

RAGHAV ACADEMY

CMA INTER GR-2

**OPERATIONS
MANAGEMENT
STRATEGIC
MANAGEMENT**

All Past Papers
and Mock Test
papers of CMA
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BY

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STUDY NOTE - 1

OPERATIONS MANAGEMENT – INTRODUCTION

OPERATIONS MANAGEMENT – INTRODUCTION	<ul style="list-style-type: none"> ✓ Operations management is the management of that part of an organization that is responsible for producing goods and/or services. ✓ An Operating System is defined as a configuration of resources combined for the provision of goods or services. ✓ Retail organizations, hospitals, bus and taxi services, tailors, hotels and dentists are all examples of operating systems. ✓ Any operating system converts inputs, using physical resources, to create outputs, the function of which is to satisfy customer's wants. ✓ It is important to note that goods and services often occur jointly. For example, having the oil changed in your car is a service, but the oil that is delivered is a good. similarly, house painting is a service, but the paint is a good. the goods-service combination is a continuum. ✓ It can range from primarily goods, with little service, to primarily service, with few goods. Because there are relatively few pure goods or pure services, companies usually sell product packages, which are a combination of goods and services.
OBJECTIVES OF OPERATIONS MANAGEMENT	<ul style="list-style-type: none"> ✓ Objectives of operations management can be categorised into <ul style="list-style-type: none"> (i) Customer service and (ii) Resource utilisation. ✓ (i) Customer service The first objective is the customer service for the satisfaction of customer wants. Customer service is therefore a key objective of operations management. The Operations Management must provide something to a specification which can satisfy the customer in terms cost and timing. ✓ (ii) Resource utilization Another major objective is to utilize resources for the satisfaction of customer wants effectively, i.e., customer service must be provided with the achievement of effective operations through efficient use of resources. Inefficient use of resources or inadequate customer service leads to commercial failure of an operating system. ✓ Often both cannot be maximized, and hence a satisfactory performance must be achieved on both objectives.
SCOPE OF OPERATION	<ul style="list-style-type: none"> ✓ Operations management concern with the conversion of inputs into outputs, using physical resources, so as to provide the desired utilities to the customer

MANAGEMENT	<p>while meeting the other organizational objectives of effectiveness, efficiency and adoptability.</p> <ul style="list-style-type: none"> ✓ Following are the activities, which are listed under production and operations management functions: <ol style="list-style-type: none"> 1. Location of facilities. 2. Plant layouts and material Handling. 3. Product Design. 4. Process Design. 5. Production and planning control. 6. Quality control. 7. Materials management. 8. Maintenance management.
PRODUCTION MANAGEMENT VS OPERATIONS MANAGEMENT	<ul style="list-style-type: none"> ✓ There are two points of distinction between production management and operations management. ✓ First, the term production management is more used for a system where tangible goods are produced. ✓ Whereas, operations management is more frequently used where various inputs are transformed into intangible services. ✓ Viewed from this perspective, operations management will cover such service organisations as banks, airlines, utilities, pollution control agencies, super bazaars, educational institutions, libraries, consultancy firms and police departments, in addition, of course, to manufacturing enterprises. ✓ The second distinction relates to the evolution of the subject. Operations management is the term that is used nowadays. Production management precedes operations management in the historical growth of the subject.
CHARACTERISTIC OF MODERN OPERATIONS FUNCTION	<ul style="list-style-type: none"> ✓ Specifically, today's production system is characterised by at least four features. <ol style="list-style-type: none"> 1. Manufacturing as Competitive advantage. 2. Services Orientation is gaining greater relevance. 3. Disappearance of Smokestacks 4. Small has become beautiful, it was E.F. Schumacher who, in his famous book <i>Small is Beautiful</i>, opposed giant organisations and increased specialisation.
RECENT TRENDS IN PRODUCTION/ OPERATIONS MANAGEMENT	<ul style="list-style-type: none"> ✓ 1. Global Market Place : Globalisation of business has compelled many manufacturing firms to have operations in many countries where they have certain economic advantage. This has resulted in a steep increase in the level of competition among manufacturing firms throughout the world. ✓ 2. Production/Operations Strategy : More and more firms are recognising the importance of production/ operations strategy for the overall success of their business and the necessity for relating it to their overall business strategy. ✓ 3. Total Quality Management (TQM) : TQM approach has been adopted by many firms to achieve customer satisfaction by a never-ending quest for improving the quality of goods and services.

- ✓ **4. Flexibility:** the ability to adapt quickly to changes in volume of demand, in the product mix demanded, and in product design or in delivery schedules, has become a major competitive strategy and a competitive advantage to the firms. This is sometimes called as agile manufacturing.
- ✓ **5. Time Reduction:** reduction of manufacturing cycle time and speed to market for a new product provide competitive edge to a firm over other firms. When companies can provide products at the same price and quality, quicker delivery (short lead times) provide one firm competitive edge over the other.
- ✓ **6. Technology:** advances in technology have led to a vast array of new products, new processes and new materials and components. automation, computerisation, information and communication technologies have revolutionised the way companies operate.
- ✓ **7. Worker Involvement:** the recent trend is to assign responsibility for decision making and problem solving to the lower levels in the organisation. this is known as employee involvement and empowerment.
- ✓ **8. Re-engineering:** this involves drastic measures or break-through improvements to improve the performance of a firm. It involves the concept of clean-slate approach or starting from scratch in redesigning the business processes.
- ✓ **9. Environmental Issues :** today's production managers are concerned more and more with pollution control and waste disposal which are key issues in protection of environment and social responsibility.
- ✓ **10. Corporate downsizing (or Right Sizing):** Downsizing or right sizing has been forced on firms to shed their obesity. This has become necessary due to competition, lowering productivity, need for improved profit and for higher dividend payment to shareholders.
- ✓ **11. Supply-Chain Management:** Management of supply-chain, from suppliers to final customers reduces the cost of transportation, warehousing and distribution throughout the supply chain.
- ✓ **12. Lean Production:** production systems have become lean production systems which use minimal amounts of resources to produce a high volume of high quality goods with some variety. These systems use flexible manufacturing systems and multi-skilled workforce to have advantages of both mass production and job production (or craft production).

STUDY NOTE - 2

OPERATIONS PLANNING

Forecasting	<ul style="list-style-type: none"> ➤ Forecasting means peeping into the future. ➤ This systematic method of probing the future is called forecasting. ➤ 'Short range forecasting period may be one week, two weeks or a couple of months. ➤ Medium range forecasting period may vary from 3 to 6 months. ➤ Long range forecasting period may vary from one year to any period.
Steps in forecasting	<ul style="list-style-type: none"> ➤ Whatever may be the method used for forecasting, the following steps are followed in forecasting. <ul style="list-style-type: none"> (a) Determine the objective of forecast: What for you are making forecast? is it for predicting the demand? is it to know the consumer's preferences? is it to study the trend? You have to spell out clearly the use of forecast. (b) Select the period over which the forecast will be made? Is it long-term forecast or medium-term forecast or short-term forecast? What are your information needs over that period? (c) Select the method you want to use for making the forecast. This method depends on the period selected for the forecast and the information or data available on hand. It also depends on what you expect from the information you get from the forecast. Select appropriate method for making forecast. (d) Gather information to be used in the forecast. The data you use for making forecasting to produce the result, which is of great use to you. the data may be collected by: <ul style="list-style-type: none"> (i) Primary source: This data we will get from the records of the firm itself. (ii) Secondary source: this is available from outside means, such as published data, magazines, educational institutions etc. (e) Make the forecast: Using the data collected in the selected method of forecasting, the forecast is made.
Methods or techniques of sales forecasting	<ul style="list-style-type: none"> ➤ The most common methods of sales forecasting are: <ol style="list-style-type: none"> 1. Survey of buyer's intentions or the user's expectation method: Under this system of sales forecasting actual users of the product of the concern are contacted directly and they are asked about their intention to buy the company's products in an expected given future usually a year. Total sales forecasts of the product then estimated on the basis of advice and willingness of various customers. This is most direct method of sales forecasting.

- 2. Collective opinion or sales force composite method:** Under this method, views of salesmen, branch manager, area manager and sales manager are secured for the different segments of the market. Salesmen, being close to actual users are required to estimate expected sales in their respective territories and sections. The estimates of individual salesmen are then consolidated to find out the total estimated sales for the coming session. These estimates are then further examined by the successive executive levels in the light of various factors like proposed changes in product design, advertising and selling prices, competition etc. before they are finally emerged for forecasting.
- 3. Group executive judgement or executive judgement method:** this is a process of combining, averaging or evaluating, in some other way, the opinions and views of top executives. Opinions are sought from the executives of different fields i.e., marketing; finance; production etc. and forecasts are made.
- 4. Experts' opinions:** Under this method, the organisation collects opinions from specialists in the field outside the organisation. Opinions of experts given in the newspapers and journals for the trade, wholesalers and distributors for company's products, agencies or professional experts are taken. By analysing these opinions and views of experts, deductions are made for the company's sales, and sales forecasts are done.
- 5. Market test method:** Under this method seller sells his product in a part of the market for sometimes and makes the assessment of sales for the full market on the bases of results of test sales. This method is quite appropriate when the product is quite new in the market or good estimators are not available or where buyers do not prepare their purchase plan.
- 6. Trend projection method:** Under this method, a trend of company's or industry's sales is fixed with the help of historical data relating to sales which are collected, observed or recorded at successive intervals of time. such data is generally referred to as time series. The change in values of sales is found out.
- 7. Moving average method:** this is another statistical method to calculate the trend through moving averages. As far as possible, the period for moving averages should be in odd numbers such as period of 3, 5 or 7 years. The period in even numbers will create a problem in centralising the values of averages.

Criteria of a good forecasting method

- (i) **Accuracy:** Accuracy of the forecasting figures is the life blood of the business because many important plans and programmes, policies and strategies are prepared and followed on the basis of such estimates.
- (ii) **Simplicity:** The method for forecasting should be very simple. If the method is difficult or technical, then there is every possibility of mistake.
- (iii) **Economy:** the method to be used should be economical taking into account the importance of the accuracy of forecast.
- (iv) **Availability:** the method should be such for which the relevant information may be available immediately with reasonable accuracy. Moreover, the technique must give quick results and useful information to the management.
- (v) **Stability:** the data of forecasting should be such wherein the future changes

	<p>are expected to be minimum and are reliable for future planning for sometime.</p> <p>(vi) Utility: the forecasting technique must be easily understandable and suitable to the management.</p>
Capacity Planning:	<p>➤ Capacity planning is concerned with finding answers to the basic questions regarding capacity such as:</p> <p>(i) What kind of capacity is needed? (ii) How much capacity is needed? (iii) When this capacity is needed?</p>
Factors of effective capacity	<p>➤ Effective Capacity can be determined by the following factors:</p> <p>Facilities - design, location, layout and environment. Product - product design and product-mix. Process - Quantity and quality capabilities. Human factors - Job content, Job design, motivation, compensation, training and experience of labour, learning rates and absenteeism and labour turn over. Operational factors - scheduling, materials management, quality assurance, maintenance policies, and equipment break-downs. External factors - product standards, safety regulations, union attitudes, pollution control standards.</p>
Forms of capacity planning	<p>Based on time-horizon</p> <p>(i) Long-term capacity planning and (ii) short-term capacity planning</p> <p>Based on amount of resources employed</p> <p>(i) Finite capacity planning and (ii) Infinite capacity planning</p>
Factors Affecting Capacity Planning	<p>(i) Controllable Factors: amount of labour employed, facilities installed, machines, tooling, shifts of work per day, days worked per week, overtime work, subcontracting, preventive maintenance and number of production set ups.</p> <p>(ii) Less Controllable Factors: absenteeism, labour performance, machine breakdowns, material shortages, scrap and rework, strike, lock-out, fire accidents etc.</p>
Capacity Requirement Planning	<p>➤ Capacity requirement planning (CRP) is a technique which determines what equipment and labour/personnel capacities are required to meet the production objectives (i.e., volume of products) as per the master production schedule and material requirement planning (MRP-I).</p>
Factors favouring over capacity and under capacity:	
The over capacity is preferred when:	<p>➤ (a) Fixed cost of the capacity is not very high. ➤ (b) Subcontracting is not possible because of secrecy of design and/or quality requirement.</p>

	<ul style="list-style-type: none"> ➤ (c) The time required to add capacity is long. ➤ (d) The company cannot afford to miss the delivery, and cannot afford to lose the customer. ➤ (e) there is an economic capacity size below which it is not economical to operate the plant
The under capacity is preferred when:	<ul style="list-style-type: none"> ➤ (a) shortage of products does not affect the company (i.e., lost sales can be compensated). ➤ (b) the technology changes fast, i.e., the rate of obsolescence of plant and equipment are high. ➤ (c) the cost of creating the capacity is prohibitively high.
FACILITY LAYOUT	<ul style="list-style-type: none"> ➤ The questions to be addressed in layout planning are: <ul style="list-style-type: none"> • How much space and capacity does each centre need? • How should each center's space be configured? • What centres should the layout include? • Where should each centre be located? the location of a centre has two dimensions: <ul style="list-style-type: none"> • Absolute location or the particular space that the centre occupies within the facility. • Relative location i.e., the placement of a centre relative to other centers.
Good Plant layout-Objectives:	<ul style="list-style-type: none"> ➤ • Efficient utilisation of labour reduced idle time of labour and equipments, ➤ • Higher flexibility (to change the layout easily), ➤ • Higher utilisation of space, equipment and people (employees), ➤ • Improved employee morale and safe working conditions, ➤ • Improved flow of materials, information and people (employees), ➤ • Improved production capacity, ➤ • Reduced congestion or reduced bottleneck centers, ➤ • Reduced health hazards and accidents, ➤ • To allow ease of maintenance, ➤ • To facilitate better coordination and face-to-face communication where needed, ➤ • To improve productivity, ➤ • To provide ease of supervision, ➤ • To provide product flexibility and volume flexibility, ➤ • To utilise available space efficiently and effectively.
Plant Layout-Principles:	<ul style="list-style-type: none"> ➤ The layout selected in conformity with layout principles should be an ideal one. these principles are: <ul style="list-style-type: none"> • Principle of Minimum Travel: men and materials should travel the shortest distance between operations so as to avoid waste of labour and time and minimise the cost of materials handling. • Principle of Sequence: machinery and operations should be arranged in a sequential order. this principle is best achieved in product layout, and efforts should be made to have it adopted in the process layout.

	<ul style="list-style-type: none"> • Principle of Usage: every unit of available space should be effectively utilised. this principle should • Principle of Compactness: There should be a harmonious fusion of all the relevant factors so that the final layout looks well integrated and compact. • Principle of Safety and Satisfaction: the layout should contain built in provisions for safety for the workmen. it should also be planned on the basis of the comfort and convenience of the workmen so that they feel satisfied. • Principle of Flexibility: The layout should permit revisions with the least difficulty and at minimum cost. • Principle of Minimum Investment: The layout should result in savings in fixed capital investment, not by avoiding installation of the necessary facilities but by an intensive, use of available facilities.
Types of Layout:	<ul style="list-style-type: none"> ➤ A layout essentially refers to the arranging and grouping of machines which are meant to produce goods. grouping is done on different lines. the choice of a particular line depends on several factors. the methods of grouping or the types of layout are: <ul style="list-style-type: none"> (i) Process layout or functional layout or job shop layout; (ii) Product layout or line processing layout or flow-line layout; (iii) Fixed position layout or static layout; (iv) cellular manufacturing (cm) layout or group technology layout and (v) combination layout or Hybrid layout.
Aggregate Planning	<ul style="list-style-type: none"> ➤ Aggregate planning is an intermediate term planning decision. ➤ It is the process of planning the quantity and timing of output over the intermediate time horizon (3 months to one year). ➤ Within this range, the physical facilities are assumed to be fixed for the planning period. Therefore, fluctuations in demand must be met by varying labour and inventory schedule. ➤ Aggregate planning seeks the best combination to minimise costs. production planning in the intermediate range of time is termed as ‘aggregate planning’. ➤ It is thus called because the demand on facilities and available capacities is specified in aggregate quantities.
Aggregate Planning Strategies	<ul style="list-style-type: none"> ➤ Vary the size of the workforce: output is controlled by hiring or laying off workers in proportion to changes in demand.

	<ul style="list-style-type: none"> ➤ Vary the hours worked: maintain the stable workforce, but permit idle time when there is a ‘slack’ and permit overtime (ot) when demand is ‘peak’. ➤ Vary inventory levels: Demand fluctuations can be met by large amount of inventory. ➤ Subcontract: Upward shift in demand from low level. constant production rates can be met by using
MATERIAL REQUIREMENTS PLANNING	<ul style="list-style-type: none"> ➤ Material requirement planning (MRP) refers to the basic calculations used to determine component requirements from end item requirements. It also refers to a broader information system that uses the dependence relationship to plan and control manufacturing operations.
Evolution of MRP II	<ul style="list-style-type: none"> ➤ MRP simply exploded the MPS into the required materials and was conceived as an inventory control tool or a requirements calculator. ➤ Later the logic of MRP technique was extended to serve as the key component in an information system for planning and controlling production operation and purchasing. ➤ It was helpful to production and operations managers to determine the relative priorities of shop orders and purchase orders.
ERP	<ul style="list-style-type: none"> ➤ ERP is a software package developed for optimum use of resources of an enterprise in a planned manner. ➤ ERP integrates the entire enterprise starting from the supplier to the customer, covering logistics, financial and human resources. ➤ This will enable the enterprise to increase productivity by reducing costs. ERP is a package for cost saving. ➤ Once the ERP is implemented, a single solution addresses the information needs of the whole organisation.

STUDY NOTE - 3

DESIGNING OF OPERATIONAL SYSTEM AND CONTROL

Importance of Product Design	<p>➤ Production or operations strategy is directly influenced by product design for the following reasons:</p> <ul style="list-style-type: none"> (i) As products are designed, all the detailed characteristics of each product are established. (ii) Each product characteristic directly affects how the product can be made or produced (i.e., process technology and process design) and (iii) How the product is made determines the design of the production system (production design) which is the heart of production and operations strategy.
What Does Product Design Do?	<p>➤ The activities and responsibilities of product design include the following:</p> <ul style="list-style-type: none"> (i) Translating customer needs and wants into product and service requirements (marketing). (ii) Refining existing products (marketing). (iii) Developing new products (marketing, product design and production). (iv) Formulating quality goals (quality assurance, production). (v) Formulating cost targets (accounting). (vi) Constructing and testing prototype (marketing, production). (vii) Documenting specifications (product design).
Objectives of Product Design	<ul style="list-style-type: none"> (i) The overall objective is profit generation in the long run. (ii) To achieve the desired product quality. (iii) To reduce the development time and cost to the minimum. (iv) To reduce the cost of the product. (v) To ensure producibility or manufacturability (design for manufacturing and assembly).
Factors Influencing Product Design	<ul style="list-style-type: none"> (i) Customer requirements: The designers must find out the exact requirements of the customers to ensure that the products suit the convenience of customers for use. (ii) Convenience of the operator or user: The industrial products such as machines and tools should be so designed that they are convenient and comfortable to operate or use. (iii) Trade off between function and form: The design should combine both performance and aesthetics or appearance with a proper balance between the two. (iv) Types of materials used: Discovery of new and better materials can improve the product design. (v) Work methods and equipments: Designers must keep abreast of improvements in work methods, processes and equipments and design the products to make use of the latest technology and manufacturing processes to achieve reduction in costs.

	<p>(vi) Cost/Price ratio: In a competitive market, there is lot of pressure on designers to design products which are cost effective because cost and quality are inbuilt in the design. With a constraint on the upper limit on cost of producing products, the designer must ensure cost effective designs.</p> <p>(vii) Product quality: The product quality partly depends on quality of design and partly on quality of conformance. The quality policy of the firm provides the necessary guidelines for the designers regarding the extent to which quality should be built in the design stage itself by deciding the appropriate design specifications and tolerances.</p> <p>(viii) Process capability: The product design should take into consideration the quality of conformance, i.e., the degree to which quality of design is achieved in manufacturing. This depends on the process capability of the machines and equipments.</p> <p>(ix) effect on existing products: New product designs while replacing existing product designs, must take into consideration the use of standard parts and components, existing manufacturing and distribution strategies and blending of new manufacturing technology with the existing one so that the costs of implementing the changes are kept to, the minimum.</p> <p>(x) Packaging: Packaging is an essential part of a product and packaging design and product design go hand in hand with equal importance. Packaging design must take into account the objectives of packaging such as protection and promotion of the product.</p>
Characteristics of good Product Design	<p>A good product design must ensure the following:</p> <p>(i) function or performance: The function or performance is what the customer expects the product to do to solve his/her problem or offer certain benefits leading to satisfaction.</p> <p>(ii) appearance or aesthetics: This includes the style, colour, look, feel, etc. which appeals to the human sense and adds value to the product.</p> <p>(iii) reliability: This refers to the length of time a product can be used before it fails. In other words, reliability is the probability that a product will function for a specific time period without failure.</p> <p>(iv) maintainability: Refers to the restoration of a product once it has failed. High degree of maintainability is desired so that the product can be restored (repaired) to be used within a short time after it breaks down. This is also known as serviceability.</p> <p>(v) availability: This refers to the continuity of service to the customer. A product is available for use when it is in an operational state. Availability is a combination of reliability and maintainability. High reliability and maintainability ensures high availability.</p> <p>(vi) Productibility: This refers to the ease of manufacture with minimum cost (economic production). This is ensured in product design by proper specification of tolerances, use of materials that can be easily processed and also use of economical processes and equipments to produce the product quickly and at a cheaper cost.</p>

	<p>(vii) Simplification: This refers to the elimination of the complex features so that the intended function is performed with reduced costs, higher quality or more customer satisfaction. A simplified design has fewer parts which can be manufactured and assembled with less time and cost.</p> <p>(viii) Standardisation: Refers to the design activity that reduces variety among a group of products or parts.</p> <p>(ix) Specification: A specification is a detailed description of a material, part or product, including physical measures such as dimensions, volume, weight, surface finish etc.</p> <p>(x) Safety: The product must be safe to the user and should not cause any accident while using or should not cause any health hazard to the user. Safety in storage, handling and usage must be ensured by the designer and a proper package has to be provided to avoid damage during transportation and storage of the product.</p>
PROCESS DESIGN & SELECTION	<ul style="list-style-type: none"> ➤ Process Design is concerned with the overall sequences of operations required to achieve the product specifications. ➤ It specifies the type of work stations to be used, the machines and equipments necessary to carry out the operations.
Process Planning	<ul style="list-style-type: none"> ➤ Process planning refers to the way production of goods or services is organised. It is the basis for decisions regarding capacity planning, facilities (or plant) layout, equipments and design of work systems. ➤ Process selection is necessary when a firm takes up production of new products or services to be offered to the customers. Three primary questions to be addressed before deciding on process selection are: <ul style="list-style-type: none"> ➤ (i) How much variety of products or services will the system need to handle? ➤ (ii) What degree of equipment flexibility will be needed? ➤ (iii) What is the expected volume of output?
Process Strategy	<ul style="list-style-type: none"> ➤ Key aspects in process strategy include: ➤ (i) Make or buy decisions (ii) capital intensity and (iii) Process flexibility ➤ Make or buy decisions refer to the extent to which a firm will produce goods or provide services in-house or go for outsourcing (buying or subcontracting). ➤ Capital intensity refers to the mix of equipment and labour which will be used by the firm. ➤ Process flexibility refers to the degree to which the system can be adjusted to changes in processing requirements due to such factors as changes in product or service design, changes in volume of products produced and changes in technology.

Three process strategies:	<ul style="list-style-type: none"> ➤ Virtually every good or service is made by using some variation of one of three process strategies. <p>They are:</p> <ul style="list-style-type: none"> (i) process focus (ii) repetitive focus and (iii) product focus. <p>(i) Process focus:</p> <ul style="list-style-type: none"> ➤ Majority (about 75 per cent) of global production is devoted to low volume, high variety products in manufacturing facilities called job shops. Such facilities are organised around performing processes. <p>(ii) repetitive focus:</p> <ul style="list-style-type: none"> ➤ A repetitive process is a product oriented production process that uses modules. It falls between product focus and process focus. It uses modules which are parts or components prepared often in a continuous or mass production process. <p>(iii) Product focus:</p> <ul style="list-style-type: none"> ➤ It is a facility organised around products, a product oriented, high-volume low-variety process. It is also referred to as continuous process because it has very long continuous production run.
PROCESS SELECTION	<ul style="list-style-type: none"> ➤ Process choice determines whether resources are organised around products or processes in order to implement the flow strategy. ➤ It depends on the volumes and degree of customisation to be provided.
Process Choice	<ul style="list-style-type: none"> ➤ The production manager has to choose from five basic process types — <ul style="list-style-type: none"> (i) job shop, (ii) batch, (iii) repetitive or assembly line, (iv) continuous and (v) project. <p>(i) Job shop process: It is used in job shops when a low volume of high-variety goods are needed. Processing is intermittent, each job requires somewhat different processing requirements. A job shop is characterised by high customisation (made to order), high flexibility of equipment and skilled labour and low volume.</p> <p>(ii) Batch process: Batch processing is used when a moderate volume of goods or services is required and also a moderate variety in products or services. A batch process differs from the job process with respect to volume and variety.</p> <p>(iii) repetitive process: This is used when higher volumes of more standardised goods or services are needed. This type of process is characterised by slight flexibility of equipment (as products are standardised) and generally low labour skills. Products produced include automobiles, home appliances, television sets, computers, toys etc.</p> <p>(iv) Continuous process: This is used when a very highly standardised product</p>

is desired in high volumes. These systems have almost no variety in output and hence there is no need for equipment flexibility.

(v) Project process: It is characterised by high degree of job customisation, the large scope for each project and need for substantial resources to complete the project.

STUDY NOTE - 4

PRODUCTION PLANNING AND CONTROL

OBJECTIVES OF PRODUCTION PLANNING AND CONTROL	<ul style="list-style-type: none"> ➤ The ultimate objective of production planning and control is to contribute to the profits of the enterprise. This is accomplished by keeping the customers satisfied through the meeting of delivery schedules. ➤ Further, the specific objectives of production planning and control are to establish the routes and schedules for work that will ensure the optimum utilisation of raw materials, labourers, and machines to provide the means for ensuring the operation of the plant in accordance with these plans. ➤ Production planning and control is essentially concerned with the control of work-in-process. To control work-in-process effectively it becomes necessary to control not only the flow of material but also the utilisation of people and machines. ➤ Production planning and control fulfils these objectives by focusing on the following points: <ul style="list-style-type: none"> (i) Analysing the orders to determine the raw materials and parts that will be required for their completion, (ii) Answering questions from customers and salesmen concerning the status of their orders, (iii) assisting the costing department in making cost estimates of orders, (iv) assisting the human resource departments in the manpower planning and assignment of men to particular jobs, (v) Controlling the stock of finished parts and products, (vi) Determining the necessary tools required for manufacturing, (vii) Direction and control of the movement of materials through production process, (viii) Initiating changes in orders as requested by customers while orders are in process, (ix) Issuing requisitions for the purchase of necessary materials, (x) Issuing requisitions for the purchase or manufacture of necessary tools and parts, (xi) Keeping the up-to-date records scheduled and in process, (xii) maintaining stocks of materials and parts, (xiii) notifying sales and accounting of the acceptance of orders in terms of production feasibility, (xiv) Preparing the route sheets and schedules showing the sequence of operation required to produce particular products, (xv) production of work orders to initiate production activities, (xvi) receiving and evaluating reports of progress on particular orders and initiating corrective action, if necessary, (xvii) receiving orders from customers, (xviii) revising plans when production activities cannot conform to original plans and when revisions in scheduled production are necessary because of rush orders.
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PRODUCTION CONTROL INVOLVES THE FOLLOWING FUNCTIONS:	<p>(i) planning the production operations in detail,</p> <p>(ii) routing, i.e., laying down the path for the work to follow and the order in which the various operations will be carried out,</p> <p>(iii) Scheduling, i.e., establishing the quantity of work to be done, and fixing the time table for performing the operations,</p> <p>(iv) Dispatching, i.e., issuing the necessary orders, and taking necessary steps to ensure that the time targets set in the schedules are effectively achieved,</p> <p>(v) Follow-up, taking necessary steps to check up whether work proceeds according to predetermined plans and how far there are variances from the standards set earlier,</p> <p>(vi) inspection, i.e., conducting occasional check-ups of the products manufactured or assembled to ensure high quality of the production.</p>
BASIC TYPES OF PRODUCTION CONTROL:	<p>Production control can be of six types:</p> <p>(i) Block control this type of control is most prominent in textiles and book and magazine printing.</p> <p>(ii) Flow control this type of control is commonly applied in industries like chemicals, petroleum, glass, and some areas of food manufacturing and processing.</p> <p>(iii) Load control Load control is typically found wherever a particular bottleneck machine exists in the process of manufacturing.</p> <p>(iv) Order control the most, common type of production control is called order control. this type of control is commonly employed in companies with intermittent production systems, the so-called job-lot shops.</p> <p>(v) Special project control Special production control is necessary in certain projects like the construction of bridges, office buildings, schools, colleges, universities, hospitals and any other construction industries.</p> <p>(vi) Batch control Batch control is another important, type of production control which is frequently found in the food processing industries.</p>
PRODUCTION PLANNING AND CONTROL IN CONTINUOUS-PRODUCTION SYSTEMS	<p>Production systems may be continuous or intermittent. The continuous production systems are characterised by:</p> <p>(i) Fixed-path material handling equipment,</p> <p>(ii) High volume of production,</p> <p>(iii) product layouts,</p> <p>(iv) production of standardised products,</p> <p>(v) production to stock or long-range orders,</p> <p>(vi) the use of special-purpose machines or automation.</p>
PRODUCTION PLANNING IN INTERMITTENT PRODUCTION SYSTEMS:	<p>The intermittent production systems are characterized by the following:</p> <p>(i) general purpose production machines are normally utilised and process layout is favoured.</p> <p>(ii) Materials handling equipment is typically of the varied path type such as hand trucks and forklift trucks.</p> <p>(iii) Relatively high cost, skilled labour is needed to turn out the various quantities and types of products.</p> <p>(iv) The company generally manufactures a wide variety of products; for the majority of items, sales volumes and consequently production order sizes are small in relation to the total production.</p>

TIME STUDY:	Time study aims at determining the best manner of doing a job and timing the performance of the job when done in the best manner.
WORK STUDY:	Work study aims at finding the best and most efficient way of using the available resources—men, materials, money and machinery.
METHOD STUDY:	It is the systematic investigation of the existing method of doing a job in order to develop and install an easy, rapid, efficient, effective and less fatiguing procedure for doing the same job and at minimum cost. This is achieved by eliminating unnecessary motions involved in a certain operation or by changing the sequence of operation or the process itself.
JOB EVALUATION:	Job evaluation is the ranking grading, and weighing of essential work characteristics of all jobs in order to find out or rate the worth of jobs. It is a systematic approach to ascertain the labour worth of each job and is a very important concern of all employers.
JOB DESCRIPTION AND SPECIFICATIONS	The understanding of the job content or job description is the primary requirement. Job specifications are derived from the job descriptions which have already been approved. The specification help determining the qualification required of the individual desired for the position. This in turn guides the personnel department in the selection of employees and also guides shop executives in the placement of workmen.
SYSTEMS OF VALUATION	<p>There are several systems of job evaluation. The fundamental criteria in valuation of a job into account are to make a specific list of factors which affect job values.</p> <p>The many factors are:</p> <ul style="list-style-type: none"> (i) Qualifications required of the worker, (ii) Job difficulties, (iii) Job responsibilities, (iv) Working conditions. <p>All these factors are to be analysed in detail in order to complete the job description.</p> <p>The systems of valuations which are commonly adopted are given below:</p> <ol style="list-style-type: none"> 1. the ranking or grading method, 2. the factor comparison method, 3. point rating method.
RANKING OR GRADING METHOD	Under this system the titles of all jobs are written on cards and the grading is done by several competent judges.
FACTOR COMPARISON METHOD	The factor comparison method analyses the job into much greater detail than the grading method. It ranks each job with respect to each factor that characterise the job and the factors are taken one at a time.
POINT RATING METHOD	<p>There are three methods of analytical evaluation of a job.</p> <p>They are:</p> <p>(i) Straight Point Method: This method assigns equal weights for each characteristic. When evaluating a job under this system, it is assumed that all the</p>

	<p>characteristics have ranges of values between same maximum and minimum points.</p> <p>(ii) Weighted Point Method: in this method different points are assigned to the different characteristics of doing jobs.</p> <p>(iii) Direct to Money Methods: after selecting the job characteristics, ten key jobs whose rates are believed to be correct, are taken and the present wage rates of these jobs are distributed to the job characteristics by each analyst. the jobs are then ranked by the analysts for each characteristic in order of the degree to which that characteristic is present. this serves as a check to show up any errors made in the original distribution of the wages rate to the various characteristics.</p>
LEAN OPERATIONS	<p>Lean operation has its roots in the Toyota Automobile Co., of Japan, where waste was to be avoided at all costs:</p> <p>(i) the waste in time caused by having to repair faulty products (ii) the waste of investment in keeping high inventories and (iii) the waste of having idle workers.</p> <p>The elements of lean production are:</p> <p>(i) to consider the organisation in terms of supply chain of value streams that extends from suppliers of raw materials, through transformation to the final customer.</p> <p>(ii) to organise workers in teams and to have every one in the organisation conscious of his or her work.</p> <p>(iii) To produce products of perfect quality and to have continuous quality improvement as a goal.</p> <p>(iv) to organise the operation by product or cellular manufacturing, rather than using a functional or process layout.</p> <p>(v) to operate the facility in a just-in-time mode.</p>
JUST-IN-TIME (JIT)	<p>The specific goal of JIT manufacturing is to provide /the right quality level at the right place. customer demand always determines what is right. JIT tries to build only what internal and external customers want and when they want it.</p> <p>The more focussed objectives of JIT are:</p> <p>(i) produce only the products (goods or services) that customers want. (ii) Produce products only as quickly as customers want to use them. (iii) Produce products with perfect quality. (iv) produce in the minimum possible lead times. (v) produce products with features that customers want and no others. (vi) Produce with no waste of labour, materials or equipment, designate a purpose for every movement to leave zero idle inventory. (vii) produce with methods that reinforce the occupational development of workers.</p>
OVERVIEW OF JIT MANUFACTURING	<p>JIT manufacturing includes many activities :</p>

- (i) Inventory reduction :** Jit is a system for reducing inventory levels at all stages of production viz. raw materials, work-in-progress and finished goods.
- (ii) Quality improvement :** JIT provides a procedure for improving quality both within the firm and outside the firm.
- (iii) Lead time reduction :** With JIT, lead time components such as set-up and move times are significantly reduced.
- (iv) Vendor control/Performance improvement :** Jit gives the buying organisation greater power in buyer-supplier relationship. The firm moves from a situation where multiple suppliers are used to a situation where only one or two suppliers are used for supplying most parts. With fewer suppliers, the buying organisation has more power because it is making larger purchases from each vendor. also, the buying organisation can now impose higher requirements on each supplier in terms of delivery and quality.
- (v) Continuous Improvement:** In the JIT system, existing problems are corrected and new problems identified in a never-ending approach to operations management.
- (vi) Total Preventive Maintenance:** JIT emphasises preventive maintenance to reduce the risk of equipment break-downs which may cause production hold ups and increase in manufacturing cycle time due to delays.
- (vii) Strategic gain:** JIT provides the firm's management with a means of developing, implementing and maintaining a sustainable competitive advantage in the market place.

STUDY NOTE - 5

PRODUCTIVITY MANAGEMENT AND QUALITY MANAGEMENT

MEASUREMENT TECHNIQUES OF PRODUCTIVITY INDEX	<ul style="list-style-type: none"> ➤ A productivity index is a device of expressing the ratio between outputs and the inputs of the resources numerically.
Importance of the concept of productivity	<ul style="list-style-type: none"> ➤ The importance of the concept of productivity can be viewed from the following points: <ul style="list-style-type: none"> 1. To beat the competition: The firm whose productivity is higher can only beat the competition and can exist in the market for long. 2. Guide to Management: These indices can serve as a valuable guide to the management for improving the performance of its enterprise. 3. An Indicator of Progress: It implies the development of an attitude of mind and a constant urge to better, cheaper, quicker and safer ways of doing a job, manufacturing a product and providing a service. 4. Maximum utilisation of Scarce resources: In order to provide the articles or commodities to the consumers at the lowest possible cost, the productivity urges to utilise the available resources to the maximum to the satisfaction of customers. 5. Key to National Prosperity: The productivity, in fact, has become synonymous to progress. The working conditions and wages of workers will improve and industrialists too will get larger profits. Thus higher productivity is the key to national prosperity. The secrets of Japan and Western countries' prosperity lie in increased productivity. 6. Prosperity to labour: The higher productivity is a boon to labour also. It brings improved working conditions, better wages and salaries to workers, better labour welfare activities to labourers. Thus their standard of living is improved. 7. Other uses: <ul style="list-style-type: none"> (i) Higher productivity increases the profits and reserve funds of the industry that can be used for expansion and modernisation. (ii) It increases the goodwill of the firm due to cheaper goods to the public, well-off staff and more profits and better financial position. (iii) It improves the competitive strength of the company in export markets through reduction in cost of production and quality products.
Measurement of Productivity:	<ul style="list-style-type: none"> ➤ The productivity or the performance of various input and output factors can be measured in many ways. These measures are mainly based on the following two criteria: <ul style="list-style-type: none"> (i) change in output per unit of input: indicates the change in the performance of corresponding input during the given period, e.g., change in output per

	<p>worker or per man-hour will signify the change in performance of labour.</p> <p>(ii) change in input per unit of output: during the given period signifies the change in the performance of the corresponding input factor, e.g., change in man-hour or workers' per unit of output will also indicate the change in the performance of the labour input.</p>
<p>TOOLS OF PRODUCTIVITY</p> <p>OR</p> <p>HOW TO INCREASE PRODUCTIVITY</p>	<p>➤ The productivity of an enterprise can be improved by improving the performance of various inputs and other factors affecting productivity. For this purpose, use of following tools can be recommended.</p> <p>1. Human aspects: Under this, cooperation of workers is sought in the following ways:</p> <ul style="list-style-type: none"> (i) More workers' participation in management or in decision making through joint consultation. (ii) Improving communication services. (iii) Improving mutual trust and cooperation through improved job procedures, better training of employees, more workers incentives by implementing various incentive schemes, and labour welfare programmes. (iv) Better planning of work, more effective management, more democracy in administration, improved human relations and selection and training of personnel at various levels of management are some human efforts from the side of management in order to improve the productivity. <p>2. Supply of Inputs:</p> <ul style="list-style-type: none"> (i) Improvement in the nature and quality of raw materials and their supplies to the work. (ii) Proper provision of plant, equipment and their maintenance. (iii) Introduction of more and more machines and equipment in place of physical work. (iv) Fuller utilisation of manpower and efficiency or capacity of plant and equipment employed. <p>3. Technological aspects: Certain methodological and technological developments are also necessary to improve the productivity of the concern. These are;</p> <ul style="list-style-type: none"> (i) Work, time and motion studies to determine better ways and means of doing a job. (ii) Implementing various simplification, specialisation and standardisation programmes. (iii) Applying control techniques comprising production and planning control, cost control and quality control techniques. (iv) Improving layout of plants, shops and machine tools, and material handling and internal transportation system. (v) Improving inspection techniques so as to minimise the wastage and defective work.
<p>FACTORS AFFECTING INDUSTRIAL PRODUCTIVITY</p>	<p>➤ Productivity is defined to be some ratio between output and input. Thus all factors which affect output and inputs will also affect the measure of productivity.</p> <p>➤ The following factors affect the productivity.</p> <p>1. Technological development: Technical factors including the degree of mechanisation, technical know-how, raw materials, layout and the methods and techniques of work determine the level of technological development in any</p>

industry.

2. Individual factors: Individual factors such as knowledge, skill and attitude also affect the productivity of industry.

3. Organisation factors: Organisation factors include various steps taken by the organisation towards maintaining better industrial relations such as delegation and decentralisation of authority, participative management (workers' participation in management), organisational efficiency, proper personnel policies relating to selection, placement, promotion, wage salary levels, incentives, merit rating, job evaluation, training and provision for two-way communication, supervision, etc.

4. Work environment: The importance of proper work environment and physical conditions on the job has been emphasised by industrial psychologists and human engineers. Better work environment ensures the greatest ease at work through better ventilation and light arrangement, improved safety devices, reduction in noise, introducing suitable rest-pause etc.

5. Other factors: There are several other factors that affect productivity. These are:

(a) Natural factors: Physical, geographical and climatic conditions influence the productivity at large. Abundance of natural resources affects the productivity and similarly climate affects the efficiency of workers to a great extent.

(b) Managerial factors: The industrial productivity is influenced very much through managerial ability and leadership. The managerial ability of utilising the available resources to the maximum, organising capacity, foresightedness, decision-making ability and entrepreneurship are certain factors that contribute to productivity.

(c) Government Policy: Government policies towards industry also contribute to industrial productivity. Taxation policy, financial and administrative policy, tariff policy and protection policy affect the productivity to a large extent.

WHAT IS TOTAL QUALITY MANAGEMENT (TQM)?	➤ A philosophy that involves everyone in an organisation in a continual effort to improve quality and achieve customer satisfaction.
BASIC CONCEPTS IN TQM	1. Top management commitment and support.
	2. Focus on both internal and external customers.
	3. Employee involvement and empowerment.
	4. Continuous improvement (KAIZEN)
	5. Partnership with suppliers
	6. Establishing performance measures for processes
ESSENTIALS OF TQM FOCUS	1. Customer satisfaction
	2. Leadership

	<ol style="list-style-type: none"> 3. Quality policy 4. Organisation structure 5. Employee involvement 6. Quality costs 7. Supplier selection and development 8. Recognition and reward.
UNDERLYING PRINCIPLES IN TQM	<ol style="list-style-type: none"> 1. Strive for quality in all things (Total Quality) 2. The customer is the creation of quality 3. Improve the process or systems by which products are produced 4. Quality improvement is continuous, never ending activity (continuous improvement-Kaizen) 5. Worker involvement is essential 6. Ground decisions and actions on knowledge 7. Encourage team work and cooperation.
SCOPE OF TQM	<ol style="list-style-type: none"> 1. Are integrated organisational infrastructure 2. A set of management practices 3. A wide variety of tools and techniques.
ISO STANDARD BASICS	<ul style="list-style-type: none"> ➤ Many international businesses recognize the importance of quality certification. The EU, in 1987, established ISO [International Organisation for Standardisation] 9000 certification. ➤ Two of the most well known of these are ISO 9000 and ISO 14,000. ISO 9000 pertains to quality management.

STUDY NOTE - 6

PROJECT MANAGEMENT

PROJECT PLANNING	<ul style="list-style-type: none"> ➤ A project is a carefully defined set of activities that use resources (money, people, materials, energy, space, provisions, communication, etc.) to meet the predefined objectives. ➤ Initially, the project scope is defined and the appropriate methods for completing the project are determined. ➤ Following this step, the durations for the various tasks necessary to complete the work are listed and grouped into a work breakdown structure. ➤ The logical dependencies between tasks are defined using an activity network diagram that enables identification of the critical path. Float or slack time in the schedule can be calculated using project management software. ➤ Then the necessary resources can be estimated and costs for each activity can be allocated to each resource, giving the total project cost. ➤ At this stage, the project plan may be optimized to achieve the appropriate balance between resource usage and project duration to comply with the project objectives. ➤ Once established and agreed, the plan becomes what is known as the baseline. ➤ Progress will be measured against the baseline throughout the life of the project. Analysing progress compared to the baseline is known as earned value management.
GANTT CHART	<ul style="list-style-type: none"> ➤ Gantt Chart is a principal tool used in scheduling and also in some methods of loading. ➤ This chart was originated by the American engineer Henry L. Gantt and consists of a simple rectangular grid, divided by series of parallel horizontal and vertical lines. ➤ The vertical lines always divide the horizontal scale units of time. The time units can be in years, months, weeks, days, hours, minutes or even seconds according to the work for which it is prepared. ➤ In this chart, the time which an activity takes in completing the task is represented by the horizontal line. ➤ The length of the line is drawn in proportion to the duration of time.
NETWORK ANALYSIS	<ul style="list-style-type: none"> ➤ Routing is the first step in production planning. In small projects, routing is very simple. ➤ Sequence of operations is almost decided and the operations can be performed one after the other in a given sequence.

	<ul style="list-style-type: none"> ➤ But in large project, this is rather a difficult problem. ➤ There may be more than one route to complete a job. The function of production manager is to find out the path which takes the least time in completing the project. ➤ In a big project, many activities are performed simultaneously. There are many activities which can be started only at the completion of other activities. ➤ In such cases, a thorough study is required to collect the complete details about the project and then to find out a new, better and quicker way to get the work done in a decent way. ➤ In such cases, the first step is to draw some suitable diagram showing various activities and their positions in the project. ➤ It should also explain the time to be taken in completing the route from one operation to the other. It also defines the way in which the delay in any activity can affect the entire project in terms of both money and time. Such a diagram is called network diagram. ➤ A network is a picture of a project, a map of requirements tracing the work from a departure points to the final completion objective.
IMPORTANT CHARACTERISTICS IN A NETWORK ANALYSIS	<ul style="list-style-type: none"> ➤ The following are some important points to remember in a network analysis: <ul style="list-style-type: none"> (i) The objective is to be finished within the specified time otherwise there is a penalty. (ii) Various activities are to be completed in an order; however, a number of activities are performed simultaneously while there are many other activities, which can be started only when some other activities are completed. (iii) The cost of any activity is proportional to its time of completion. (iv) There can be hurdles in the process and the resources to be allocated may be limited. A network graph consists of a number of points or nodes, each of which is connected to one or more of the other nodes by routes or edges. It is a set of operations and activities describing the time orientation of a composite project.
PROCEDURE FOR DRAWING A NETWORK DIAGRAM	<ul style="list-style-type: none"> ➤ The procedure for drawing a network diagram may be explained below. ➤ There are three basic questions and the network depends on them. ➤ These questions are: <ul style="list-style-type: none"> • Which operation must be completed before each given operation can be started? • Which activities can be carried out in parallel? • Which operation immediately succeeds other given activities?
CRITICAL PATH METHOD (CPM)	<ul style="list-style-type: none"> ➤ A CPM is a route between two or more operations which minimises (or maximises) some measures of performance. This can also be defined as the

	<p>sequence of activities which will require greatest normal time to accomplish. It means that the sequence of activities which require longest duration are singled out.</p> <ul style="list-style-type: none"> ➤ It is called at critical path because any delay in performing the activities on this path may cause delay in the whole project. So, such critical activities should be taken up first.
PERT (PROGRAMME EVALUATION AND REVIEW TECHNIQUE)	<ul style="list-style-type: none"> ➤ PERT is a time-event network analysis technique designed to watch how the parts of a programme fit together during the passage of time and events. ➤ This technique was developed by the special project office of the U.S. Navy in 1958. It involves the application of network theory to scheduling, problems. In PERT we assume that the expected time of any operation can never be determined exactly.
MAJOR FEATURES OF PERT OR PROCEDURE OR REQUIREMENT FOR PERT	<p>The following are the main features of PERT:</p> <ul style="list-style-type: none"> (i) All individual tasks should be shown in a network. Events are shown by circles. Each circle represents an event—an event —a subsidiary plan whose completion can be measured at a given time. (ii) Each arrow represents an activity —the time - consuming elements of a programme, the effort that must be made between events. (iii) Activity time is the elapsed time required to accomplish an event.
DIFFERENCE IN PERT AND CPM	<p>Although these techniques (PERT and CPM) use the same principles and are based on network analysis yet they are in the following respects from each other:</p> <ul style="list-style-type: none"> (i) PERT is appropriate where time estimates are uncertain in the duration of activities as measured by optimistic time, most likely time, and pessimistic time, whereas CPM (Critical Path Method) is good when time estimates are found with certainty. CPM assumes that the duration of every activity is constant and therefore every activity is critical or not. (ii) PERT is concerned with events which are the beginning or ending points of operation while CPM is. (iii) PERT is suitable for non-repetitive projects while CPM is designed for repetitive projects. (iv) PERT can be analysed statistically whereas CPM not. (v) PERT is not concerned with the relationship between time and cost, whereas CPM establishes a relationship between time and cost and cost is proportionate to time.
STRENGTHS OF GANTT CHARTS	<p>Gantt charts are preferred for various reasons, which are as follows:</p> <ul style="list-style-type: none"> • Very simple to understand by everyone e.g. foreman, engineers, managers, and top management. • Provide useful information in a format that is simple to develop and interpret.

	<ul style="list-style-type: none"> • It is a good tool for planning as well as monitoring the progress of the work. It helps schedulers to evaluate the progress of a project at various levels. • Helps in loading the work center in relation to the available capacity. • It provides the user with a quick, visual indication of the actual status of each order and its anticipated or planned status. • The scheduler could easily incorporate changes in timing, machine loads, and current status. • Some common changes make Gantt charts fairly flexible to apply. • Gantt charts suit the requirements of a wide range of media from ruled paper to mechanical devices and computer systems.
LIMITATIONS	<ul style="list-style-type: none"> • It does not convey the variability of the task duration, equipment performance (including breakdowns), and human potential, any one of which could influence the accuracy of loading the work centers. • It does not clearly indicate the details regarding progress of activities. • It does not give a clear indication of the interrelationship between separate activities. • The chart is static and has to be updated periodically to account for new job arrivals and revised time estimates for existing jobs.

STUDY NOTE - 7

ECONOMICS OF MAINTENANCE AND SPARES MANAGEMENT

BREAK DOWN MAINTENANCE	<ul style="list-style-type: none"> ➤ Production facility is run without much routine maintenance until it breakdown. ➤ As the breakdowns are random in nature and the machine cannot be used during the repair period, production hours are lost hence the productivity is reduced. ➤ Repair maintenance is not a recommended practice, in general, but many a time many organizations prefer this, because they do not want to keep the machine idle for maintenance.
PREVENTIVE MAINTENANCE	<ul style="list-style-type: none"> ➤ A system of scheduled, planned or preventive maintenance tries to minimize the problems of breakdown maintenance. ➤ It locates weak parts in all equipments, provides them regular inspection and minor repairs thereby reducing the danger of unanticipated breakdowns. ➤ The underlying principle of preventive maintenance is that prevention is better than cure. ➤ It involves periodic inspection of equipment and machinery to uncover conditions that lead to production breakdown and harmful depreciation.
ADVANTAGES OF PREVENTIVE MAINTENANCE:	<ul style="list-style-type: none"> (i) Reduced breakdowns and downtime, (ii) Greater safety to workers, (iii) Fewer large scale repairs, (iv) Less standby or reserve equipment or spares, (v) Lower unit cost of the product manufactured, (vi) Better product quality, (vii) Increased equipments life and (viii) Better industrial relations.
ROUTINE MAINTENANCE	<ul style="list-style-type: none"> ➤ It includes lubrication, cleaning, periodic overhaul; etc. ➤ This is done while the equipment is running or during preplanned shut-downs. Running maintenance is the work which can be carried out while the facility is in service.
MAINTENANCE TECHNIQUES	<ul style="list-style-type: none"> ➤ In some cases the loss and inconvenience due to breakdown of equipment is so high that standby equipment is kept. ➤ As soon as the original equipment fails, the standby facility is employed to

	<p>avoid interruption and downtime.</p> <ul style="list-style-type: none"> ➤ Standby machines are often kept to reduce the loss due to the breakdown of a key machine. ➤ There are various costs involved in standby machines. <p>First, there is interest cost on capital investment.</p> <p>Secondly, space is needed to keep standby machines.</p> <p>Thirdly, there is depreciation in the value of standby machines.</p> <p>Fourthly, periodic checking and servicing is necessary to keep the standby machines in new condition.</p> <ul style="list-style-type: none"> ➤ The benefits of standby machines consist of protection against a complete shutdown or shut down of operations. ➤ It avoids loss of production and, therefore, it is necessary to estimate loss of future failures a table of expected costs and benefits can be prepared. ➤ Shifting production during breakdown is another technique. ➤ Under this method spare capacity is maintained not in the form of standby machines but by allowing rest to running machines at intervals and by rotation. ➤ If one machine in a production line requires shutdown, the output is maintained by shifting to under utilised machines in other lines.
MAINTENANCE ORGANIZATION	<ul style="list-style-type: none"> ➤ At least 50 to 60 percent of investment of any organization is spent on Building and Production facilities. ➤ The maintenance department will looks after the upkeep of equipments, buildings and other. ➤ For effective contribution of its work, the maintenance department must have proper place in the organization and it must also have a good organizational structure. ➤ While organizing a maintenance department one must remember that there should be clear division of authority with little or no overlap. ➤ Vertical lines of authority and responsibility must be kept as short as possible. ➤ Keep the span of control to an extent of 3 to 6 for a manager. ➤ The organizational structure should be flexible. ➤ The structure should be designed to suit the types of maintenance work involved. ➤ Depending on the need, the maintenance activity may be centralized or decentralized.
ORGANIZING MAINTENANCE WORK	<ul style="list-style-type: none"> ➤ In order to facilitate proper control of maintenance work; we must enforce three rules as below. <p>Maintenance Request</p> <p>This must be made in writing to a central point in the organization. No work</p>

should be carried out without the knowledge and approval of maintenance supervision - if this discipline is not followed by the organization, it leads to wastage of skilled manpower and inability of the maintenance personnel to schedule essential maintenance work.

Maintenance Stores

Non-availability of vital spare parts when required to meet an emergency like breakdown, may lead to excessive shutdown of the plant and equipment. **A large number of items or materials are required to be stored** and it involves investing valuable funds from the working capital. A proper stores management is essential as a backup service of good maintenance.

Records of Maintenance work Done

Paper work for maintenance is crucial for establishing a good maintenance organization and is often neglected. **The records of maintenance work carried out from time to time have to be kept equipment wise.** History cards or logbooks of all the plants and equipment must be compiled meticulously giving details of materials used, components replaced and time spent by the workforce.

EFFECTIVE MAINTENANCE

- To get the full benefits of effective maintenance the following requirement is to be fulfilled:
 - (i) Good Supervision and administration of maintenance department,
 - (ii) Good and clear instructions to be given to maintenance crew regarding the repair,
 - (iii) Proper control of work in coordination with production department,
 - (iv) Good training should be given to the maintenance personnel,
 - (v) Good scheduled maintenance program should be chalked out,
 - (vi) Proper maintenance record keeping is a must,
 - (vii) There should be adequate stock of spare parts, particularly insurance spares.

MAINTENANCE PROBLEM

- The main problem in maintenance analysis is to minimise the overall cost of maintenance without sacrificing the objectives.
- There are two alternatives before management.
- One is to repair a machine or equipment only when it breaks down.
- This will save expense of inspection and replacement of a part before its lifetime ends.
- The other alternative is to replace the equipment before the expiry of its working life.
- This will involve cost of periodic shutdown for check up and repairs.
- However, it will avoid the loss due to sudden failure or breakdown.
- The two types of cost - cost of premature replacement and cost of breakdown - need to be balanced.

REPLACEMENT OF MACHINE

- Wear and obsolescence are the two main causes for replacement of machinery in every aspect of life.
- In replacement decisions, the basic problem is to decide whether to replace a machine or equipment at present or at a future date.

OBJECTIVES OF MAINTENANCE	<p>(i) To keep all the production facilities and other allied facilities such as building and premises, power supply system, etc in an optimum working condition,</p> <p>(ii) To ensure specified accuracy to products and time schedule of delivery to customers,</p> <p>(iii) To keep the down time of the machine at minimum, so that the production program is not disturbed,</p> <p>(iv) To keep the production cycle within the stipulated range,</p> <p>(v) To modify the machine tools to meet the augmented need for production,</p> <p>(vi) To improve productivity of existing machine tools and to avoid sinking of additional capital,</p> <p>(vii) To keep the maintenance cost at a minimum as far as possible, thereby keeping the factory Overheads at minimum,</p> <p>(viii) To extend the useful life of plant and machinery, without sacrificing the level of performance</p>
SPARE PARTS MANAGEMENT	<ul style="list-style-type: none"> ➤ In manufacturing plants that own a huge number of equipment, supervising the spare parts correctly and in a timely manner is a difficult task. ➤ Usually, spare parts are categorized into two main groups • fast moving • slow moving parts. ➤ Fast moving spares are those that are usually required, and slow moving spares are those that are hardly ever required. ➤ The system should do the following to keep track. <ul style="list-style-type: none"> (a) keep record of the spare parts required for a particular type of maintenance; (b) keep record of the spare parts received and used in the past; (c) schedule forthcoming major maintenance services; (d) keep record of spare parts vendors; (e) forecast future demand for fast moving spare parts based on past consumptions; etc.
Types of Spares	<ul style="list-style-type: none"> • Regular spares The spare parts required regularly and in substantial number. Both reliability and per unit cost of these items are less. • insurance spares An insurance spare is a spare part that you hold in your spare parts inventory, that you would not expect to use in the normal life of the plant and equipment but if not available when needed it would result in significant losses. • capital spares Capital spares are spare parts which, although acknowledged to have a long life or a small chance of failure, would cause a long shutdown of equipment

because it would take along time to get a replacement for them.

- **Rotable spares**

Rotable items are generally thought of as items of plant or assets that periodically are changed out for repair or overall. The management of rotable items and repairable spare parts is different to the management of other inventory items and proper control requires greater cooperation between maintenance and stores/inventory management. The successful management of these items is far more active than other spare parts as maintenance and store/inventory personnel must work together to ensure that there is visibility of the status of items.

MEANING OF STRATEGY

1. Strategy is all about **integrating organizational activities** and utilizing and allocating the **scarce resources** within the organizational environment so as to meet the **present objectives**.
2. Strategy can also be defined as **knowledge of the goals, the uncertainty of events** and the need to take into consideration the likely or actual **behavior of others**.
3. Strategy is the **outline of decisions** in an organization that shows its objectives and goals, reduces the key policies, and plans for achieving these goals, and defines the business the company is to carry on, the type of economic and human organization it wants to be, and the contribution it plans to make to its shareholders, customers and society at large.
4. Strategy may be defined as the direction and scope of a organisation over the long term, which achieves advantage for the organisation through the configuration of resources within a changing environment and to fulfill stakeholder expectations.
5. The definition of strategy encompasses a comprehensive master approach that states how the corporation will achieve its mission and objectives. **It maximizes competitive advantage and minimizes competitive disadvantage.**

FEATURES OF STRATEGY

Features of Strategy:

- (i) Strategy is important to **foresight, the uncertain events** of firms/industries .
- (ii) Strategy deals with **long term developments** rather than routine operations. For example innovations or new products, new methods of productions, or new markets to be developed in future.
- (iii) Strategy is created to **deal behavior of customers and competitors**.
- (iv) Strategy is a **well defined roadmap of an organization**.

The characteristics of a strategic decision/strategy

- (i) Strategy is likely to be concerned with **long-term direction** of an organisation.
- (ii) Strategic decisions are normally about trying to **achieve some advantage** for the organisation over competition.
- (iii) Strategy is likely to be concerned with the **scope of the organisation's activities**.
- (iv) Strategy can be seen as **matching the resources and activities to the environment** in which it operates.
- (v) Strategy can be seen as **stretching** an organisation's **resources and competences to create new opportunities** or to capitalise on them.
- (vi) Strategies may require **major resource changes** for an organisation.
- (vii) Strategic decisions **likely to affect operational decisions**.
- (viii) The strategy of an organisation is affected **not only by environmental factors** and resource availability **but also by the values and expectations** of those who have power in and around the organisation.

The consequences of the characteristics of strategy

- (i) Strategic Decisions are likely to be **complex in nature**
- (ii) Likely to be made in situations of **uncertainty**
- (iii) Likely to demand an **integrated approach**
- (iv) **Manage change relationships** and networks outside the organisation
- (v) Strategic Decisions will very often **involve change in organisations**

RELATIONSHIP BETWEEN STRATEGY AND COMPETITIVE ADVANTAGE

1. A company achieves competitive advantage when it **provides buyers with superior value** compared to rival sellers or offers the same value at a lower cost to the firm.
2. The advantage is sustainable if it persists despite the best efforts of competitors to match or surpass this advantage.
3. These include choices about:
 - (i) How to attract and please customers?
 - (ii) How to compete against rivals?
 - (iii) How to position the company in the market place?
 - (iv) How best to respond to changing economic and market conditions?
 - (v) How to capitalize on attractive opportunities to grow the business?
 - (vi) How to achieve the company's performance targets?

STRATEGIC MANAGEMENT

1. Strategic management is defined by **William F. Glueck** as “a stream of decisions and actions which leads to the development of an effective strategy or strategies to help achieve objectives.”
2. Strategic management according to **Alfred D. Chandler** is “determination of the basic long-term goals and objectives of an enterprise and adoption of course of action and allocation of resources necessary to carry out these goals.”
3. **Recently Harrison & St. John** define Strategic Management as the process through which organisations analyse and learn from their internal and external environments, establish strategic direction, create strategies that are intended to help achieve established goals, and execute these strategies, all in an effort to satisfy key organizational stakeholders.
4. Strategic Management include understanding the **strategic position** of an organisation, **strategic choices** for the future and turning **strategy into action**.
5. The **STRATEGIC POSITION** is concerned with the impact on strategy of the external environment, internal resources and competences, and the expectations and influence of stakeholders.
6. **STRATEGIC CHOICES** involve understanding the underlying bases for future strategy at both the corporate and business unit levels and options for developing strategy in terms of both the directions and methods of development.
7. **STRATEGY INTO ACTION** is concerned with ensuring that strategies are working in practice.

Difference between Strategic Management and Operational Management

Strategic Management is ambiguous/uncertain, complex, organisation wide, fundamental and has long term implications. On the other hand, operational management is routinised, operationally specific and has short term implications.

ADVANTAGES OF STRATEGIC MANAGEMENT

- **Discharges Board Responsibility**

The first reason that most organizations state for having a strategic management process is that it discharges the responsibility of the Board of Directors.

- **Forces an Objective Assessment**

Strategic management provides a discipline that enables the board and senior management to actually take a step back from the day-to-day business to think about the future of the organization. Without this discipline, the organization can become solely consumed with working through the next issue or problem without consideration of the larger picture.

- **Provides a Framework for Decision-Making**

Strategy provides a framework within which all staff can make day-to-day operational decisions and understand that those decisions are all moving the organization in a single direction.

- **Supports Understanding & Buy-In**

Allowing the board and staff participation in the strategic discussion enables them to better understand the direction, why that direction was chosen, and the associated benefits. For some people simply knowing is enough; for many people, to gain their full support requires them to understand.

- **Enables Measurement of Progress**

A strategic management process forces an organization to set objectives and measures of success. The setting of measures of success requires that the organization first determine what is critical to its ongoing success and then forces the establishment of objectives and keeps these critical measures in front of the board and senior management.

- **Provides an Organizational Perspective**

Addressing operational issues rarely looks at the whole organization and the interrelatedness of its varying components. Strategic management takes an organizational perspective and looks at all the components and the interrelationship between those components in order to develop a strategy that is optimal for the whole organization and not a single component.

THE DISADVANTAGES OF STRATEGIC MANAGEMENT

- **The Future Doesn't Unfold as Anticipated**

One of the major criticisms of strategic management is that it requires the organization to anticipate the future environment in order to develop plans, and as we all know, predicting the future is not an easy undertaking. The belief being that if the future does not unfold as anticipated then it may invalidate the strategy taken.

- **It Can be Expensive**

There is no doubt that there are many organizations that cannot afford to hire an external consultant to help them develop their strategy.

- **Long Term Benefit vs. Immediate Results**

Strategic management processes are designed to provide an organization with long-term benefits. If you are looking at the strategic management process to address an immediate crisis within your organization, it won't.

- **Impedes Flexibility**

When you undertake a strategic management process, it will result in the organization saying "no" to some of the opportunities that may be available. This inability to choose all of the opportunities presented to an organization is sometimes frustrating. In addition, some organizations develop a strategic management process that become excessively formal.

STRATEGIC DEVELOPMENT

- (i) ***Intended strategy***: an expression of interest of desired strategic direction deliberately formulated or planned by managers.
- (ii) ***Realised strategy***: the strategy actually being followed by an organisation in practice.
- (iii) ***Unrealised strategy***: the strategy that does not come about in practice or only partially so.
- (iv) ***Imposed strategy***: there may be situations in which managers face what they see as the imposition of strategy by agencies or forces external to the organisation.
- (v) ***Emergent strategy***: unplanned responses to unforeseen circumstances.

STRATEGIC FIT AND STRATEGIC STRETCH

Strategy can be seen as *matching the resources* and activities to the environment in which it operates. This is sometimes known as the search of strategic fit. The notion of *strategic fit* is developing strategy by identifying opportunities in the business environment and adapting resources and competences so as to take advantage of these.

Strategy can also be seen as building on or *stretching* an organisation's resources and competences to create new opportunities or to capitalise on them. Stretch is the leverage of the resources and competences of an organization to provide competitive advantage and /or yield new opportunities.

STRATEGIC MANAGEMENT FRAMEWORK

Stage 1: In this stage, organisation analyse about their present situation in terms of their Strengths, Weaknesses, Opportunities and Threats.

Stage 2: In this stage, organisations setup their missions, goals and objectives by analysing where they want to go in future.

Stage 3: In this stage organisation analyses various strategic alternatives to achieve their goals and objectives. The alternatives are analysed in terms of what business portfolio/product mix to adopt, expansion, merger, acquisition and divestment options etc are analysed to achieve the goals.

Stage 4: In this organisations select the best suitable alternatives in line with their SWOT analysis

Stage 5: This is implementation stage in which organisation implement and execute the selected alternatives to achieve their strategic goals and objectives.

IMPORTANCE OF STRATEGIC MANAGEMENT

- (i) Discover organisation strengths and weaknesses
- (ii) Identify the available opportunities and possible threats
- (iii) Discover the objectives and goals in line with organisations strengths and available opportunities
- (iv) Implement changes to overcome weaknesses and manage the threats.
- (v) Provide vision/mission or direction to future of organisations
- (vi) Build a dynamic and strong organisation
- (v) Help to achieve growing and stable organisation.

STRATEGIC MANAGEMENT PROCESS

Step 1: Identifying Defining Business Mission, Purpose and Objectives:

Every organisation has a mission, purpose and objectives, even if these elements are not consciously designed, written & communicated. These elements relate the organisation with the society and states that it has to achieve for itself and to the society.

Step 2: Environmental Analysis:

Environmental factors — both internal environment and external environment — are analysed to:

- (i) identify changes in the environment,
- (ii) identify present and future threats and opportunities, and
- (iii) assess critically it's own strengths and weaknesses.

Step 3: Revise Organisational Direction:

A thorough analysis of organisation's environment pinpoints it's strengths, weaknesses, opportunities and threats (SWOT). This can often help management to reaffirm or revise it's organisational direction.

Step 4: Strategic Alternatives and Choice:

Many alternative strategies are formulated based on possible options and in the light of organisational analysis and environmental appraisal. Alternative strategies will be ranked based on the SWOT analysis. The best strategy out of the alternatives will be chosen.

Step 5: Strategy Implementation:

The logically developed strategy is to be put into action. The organisation can not reap the benefits of strategic management, unless the strategy is effectively implemented. The managers should have clear vision and idea about the competitor's strategy, organisation's culture, handling change, skills of the managers-in-charge of implementation and the like. The progress from the stage of identification of business mission, purpose and objectives to the stage of achieving desired performance must overcome many obstacles.

Step 6: Strategic Evaluation and Control:

The final step of strategic management process is strategic evaluation and control. It focuses on monitoring and evaluating the strategic management process in order to improve it and ensure that it functions properly. The managers must understand the process of strategic control and the role of strategic audit to perform the task of control successfully.

VISION

Vision is a statement of the future. It indicates where the organisation is headed and what it intends to be.

We can conclude that;

1. Vision provide a road map to Company's future
2. Vision indicates the kind of company management is trying to create for future.
3. Vision specifies about company intention and capabilities to adapt to new technologies
4. Vision also specifies management policies towards customers and societies.

Well conceived visions are ***distinctive*** and ***specific*** to a particular organisation; they avoid generic, feel-good statements.

A number of organisations have summed up their visions in a brief phrase for e.g.

- **Nike:** 'To bring innovation and inspiration to every athlete in the world.'
- **Scotland Yard:** 'to make London the safest major city in the world.'
- **Dabur:** 'Dedicated to the health and well being of every household.'
- **Infosys:** 'To be a globally respected corporation that provides best-of-breed business solutions, leverage technology, delivered by best-in-class people.'

Strategic vision specifies primarily three elements:

1. Forming a mission statement that defines what business the company presently is in? And "who we are and where we are now?"
2. Using this mission statement as base to define long term path by indicating choices about "Where we are going?"
3. Finally, communicating above strategic vision in clear and committed term.

Strategic Vision has important purposes, such as:

1. Clearly provide the direction that company wants to follow
2. Identify the need of changing from existing direction or products, if stated in vision statement.
3. Create passionate environment in the organisation to steer the company with great excitement in selected direction.
4. Create creativity in every member of company to prepare company for future.
5. Promote entrepreneurship.

The benefits of having a Vision

According to Parikh and Neubauer (1993), a well construed vision can provide the following benefits:

- Good visions are inspiring and exhilarating.
- Vision represents a discontinuity, a step function and a jump ahead so that the company knows what it is to be.
- Good vision helps in the creation of a common identity and a shared sense of purpose.
- Good visions are competitive, original and unique. They make sense in the market place as they are practical.
- Good visions foster risk taking and experimentation.
- Good visions foster long term thinking
- Good visions represent integrity: they are truly genuine and can be used to the benefit of the people.

MISSION

The mission is a general enduring statement of instruction of an organisation. The corporate mission is the purpose or reason for it's existence.

A company's mission describes its purpose and its present business (who we are, what we do and why we are here).

It announces what the company is providing to society; either a service or a product.

A well conceived mission statement defines the fundamental, unique purpose that sets a company apart from other firms of its type and identifies the scope or domain of the company's operations in terms of products offered.

A mission statement may also include the firm's values and philosophy about how it does business and treats its employees; however, that is usually better kept as a separate document.

The mission statement of an organisation can be **either product oriented or customer oriented**.

A product-oriented business definition focuses on the characteristics of the products sold and the markets served, not on which kinds of customer needs the products are satisfying.

A customer –oriented view of a company's business focuses on customer needs rather than a particular product (or solution) for satisfying those needs.

Mission statement of some organizations and the nature of the statement

- **Bharat Gas:** *To make Bharat Gas a dominant brand in the segments we market, by becoming trendsetters in customer service, safety and quality.* (It is a customer oriented mission statement).
- **Nirma:** *Nirma is a customer focused company committed to consistently offer better quality products and services that maximise value to the customer.* (It is a customer oriented mission statement).
- **Microsoft corporation:** *to empower every person and every organisation on the planet to achieve more.* (It is a customer oriented mission statement).

The Need for an Explicit Mission:

1. To ensure unanimity of purpose within the organisation.
2. To provide a basis for motivating the use of the organisation's resources.
3. To develop a basis, or standard, for allocating organisational resources.
4. To establish a general tone or organisational climate, for example, to suggest a businesslike operation.
5. To serve as a focal point for those who can identify with the organisation's purpose and direction, and to deter those who cannot from participating further in the organisation's activities.
6. To facilitate the translation of objectives and goals into a work structure involving the assignment of tasks to responsible elements within the organisation.
7. To specify organisational purposes and the translation of these purposes into goals in such a way that cost, time, and performance parameters can be assessed and controlled.

Formulation of Organisational Mission:

Organisation can not declare the mission just on some great whim and fancy, it should be based on organisations' existing capabilities and achievable milestones. Here are some guidelines for formulation of "mission" statement

- It should be based on existing business capabilities "Who we are and what we do?"
- It should follow the long term strategy principles
- Profit making should not be the only mission of organization.
- It should be logical extension of business existing capabilities.
- It should clearly and precisely present the future orientation of business
- It should include achievable missions
- It should be stated in a form that it becomes the motivating force to every member of organisation
- Mission statement once formed shall be communicated to every member of organisations
- It should include interest of customers and society

An organisation begins with the beliefs, desires, and assumptions of single entrepreneur.

These beliefs, desires and assumptions may be of the following nature:

1. The product and service offered by the organisation can provide benefits at least equal to its price.
2. The product or service can satisfy the needs of the customers not adequately served by others presently.
3. Technology used in producing product or service will be cost and quality competitive,
4. The organisation can grow and be profitable than just survive in the long run with the support of various constituents.
5. The organisation will create favourable public image which will result in contributions from the environment.

6. Entrepreneur's self-concept of the business can be communicated and adopted by employees and stakeholders.
7. The organisation will be able to satisfy the entrepreneur's needs and aspirations which he seeks to satisfy through the organisation.

Distinction between a strategic vision and a company's mission statement

The distinction between a strategic vision and a company's mission statement is fairly cut. A strategic vision portrays a company's aspirations for its future (where we are going), whereas a company's mission describes its purpose and its present business (who we are, what we do and why we are here).

OBJECTIVES, GOALS AND TARGETS

- Objectives are performance targets which organisations wants as result or outcomes in the specified periods
- Objectives achievements are used as benchmark of organisation performance and success
- Objectives are formed from visions and mission statement of organisations
- Objectives are interchangeably used with goals but goals are defined as more precise and specific with closed ended attribute (in precise quantity form) whereas objectives are open ended for future states or outcome not as precise as goals. Objectives are for long term whereas goals are for short term.

Characteristics of Objectives:

Objectives characterize business long-term prospective, such as:

- Facilitate to achieve mission and goals
- Set the basis for strategic decision making
- Clear the relationship of organisation with environment
- Should be understandable by each member of organisation
- Should be measurable and controllable
- Should be related to time frame
- Should be challenging
- Should be concrete and specific
- Should be formed within the constraints
- Should motivate people.

Formal strategies contain three elements:

1. Goals to be achieved.
2. Policies that guide or limit action.
3. Action sequences or programs that accomplish goal.

Effective strategic revolve around the key concepts or thrust area such as customer satisfaction or customer focus.

Objectives and Goals

The distinction between these two concepts is important because strategic management needs both. The difference between objectives and goals may be drawn in terms of the following four dimensions.

1. **Time Frame.** Objectives are timeless, enduring, and unending; goals are temporal, time-phased, and intended to be superseded by subsequent goals.

2. Specificity. Objectives are stated in broad, general terms, dealing with matters of image, style, and self-perception. These are aspirations to be worked in the future. Goals are much more specific, stated in terms of a particular result that will be accomplished by a specific date.

3. Focus. Objectives are usually stated in terms of some relevant environment which is external to the organisation; goals are more internally focused and carry important implications about how resources of the organisation are utilised or will be utilised in future.

4. Measurement. Both objectives and goals can be stated in terms which are quantitatively measured but the character of measurement is different. Generally, quantitative objectives are set in relative terms. Quantitative goals are expressed in absolute terms.

CONCEPT OF STRATEGIC INTENT

Here intent refers to intension. A company exhibits strategic intent when it relentlessly (aggressively) pursues an ambitious strategic objective and concentrates it's full resources and competitive actions on achieving that objective.

A company's strategic intent can helps in many ways to the company, like:

- in becoming the dominant company in the industry;
- unseating the existing industry leader;
- delivering the best customer service in the industry (or the world);
- turning new technology into products which capable of changing the way people work and live.

COMPANY GOALS: SURVIVAL, GROWTH, PROFITABILITY

Three economic goals guide the strategic direction of almost every viable business organisation. Whether or not they are explicitly stated, a company mission statement reflects the firm's intention to secure it's survival through sustained growths and profitability.

Unless a firm is able to survive, it will be incapable of satisfying any of it's stakeholders' aims. Unfortunately, like growth and profitability, survival is such an assumed goal that it is often neglected as a principal criterion in strategic decision making. When this happens, the firm often focuses on short-term aims at the expense of the long run.

POLICY AND STRATEGY

A policy is a broad guideline for decision making that links the formulation of a strategy with its implementation.

Companies use policies to make sure that employees throughout the organisation make decisions and take actions that support the corporation's mission, objectives and strategies. Some examples of company policies are as follows:

- General Electric: GE must be number one or two wherever it competes. (This supports GE's objectives to be number one in market capitalisation).
- 3M: 3M says researchers should spend 15% of their time working on something other than their primary project. This supports 3M's strong product development strategy).

Tactic or a Program:

A tactic or a program is a statement of the activities or steps needed to support a strategy. The terms are interchangeable. In practice, a program is a collection of tactics where a tactic is the individual action taken by the organisation as an element of the effort to accomplish a plan. A program or a tactic makes a strategy action-oriented.

STRATEGIC LEVELS IN ORGANISATION

There are primarily three levels of strategies in the organization.

1. Corporate Level
2. Business Level
3. Functional Level

1. Corporate Level:

This role includes defining the mission and goals of the organisation, determining what businesses it should be in, allocating resources among the different businesses, formulating and implementing strategies that span individual businesses, and providing leadership for the organisation. For example, strategies formed for Unilever Limited would be at corporate level.

2. Business Level:

A business unit is a self-contained division (with it's own functions-for example, finance, purchasing, production, and marketing departments) that provides a product or service for a particular market. Thus, whereas corporate-level general managers are concerned with strategies that span individual businesses, business-level general managers are concerned with strategies that are specific to a particular business.

3. Functional Level:

Functional-level managers are responsible for the specific business functions or operations (human resources, purchasing, product development, customer service, and so on) that constitute a company or one of it's divisions.

SITUATIONAL ANALYSIS

1. Enterprises and businesses worldwide carry out analyses to assess conditions and environment for strategic planning. Every company consists of certain frameworks that permit them to understand the market and analyze their products.
2. Companies carry out market research by conducting surveys to evaluate market requirements and trends.
3. SWOT & PEST analyses are two methods through which companies plan ahead by conducting research.

PEST ANALYSIS

1. PEST analysis refers to Political, Economical, Social, and Technological factors which manipulate the business environment.
2. PEST Analysis looks at external factors and is primarily used for market research. It is used as an alternative to SWOT analysis:
3. Following are the details of PEST Components:
 - (i) **Political** –Government decisions and policies affect a firm's position and structure, Tax laws, monetary and fiscal policies as well as reforms of labor and workforce, all influence companies in future.
 - (ii) **Economical** –Inflation, interest rates, economic growth and demand/supply trends are to be considered and analyzed effectively before planning and implementing. Economic factors affect both consumers and enterprises.
 - (iii) **Social** – Social factors involve the trends of population, domestic markets, cultural trends and demographics.
 - (iv) **Technological** – This analyses the technology trends and advancements in business environment, innovations and advancements lowers barriers to entry plus decreased production levels as it results in unemployment. This includes research and development activity, automation and incentives.

SWOT ANALYSIS

The acronym SWOT stands for Strengths, Weaknesses, Opportunities, and Threats.

SWOT analysis attempts to assess the internal strengths and weaknesses of an organisation and the opportunities and threats that its external environment presents.

Corporate Strengths:

- (i) Financially very sound
- (ii) Good products and product-mix with high demand including future prospects
- (iii) Full capacity utilisation, locational advantages
- (iv) Good infrastructures
- (v) Good industrial relations
- (vi) No political interference
- (vii) Good performance in production and services with consistent records
- (viii) Good raw materials base
- (ix) Incentives from State Government
- (x) Good relation with Government departments
- (xi) Technologically rich and with expertise

Corporate Weaknesses:

- (i) Under-utilisation of capacity due to economic slump
- (ii) High debt burden in the capital structure
- (iii) Poor product-mix
- (iv) Lack of managerial strengths
- (v) Industrial unrest
- (vi) Technology gap
- (vii) Demand gap
- (viii) Poor infrastructures
- (ix) Raw materials source at a distance
- (x) Lack of latest information technology
- (xi) Competition war
- (xii) Global threats

Opportunities:

- (i) Seasonal/climatical demand of products
- (ii) Global markets for the company's products/services (Export opportunities)
- (iii) Rural markets to explore and to penetrate
- (iv) To explore the markets in the undeveloped/under-developed/developing states/places

- (v) To avail of the incentives/concessions declared by Central and State Governments
- (vi) Diversifications opportunities
- (vii) Mergers/acquisition opportunities
- (viii) Good home market available due to boost in the economy
- (ix) Liberalised policies of the Government both at Centre as well as State level for the individual production and industrial developments.

Threats:

- (i) Globalisation
- (ii) Competition
- (iii) Price cutting war
- (iv) Free imports
- (v) Industrial unrest
- (vi) Political instability
- (vii) Quality thrusts
- (viii) High and adverse debt equity ratio
- (ix) Increase in financing cost
- (x) Economic slow down due to international recession impact

PORTFOLIO ANALYSIS

Portfolio analysis is a term used in describing methods of analysing a product -market portfolio with the following aims.

- (i) To identify the current strengths and weaknesses of an organisation's products in its markets, and the state of growth or decline in each of these markets.
- (ii) To identify what strategy is needed to maintain a strong position or improve a weak one.

Factors influencing Portfolio Strategy

1. Mission/Vision: The mission of the company is one of the most important factors which influence, the portfolio strategy because the mission defines the scope and purpose of the company. Formulation of clear vision about the future has led to restricting the portfolio companies like Glaxo.

2. Value system: A factor very much complimentary to the mission that influences the portfolio strategy is the value system of the promoters or major stock holders.

3. Future of Current Business: The future prospects of the current business are a very important factor influencing the portfolio strategy. If a current business, particularly the most important one, has a bleak future a company would be tempted to divest or diversify into growing business. Having felt that the future of the tobacco business would be very bleak, the ITC diversified into speciality paper, packaging and printing, hotels, agribusiness, financial services and international business etc. and today the non-tobacco businesses contribute a considerable share of the total turnover of ITC.

4. Position on the Portfolio Matrix/PLC: The position of different business on the product portfolio life cycle also may influence the portfolio strategy of a company. For example, Products in the declining stage may be dropped.

5. Government Policy: Government policy sometimes is an important determinant of portfolio strategy. The pre- 1991 regulatory regime did not permit many companies, particularly large ones and foreign firms, to pursue the type of growth and diversification strategies they would have followed in an environment of business freedom, resulting in distorted portfolios. The liberalisation has very significantly transformed the environment. The grant of more autonomy to the Navaratnas has provided them with considerable leeway for charting out their future growth.

6. Competitive Environment: The competitive environment too has its influence on the portfolio strategy of many companies. When competition is absent or limited, as in a protected market, even firms which are inefficient may be able to thrive. The protection itself may prompt

firms to enter such business. However, as the market becomes competitive, as has been happening in India because of the liberalisation, things may undergo drastic changes. Many firms which survived or flourished in the protected regime would not be able to survive the competition.

7. Company Resources: The resources and strengths of the company, undoubtedly, are important factors influencing the 'portfolio strategy'.

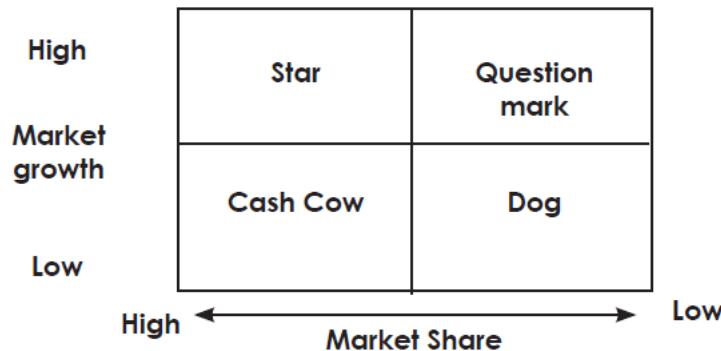
8. Supply/Demand Conditions: Problems with input supplies may encourage backward integration. Similarly, problems with marketing the output, or advantages of value addition, may encourage forward integration. When products or services can be obtained cheaply/ more efficiently from outside, it may encourage the dropping of such business and dependence on outside sources.

9. Competitive Moves: Some firms have a tendency to imitate the growth pattern of the established popular firms. There are firms which follow almost the same portfolio strategies of competitors.

10. Portfolio Strategy of Parent: The portfolio strategy of subsidiaries may be influenced by the portfolio strategy of the parent as has been the case with companies like Glaxo India, ICI and Hindustan Lever.

11. Business Environment: The business environment, in general, is an influencer of the portfolio strategy and, quite obviously, significant changes in business environment have important implications for portfolio strategy.

BCG MATRIX (BOSTON CONSULTING GROUP)



(i) Stars are products with a high share of a high growth market. In the short term, these require capital expenditure, in excess of the cash they generate, in order to maintain their market position, but promise high returns in the future.

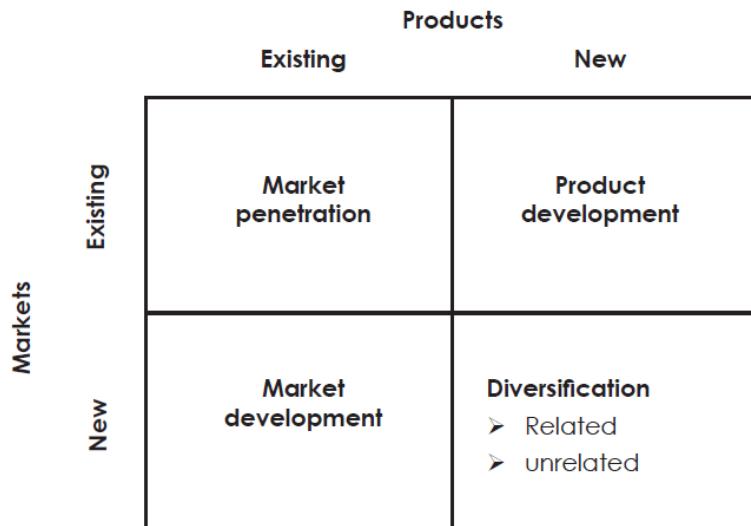
(ii) In due course, however, stars will become **cash cows**, with a high share of a low-growth market. Cash cows need very little capital expenditure and generate high levels of cash income. The important strategic feature of cash cows is that they are already generating high cash returns, which can be used to finance the stars.

(iii) Question marks are products in a high-growth market, but where they have a low market share. A decision needs to be taken about whether the products justify considerable capital expenditure in the hope of increasing their market share, or whether they should be allowed to 'die' quietly as they are squeezed out of the expanding market by rival products. Because considerable expenditure would be needed to turn a question mark into a star by building up market share, question marks will usually be poor cash generators and show a negative cash flow.

(iv) Dogs are products with a low share of a low growth market. They may be ex-cash cows that have now fallen on hard times. Dogs should be allowed to die, or should be killed off. Although they will show only a modest net cash outflow, or even a modest net cash inflow, they are 'cash traps' which tie up funds and provide a poor return, on investment, and not enough to achieve the organisation's target rate of return.

There are also **infants** (i.e. products in an early stage of development) and **warhorses** (i.e. products that have been cash cows in the past, and are still making good sales and earning good profits even now). The car industry provides interesting examples to fit the BCG matrix.

ANSOFF'S MODEL



Ansoff (1965) demonstrates the choices of strategic direction open to a firm in the form of a matrix. These strategies involve increasing the firm's investment in a product/market and so are generally only used in markets which are growing, and hence the investment may be recouped.

ARTHUR D. LITTLE PORTFOLIO MATRIX

The ADL portfolio matrix suggested by Arthur D. Little (ADL) consists of 20 cells, identified by competitive position and its stage of industry maturity. In this matrix, the stage of industry maturity is identified in four stages viz., embryonic, growth, maturity and ageing. The competitive position is categorized into five classes viz., dominant, strong, favourable, tenable and weak. The purpose of the matrix is to establish the appropriateness of a particular strategy in relation to these two dimensions.

The competitive position of a company's SBU or product line can be classified as:

Dominant - It is comparatively a rare situation where the SBU enjoys monopoly position or very strong market ability of its products. This may be due to high level of entry barriers or protected technology leadership.

Strong - When an SBU enjoys strong competitive position, it can afford to chalk out its own strategies without too much concern for the competitors.

Favourable - In this competitive position, no firm will enjoy dominant market share and the competition will be intense. The strategy formulation much depends on the competitors moves. The market leader will have a reasonable degree of freedom. Analysis of their product portfolio and learning from them would help others while framing their own strategies.

Tenable - The tenable competitive position implies that a firm can survive through specialization and focus. These firms are vulnerable to stiff competition in the market. They can withstand with cost focus and differentiation focus strategies.

Weak - The weak firms will generally show poor performance. They can withstand with niche strategy and can become strong players in their area. The consistent weak performance may need to divest or withdraw from the product line.

STAGES/STEPS/APPROACHES IN STRATEGIC PLANNING

Stage I: Strategic Option Generations

At this stage, a variety of alternatives are considered, relating to the firm's product and markets, its competitors and so forth. Examples of strategies might be:

- (a) increase market share
- (b) penetration into international market
- (c) concentration on core competencies
- (d) acquisition or expansion etc.

Stage II - Strategic Options Evaluation

Each option is then examined on its merits.

- (a) does it increase existing strengths ?
- (b) does it alleviate existing weaknesses ?
- (c) is it suitable for the firm's existing position ?
- (d) is it acceptable to stakeholders ?

Stage III - Strategic Selection

It involves choosing between the alternative strategies. This process is strongly influenced by the values of the managers in selecting the strategies.

Steps in Strategic Planning

- (i) An internal analysis that encompasses assessing company strengths and weaknesses, financial performance, people, operational limitations, corporate culture, current positioning in the market(s), the overall characterization of the condition of the company and critical issues facing by the organization.
- (ii) An external analysis that focuses on analyzing competitors, assessing market opportunities and threats, evaluating changing technology that could impact the organization, analyzing regulatory or legislative concerns, changes and trends in the market(s) the company operates in and other potential outside influences on the organization.
- (iii) Summarizing the current situation based on the information gathered and evaluated in steps one and two.

(iv) Development of a mission, vision or purpose statement. In this step, the team is starting the process of focusing the organization and its people on what the organization is all about and what is important to the organization.

(v) Goal setting. Every organization needs goals. Again, focus is a critical element in the success of any business. This step may be the most important of all of the strategic planning steps because it establishes the framework and basis for the development of the other key elements of the plan.

(vi) Defining objectives that support the goals. Objectives are more specific in nature and are supportive of the goal. They bring into even greater focus to the goals of the organization.

(vii) Development of strategies. Strategies begin defining how the goals and objectives are going to be achieved.

(viii) While not all strategic plans include tactics, a good strategic plan will include at least the key tactics thought to be important to supporting the strategies developed in step 7. Generally tactics are more fully developed and added to the plan as time goes on. Tactics are the specific tasks associated with carrying out strategies.

Strategic Management and Strategic Planning : Distinction

Strategic Management	Strategic Planning
1. It is focused on producing strategic results; new markets; new products; new technologies etc.	1. It is focused on making optimal strategic decisions.
2. It is management by results.	2. It is management by plans.
3. It is an organizational action process.	3. It is an analytical process.
4. It broadens focus to include psychological, sociological and political variables.	4. It is focused on business, economic and technological variables.
5. It is about choosing things to do and also about the people who will do them.	5. It is about choosing things to do.

ALTERNATIVES IN STRATEGIC PLANNING

Contingency plans can be defined as alternative plans that can be put into effect if certain key events do not occur as expected. Only high-priority areas require the insurance of contingency plans. Strategists cannot and should not try to cover all bases by planning for all possible contingencies. But in any case, contingency plans should be as simple as possible.

Some contingency plans commonly established by firms include the following:

1. If a major competitor withdraws from particular markets as intelligence reports indicate, what actions should our firm take?
2. If our sales objectives are not reached, what actions should our firm take to avoid profit losses?
3. If demand for our new product exceeds plans, what actions should our firm take to meet the higher demand?
4. If certain disasters occur—such as loss of computer capabilities; a hostile takeover attempt; loss of patent protection; or destruction of manufacturing facilities because of earthquakes, tornadoes, or hurricanes — what actions should our firm take?
5. If a new technological advancement makes our new product obsolete sooner than expected, what actions should our firm take?

Three major benefits:

- (i) It permitted quick response to change,
- (ii) It prevented panic in crisis situations, and
- (iii) it made managers more adaptable by encouraging them to appreciate just how variable the future can be.

Steps in Contingency Planning

Robert Linnemam and Rajan Chandran have suggested that a seven step process as follows:

Step 1 - Identify the beneficial and unfavourable events that could possibly derail the strategy or strategies.

Step 2 - Specify trigger points. Calculate about when contingent events are likely to occur.

Step 3 - Assess the impact of each contingent event. Estimate the potential benefit or harm of each contingent event.

Step 4 - Develop contingency plans. Be sure that contingency plans are compatible with current strategy and are economically feasible.

Step 5 - Assess the counter impact of each contingency plan. That is, estimate how much each contingency plan will capitalize on or cancel out its associated contingent event. Doing this will quantify the potential value of each contingency plan.

Step 6 - Determine early warning signals for key contingency event. Monitor the early warning signals.

Step 7 - For contingent event with reliable early warning signals, develop advance action plans to take advantage of the available lead time.

Benefits of Contingency Planning

- (i) It will make the future through their proactive planning and advanced preparation.
- (ii) It will introduce original action by removing present difficulties.
- (iii) It enables to anticipate future problems.
- (iv) It will change the goals to suit internal and external changes.
- (v) It experiments with creative ideas and take initiative.
- (vi) It will attempt to shape the future and create a more desirable environment.
- (vii) It permits quick response to change,
- (viii) It prevents panic in crisis situations.
- (ix) It makes managers more adaptable to unforeseen changes.

PESTEL FRAMEWORK

The PESTEL framework shows some of the macro-environmental influence which might affect organisations. It focuses on the six principal components of strategic significance in the macro-environment namely, political, economic, social, technology, environmental and legal forces.

- **Political factors**

These factors include political policies and processes, including the extent to which a government intervenes in the economy. They include matters as political structure, its goals, government stability, taxation policy, foreign trade regulation, social welfare policies, political philosophy, ideological forces, political parties, centres of power, etc.

- **Economic Factors**

Economic conditions include the general economic climate and specific factors such as business cycles, GNP trends, interest rates, money supply, inflation, unemployment, disposable income, etc. Economic factors also include conditions in the market for stocks and bonds, which can affect consumer confidence and discretionary income.

- **Socio-cultural factors**

Socio-cultural forces include the societal values, attitudes, cultural factors, population demographics, income distribution, social mobility, lifestyle changes, attitudes to work and leisure, consumerism, levels of education, etc. Socio-cultural forces vary by locale and change over time.

- **Technological factors**

These relate to knowledge applied and the material and machines used in the production of goods and services that have an impact on the business of an organisation. Technological change can encourage the birth of new industries, such as those based on nanotechnology, and disrupt others, such as the recording industry.

- **Environmental factors**

They include protection laws, waste disposal, energy consumption, weather, climate, climate change and associated factors like water shortages. These factors can directly impact industries such as insurance, farming, energy production, and tourism. They may have an indirect but substantial effect on other industries such as transportation and utilities.

- **Legal**

They include monopolies legislation, licensing, foreign investment, financing of industries, employment law, health and safety, product safety, consumer laws, antitrust laws, policies related to imports and exports, etc. Some factors such as banking regulation are industry specific. Others, such as minimum wage legislation, affect certain types of industries (low wage, labour intensive industries) more than others.

PORTER'S FIVE FORCES FRAMEWORK

The five forces framework helps to identify the sources of competition in an industry or sector.

The threat of entry

Barriers to entry are factors that need to be overcome by new entrants if they are to compete successfully. These should be seen as providing delays to entry and not as permanent barriers.

Competitive Rivalry

Competitive rivals are organisations with similar products and services aimed at the same customer group. The competitive struggle can be fought using price, product, design, advertising and promotion spending, direct selling efforts, and after-sales service and support. More intense rivalry implies lower prices or more spending on non-price competitive weapons or both.

The Bargaining Power of the Buyers

The bargaining power of the buyers refers to the ability of buyers to bargain down prices charged by companies in the industry or to raise the costs of companies in the industry by demanding better quality products and services.

The Bargaining Power of the Suppliers

The bargaining power of the suppliers refers to the ability of suppliers to raise input prices or to raise the costs of the industry in other ways.

The Threat of Substitutes

Substitute products refer to the products of different businesses or industries that can satisfy similar customer needs. Substitution reduces demand for a particular class of products as customers switch to the alternatives.

STRUCTURAL DRIVERS OF CHANGE

- **Increasing convergence of markets**

In some markets the customers' needs and preferences are becoming more similar. As some markets globalise, those operating in such markets become global customers and may search for suppliers. Moreover marketing policies needs to be developed all over again.

- **Cost advantage of global operations**

This benefit might accrue to industries that operate in large volume, standardised production and enjoy economies of scale. In order to realise location economies businesses search globally for low cost operations and enjoying competitive edge.

- **Activities and policies of the governments**

The government policies and activities have also resulted in influencing the globalisation of industry. The moves towards free trade and technical standardisation of many products between countries have resulted in increasing competition.

- **Global competition**

It is the global competition that acts as a driver to globalisation. It may be mentioned that high level of import and export between countries increases interaction between competitors on a more global scale. The interdependence of companies across the world promotes global trade.

DIVERSIFICATION STRATEGY

Diversification strategy is a process of entering new industries, distinct from a company's core or original industry, to make new kinds of products that can be sold profitably to customers in these new industries.

It takes the organisation away from its current markets or products or competences. Diversification strategy can be broadly classified into related (concentric) diversification and unrelated (conglomerate) diversification.

(a) Related (concentric) diversification is a corporate level strategy that is based on development beyond current products and markets, but within the value system or 'industry' in which it operates. The multi business model of related diversification is based on taking advantage of strong technological, manufacturing, marketing and sales commonalities between new and existing business units that can be suitably adjusted or modified to increase the competitive advantage of one or more business units.

(b) Unrelated (conglomerate) diversification is a corporate level strategy based on multi business model whose goal is to increase profitability through the use of generic organisational competences to increase performance of all the company's business units. In other words when an organisation moves beyond its current value system or industry it is called unrelated (conglomerate) diversification.

STRATEGY FORMULATION & IMPLEMENTATION

Formulation of strategy

- (i) Develop and evaluate strategic alternatives
- (ii) Select appropriate strategies for all levels in the organisation that provide relative advantage over competitors
- (iii) Match organizational strengths to environmental opportunities
- (iv) Correct weaknesses and guard against threats

Implementation of strategy

- (i) effectively fitting organizational structure and activities to the environment
- (ii) The environment dictates the chosen strategy; effective strategy implementation requires an organisational structure matched to its requirements. Evaluating results
- (iii) How effective have strategies been?
- (iv) What adjustments, if any, are necessary

PRODUCTION STRATEGY

The following steps are involved in the formulation of production strategy □

- (i) Study the overall corporate plan and define the objectives.
- (ii) Analyse the present production operations and the present and future environment.
- (iii) Review sales- forecast and marketing.
- (iv) Make strategic decisions for production.

MARKETING STRATEGY

“Marketing is the performance of business activities that direct the flow of goods and services from producer to consumer or user.”

Marketing involves eight important functions:

Buying, Selling, Storage, Transportation, Financing, Standardisation, Grading and Risk-Taking.

Marketing Environment:

It is the sum-total of external factors within which the enterprise operates. It is the compendium of forces external in nature like social, economic, ethical, political, physical and technological. These are uncontrollable external forces that provide opportunities and challenges to the firm.

Universal Functions of Marketing:

Universal functions of marketing consist of buying, selling, transporting, storing, standardisation and grading, financing, risk-taking and market information.

Marketing Plan:

Marketing plan is a written document that specifies in detail the firms marketing objectives and how marketing management will use the controllable marketing tools such as product design, channels, promotion and pricing to achieve these objectives.

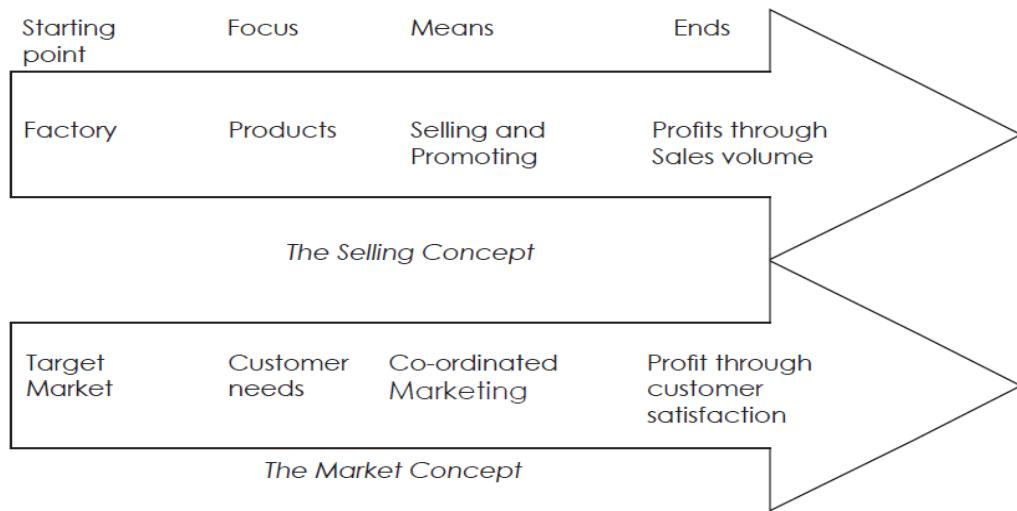
The Marketing Concept and the Selling Concept

The marketing concept has been expressed in many colourful ways:

- (i) meeting needs profitably
- (ii) find wants and fill them
- (iii) love the customer, not the product
- (iv) have it your way
- (v) you're the boss
- (vi) to do all in our power to pack the customer's rupee full of value, quality and satisfaction

The marketing concept rests on four main pillars, namely target market, customer needs, coordinated marketing and profitability. These are shown in the figure below, where they are constructed with a selling orientation. The selling concept takes an inside-out perspective.

It starts with the factory, focuses on the company's existing products, and calls for heavy selling and promoting to produce profitable sales. The marketing concept takes an outside-in perspective. It starts with a well-defined market, focuses on customer needs, co-ordinates all the activities that will affect customers and produces profit through customer satisfaction.



MANPOWER STRATEGY

HRD is defined as a process by which employees are encouraged and helped in a continuous and planned way to

- (a) acquire and sharpen capabilities to perform functions relating to their present or future positions,
- (b) develop their general abilities as individuals,
- (c) identify and make use of their own inner potentials for their own and/or organisational purposes and
- (d) develop an organisational culture whereby superior-subordinate relations, team work and collaboration among sub-units may lead to strengthening healthy work ethos, motivation and pride of employees.

The purpose of HRM strategy is to reflect and facilitate the achievement of corporate-level strategy by linking the functions of HRM with the strategic goals and objectives—securing competitive advantage either as a cost or price leader or through the unique and differentiated nature of its product, at the same time fostering the development of an appropriate organisational culture.

The following aspects of human resource strategy are required to be focused for the purpose:

- Job analysis and human resource planning before selection and recruitment of manpower,
- Recruitment and selection of staff with required skill and abilities with the process being consistent with the objectives,
- Human resource development by way of training and development programmes, performance appraisal, appropriate compensation package and incentive schemes to secure motivation.

The more important features which human resource strategy may bring to bear on the organisation are as follows:

(i) Orientation of the members.

HRM strategy has to ensure that individuals employed in the organisation have necessary orientation so that the mission and objectives of the organisation are internalised by the members and they have a sense of identification with the values and culture of the organisation.

(ii) Facilitation of organisational changes as and when called for.

The practices and procedures are required to be in conformity with the changing internal and external conditions. This is a vital role of HR strategy management.

(iii) Coping with diversity of workforce.

Modern organisations with highly complex nature of jobs and processes generally have a highly diversified workforce differentiated in terms of age, sex, religion, professional and technical skills and educational background. To maintain a balanced workforce with harmonious relations and providing equitable incentives and rewards are aspects of HRM functions which can sustain an effective workforce. This is a responsibility of HR strategy managers.

(iv) Maintaining competent and committed workforce in a competitive environment.

The intensity of market competition for enterprises has been growing fast with globalisation and liberalisation of economic policies. There are competitive strategies of low cost production and differentiation of products which may enable companies to secure a competitive edge. HRM has the responsibility of managing workforce so as to make it competent in ability as well as committed to organisational success.

(v) Development of core competency.

An enterprise succeeds in achieving its strategic objectives mainly on the basis of capabilities in the technical, marketing or human skills in areas of crucial importance. These are known as core competencies of the organisation which are unique internal strengths not possessed by competitors. HRM is required to undertake building up of core competency by the organisation as to secure dynamic leadership in the product market.

(vi) Empowered workforce as an active resource. HR strategy is best managed when the members of an organisation are individually in control of their work and are able to realise their potentials with empowerment to take relevant decisions on their own. This is likely to secure enduring performance based achievements.

(vii) Appropriate work culture and ethical norms. No organisation can get the best contribution from its members unless individuals develop a liking for challenging jobs and follow the ethical norms of the organisation functionally. This may require redesigning of jobs and work processes as well as developing trust and confidence among individuals and work groups, as also emphasising intrinsic motivation for improving performance. HRM encompasses creation of an appropriate work culture on the above lines.

Cardinal Principles of Motivation

While designing strategy to motivate employees, the management must bear in mind the following cardinal principles:

- (a) All reasonably healthy adults have a considerable reservoir of potential energy. Differences in the total amount of potential energy are important determinants of motivation.
- (b) All adults have a number of basic motives which can be thought of as values or outlet that channel and regulate the flow of potential energy from this reservoir.
- (c) Most adults within a given socio-cultural system may have the same set of motives or energy outlets that channel and regulate the flow of potential energy from this reservoir.

- (d) Actualisation of motive depends on specific situation in which a person finds himself.
- (e) Certain characteristics of a situation arouse or trigger different motives, opening different values or outlets. Each motive or energy outlet is responsive to a different set of situational characteristics.
- (f) Each motive leads to a different pattern of behaviour.
- (g) By changing the nature of the situational characteristics or stimuli, different motives are aroused or actualised resulting in the emerging of distinct different patterns of behaviour.

Several Strategies of Motivation

1. Managerial Communication:

The most important and basic strategy for a manager is simply to communicate well with the organisational people. This satisfies such basic human needs as recognition, a sense of belonging, and security.

2. Theory X and Theory Y:

Douglas McGregor identified two sets of assumptions. According to him, Theory X involves negative assumptions that managers often use as the basis for dealing with people. Theory Y represents positive assumptions which managers strive to use. The basic rationale for using Theory Y rather than Theory X in most situations is that managerial activities reflect Theory X assumptions. As such, the activities based on Theory Y assumptions generally are more successful in motivating organisation people than those based on Theory X assumptions.

3. Job Design:

A third strategy managers can use to motivate organisation members involves the design of jobs that organisation members perform. Earliest attempt to overcome job boredom was **job rotation** in which individuals are moved from job to job and thus they are not required to perform a particular job for over the long-term.

Subsequently, **job enlargement** is another strategy developed to overcome the boredom of more simple and specialised jobs. Job enlargement involves increasing the number of operations an individual performs and thereby increasing the individual's satisfaction in work. Job enlargement programme have been found more successful in increasing job satisfaction than have job rotation programmes.

In recent years, two other job design strategies, viz., **Job Enrichment and Flexitime**, have been evolved.

Job enrichment is the process of incorporating motivators into a job situation. The job content can be enriched in terms of providing higher responsibility, opportunity for achievement, opportunity for recognition, advancement and learning opportunities.

Another more recent job design strategy for motivating organisation members is based on a concept called **flexitime or flexible working hour's programmes**. The major thrust of this strategy is that it permits workers to choose own working hours within hours within certain limitations. The choices of starting and finishing times can be as flexible as the organisation allows, to ensure that flexibility does not become counter-productive within the organisation, many flexitime programmes include a core period during which all employees must be on the job. Flexitime strategy has been found resulting in greater job satisfaction which typically results in greater productivity. It can also result in higher motivation levels of workers. This may enable the management in recruiting and attracting qualified employees.

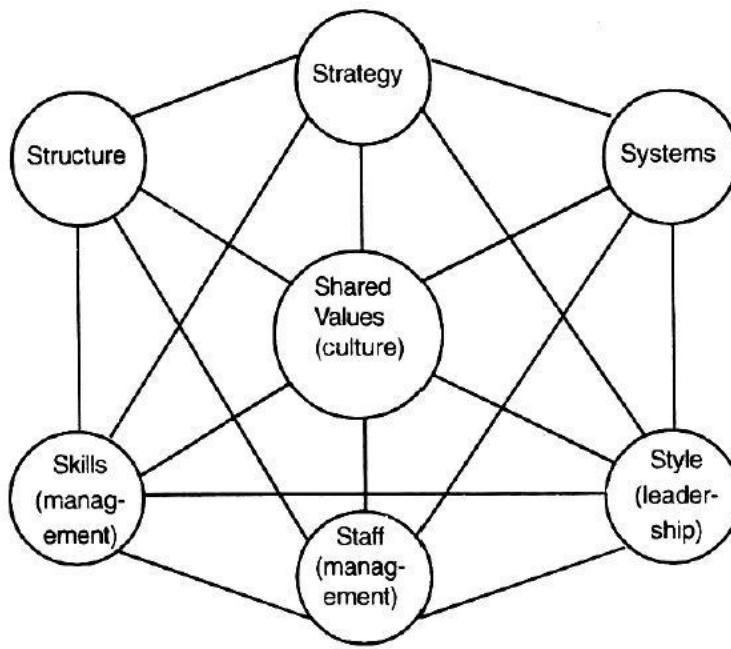
4. Behaviour Modification:

Behaviour modification focuses on encouraging appropriate behaviour as a result of the consequences of that behaviour. According to the law of effect, behaviour that is rewarded tends to be repeated and behaviour that punished tends to be eliminated.

5. Participative Management:

This will elicit employee's commitment in executing decisions. Further, the successful process of making a decision, executing it and then seeing the positive consequences can help satisfy one's need for achievement, provides recognition and responsibility and enhance self esteem.

STRATEGIC IMPLEMENTATION (McKinsey's 7-S Framework)



The McKinsey Company, a well known management consultancy firm in the United States, towards the end of 1970s was asked to find a solution to this knotty issue. The researchers Peters and Waterman found after examining America's best run companies that the problem in strategy lay in its implementation and structure was only one lever in the hands of management. The other levers were systems, staff, style, skills and superordinate goals.

A strategy is usually successful when the other S's in the 7-S framework fit into or support the strategy.

- **Strategy:** A set of decisions and actions aimed at gaining a sustainable competitive advantage.
- **Structure:** The organisation chart and associated information that shows who reports to whom and how tasks are both divided and integrated.
- **Systems:** The flow of activities involved in the daily operation of a business, including its core processes and its support systems.
- **Style:** How managers collectively spend their time and attention and how they use symbolic behaviour. How management acts is more important than what management says.
- **Staff:** How companies develop employees and shape basic values.
- **Shared Values:** Commonly held beliefs, mindsets and assumptions that shape how an organisation behaves— its corporate culture.
- **Skills:** An organisation's dominant capabilities and competencies.

ORGANIZATIONAL STRUCTURE

There are several types of organizational structure:

- (1) Functional Structure
- (2) Geographic Structure
- (3) Matrix Structure
- (4) Hybrid Structure

Functional structure:

The functional structure is characterized by the simultaneous combination of similar activities and the separation of dissimilar activities on the basis of function. A functional structure is most appropriate when the organization is small to medium size and relatively stable.

Geographic structure:

Each geographic unit includes all functions required to produce and market products in that region. Organization according to geographic areas or territories is rather common structural form for large-scale enterprise whose strategies need to be tailored.

Matrix structure:

The matrix structure creates a dual chain of command; two lines of budget authority and two sources of performance and reward. The key feature of the matrix is that product (or business) and functional lines of authority are overlaid to form a matrix or grid, between the product manager and functional manager.

Hybrid Organization And supplemental Methods:

A single type of structural design is not always sufficient to meet the requirements of strategy. When this occurs, one opinion is to mix and blend the basic organizations forms, matching structure to strategy, requirement by requirement, and unit by unit, Hybrid structure is a form of departmentalization that adopts parts of both functional and divisional structures at the same level of management.

STRATEGIC CONTROL SYSTEMS

- **Personal Control**

It is the desire to shape and influence the behaviour of a person in a face to face interaction in order to achieve the organisation's goals.

- **Output control**

This system involves the estimation and forecasting of appropriate performance goals for each unit/division, department and employees and then measure the actual performance relative to these goals.

- **Behaviour control**

The establishment of a comprehensive system of rules and procedures to direct the actions or behaviour of divisions, functions and individuals is called behaviour control. The main purpose of having behaviour control is not to specify goals but to standardise the way of reaching them.

STRATEGY BUSINESS UNIT (SBU)

SBU groups similar divisions into “Strategic Business Units” and then delegates authority and responsibility of each unit to a senior executive who is normally identified as CEO or MD of that SBU. It is an extension of Divisional structure.

Big organisation like Unilever, etc have many SBUs for their different categories of products like Cosmetics, Food products and Beverages, etc, and each is managed through separate unit head.

Advantages:

- (i) Promotes accountability since units' heads are responsible for individual SBU profitability
- (ii) Career development opportunities are further higher in this structure
- (iii) Allow better control of categories of products manufacturing, marketing and distributions
- (iv) Helps to expand in different related and unrelated businesses

Disadvantages:

- (i) May provide inconsistent approach to tackle customers, etc, because each unit may work in its own way to handle situations
- (ii) High cost approach

The three most important Characteristics of SBU are:

- It is a single business or a collection of related businesses which offer scope for independent planning and which might feasibly stand alone from the rest of the organisation.
- Has its own set of competitors.
- Has a manager who has responsibility for strategic planning and profit performance, and who has control of profit-influencing factors.

BUSINESS PROCESS RE-ENGINEERING

Business process re-engineering (BPR) is a business management strategy, originally pioneered in the early 1990s, focusing on the analysis and design of workflows and processes within an organization. BPR aimed to help organizations fundamentally rethink how they do their work in order to dramatically improve customer service, cut operational costs, and become world-class competitors. In the mid-1990s, as many as 60% of the Fortune 500 companies claimed to either have initiated reengineering efforts, or to have plans to do so.

The 3 Rs of re-engineering

REDESIGN	RETOOL	REORCHESTRATE
<ul style="list-style-type: none"> • Simplify • Standardize • Empowering • Employeeship • Groupware • Measurements 	<ul style="list-style-type: none"> • Networks • intranets • extranets • Work Flow 	<ul style="list-style-type: none"> • synchronize ■ process ■ IT ■ human resources

Stages of BPR

The Envision stage: the company reviews the existing strategy and business processes and based on that review business processes for improvement are targeted and IT opportunities are identified.

The Initiation stage: project teams are assigned, performance goals, project planning and employee notification are set.

The Diagnosis stage: documentation of processes and sub-processes takes place in terms of process attributes (activities, resources, communication, roles, IT and costs).

The Redesign stage: new process design is developed by devising process design alternatives and through brainstorming and creativity techniques.

The Reconstruction stage: management technique changes occur to ensure smooth migration to the new process responsibilities and human resource roles.

The Evaluation stage: the new process is monitored to determine if goals are met and examine total quality programs.

CORE COMPETENCE AND CRITICAL SUCCESS FACTORS

Core competences are activities or processes that critically underpin an organisation's competitive advantage.

The core competences have the following characteristics

- (i) Provide distinctive advantage for the firm
- (ii) Difficult for the competitors to imitate
 - Competence is rare
 - Competence is concerned with managing complex activities or processes
 - Competitors are not clear which resource or competences have caused the success of the firm. This is known as causal ambiguity
 - The competence is embedded in the culture
- (iii) They make a significant contribution to customer value and the end products offered by the firm
- (iv) They provide access to a wide variety of markets.

Core skills are fundamental resources of an organisation. It is very important that organisation's should understand the process of developing core competence. Building core competence is a time consuming and challenging exercise.

The core competency building process has three stages

- Developing the ability to do something by upgrading or expanding the skills.
- Learning to perform the activity consistently well, so that it transforms into a competence or capability.
- Sharpening performance such that it becomes better than rivals at performing the activity, thus raising the competence to the rank of a distinctive competence (or competitively superior capability). This opens an avenue to competitive advantage.

Critical Success Factors

Critical Success Factors (CSFs) are those product features which are particularly valued by a group of customers and, therefore, where the organisation must excel in order to outperform competition.

According to Rockart there are four major sources of CSFs

- ***Structure of the Industry:***

Some CSFs are specific to the structure of the industry. For e.g., the extent of service support expected by the customers. Automobile companies have to invest in building a national network of authorized service stations to ensure service delivery to their customers.

- ***Competitive strategy, industry position and geographic location:***

CSFs also arise from the above factors. For e.g. the large pool of English- speaking manpower makes India an attractive location for outsourcing the BPO needs of American and British firms.

- ***Environmental Factors:***

CSFs may also arise out of general/business environment of a firm, like the deregulation of Indian industry. With the deregulation of telecommunication industry, many private companies had opportunities of growth.

- ***Temporal factors:***

Certain short-term organisational developments like sudden loss of critical manpower (like the charismatic CEO) or break-up of the family owned business, may necessitate CSFs like 'appointment of a new CEO' or 'rebuilding the company image'.

OHMAE'S THREE CS.

In order to identify CSFs in the industry there are three important areas that need to be analysed. They are known as Ohmae's three Cs.

Customers:

The important questions that should be considered are

- Who are the customers?
- Who are the potential customers?
- Are there any segments?
- Why customers buy from us?
- Why they buy from our competitors?

The CSFs in this area may relate to:

Price, Service, Product or Service reliability, Quality, Specifications, Branding

Competition

- Who are the main competitors?
- How intense is competition?
- What is the necessity to achieve market superiority?

The CSFs in this area may relate to:

Cost comparisons, Price comparisons, Quality issues, Market dominance, Service distributors

Corporation

- What are our key resources and those of our competitors?
- What do they deliver to customers?
- How does the company compare costs, technological skills, organisational ability and marketing with its rivals?

The CSFs in this area may relate to:

Low cost operations, Economies of Scale, Labour costs, Production output levels, Quality operations, Innovative ability, Labour/management relations, Technologies and copyrights, Skills

Paper 9- OPERATIONS MANAGEMENT & STRATEGIC MANAGEMENT

Paper 9- Operations Management and Strategic Management

Full Marks: 100

Time allowed: 3 hours

The figures in the margin on the right side indicate full marks.

This question paper has two sections.

Both the sections are to be answered subject to instructions given against each.

Section – I : [Operations Management]

1. a) Choose the correct answer from the given four alternatives.

[1x10=10]

- (i) To decide work load for men and machines:**
 - (a) Medium range forecasting is used,**
 - (b) Short term forecasting is used,**
 - (c) Long range forecasting is used,**
 - (d) A combination of long range and medium range forecasting is used**

- (ii) Most suitable layout for Continuous production is:**
 - (a) Line layout,**
 - (b) Process Layout,**
 - (c) Group technology,**
 - (d) Matrix layout.**

- (iii) Generally in continuous production the production is carried out to:**
 - (a) Customer's order,**
 - (b) Government orders only,**
 - (c) For stock and supply,**
 - (d) Few rich customers**

- (iv) The cycle time, selected in balancing a line must be:**
 - (a) Must be greater than the smallest time element given in the problem,**
 - (b) Must be less than the highest time element given in the problem,**
 - (c) Must be slightly greater than the highest time element given in the problem,**
 - (d) Left to the choice of the problem solver.**

- (v) The difference between product system and project system is:**
 - (a) Project system the equipment and machinery are fixed whereas in product system they are movable,**
 - (b) In Product system the machinery and equipment are fixed and in project system they are not fixed,**
 - (c) Project system produces only standardized products and product system produces only unstandardised products,**
 - (d) Products cannot be stocked whereas projects can be stocked.**

- (vi) In an organisation the production planning and control department comes under :**
 - (a) Planning department**
 - (b) Manufacturing department**
 - (c) Personal department**
 - (d) R & D department**

(vii) In general, medium range forecasting period will be approximately:

- (a) 5 to 10 Years,
- (b) 2 to 3 days,
- (c) 3 to 6 months,
- (d) 10 to 20 years

(viii) The method used in scheduling a project is:

- (a) A schedule of breakdown of orders,
- (b) Outline Master Programme,
- (c) PERT & CPM,
- (d) Schedule for large and integrated work.

(ix) Z-chart can be used to show:

- (a) Process used in production,
- (b) Quality level of the product,
- (c) Both the plan and the performance, and deviation from the plan,
- (d) To show cost structure of the product.

(x) One of the aims of loading is:

- (a) To finish the job as early as possible,
- (b) To minimise the material utilisation,
- (c) To improve the quality of product,
- (d) To keep operator idle time, material waiting time and ancillary machine time at minimum.

(b) Match the following:

[6×1=6]

	Column 'A'		Column 'B'
a.	Materials Requirement Planning	i.	Quality Control
b.	Programme Evaluation and Review Technique	ii.	Cost Control
c.	Average Outgoing Quality	iii.	Product mix determination
d	Methods Time measurement	iv.	Inventory management
e.	Linear Programming	v.	Project planning
f.	Value Analysis	vi.	Work measurement

(c) State whether the following statements are True/False.

1×6=6

- (i) It is desirable to conduct work measurement after Method study.
- (ii) In carrying out Job Evaluation studies, point system is the best method.
- (iii) If the total float value is zero, it means the resources are just sufficient to complete the activity without delay.
- (iv) Incentives are substitute for lower wages.
- (v) Personnel Manager has nothing to do with productivity. It is the job of Technical Personnel.
- (vi) Ranking is one of the Job Evaluation Techniques.

Answer:

1. (a) (i) (b) Short term forecasting is used,
 (ii) (a) Line layout
 (iii) (c) For stock and supply
 (iv) (c) Must be slightly greater than the highest time element given in the problem
 (v) (b) In Product system the machinery and equipment are fixed and in project system are not fixed.
 (vi) (b) Manufacturing department
 (vii) (c) 3 to 6 months
 (viii) (c) PERT & CPM
 (ix) (c) Both the plan and the performance, and deviation from the plan
 (x) (d) To keep operator idle time, material waiting time and ancillary machine time at minimum.

(b)

	Column 'A'		Column 'B'
a.	Materials Requirement Planning	iv.	Inventory management
b.	Programme Evaluation and Review Technique	v.	Project planning
c.	Average Outgoing Quality	i.	Quality Control
d.	Methods Time measurement	vi.	Work measurement
e.	Linear Programming	iii.	Product mix determination
f.	Value Analysis	ii.	Cost Control

- (c) (i) (T)
 (ii) (T)
 (iii) (T)
 (iv) (F)
 (v) (F)
 (vi) (T)

[Answer any three questions from the following]

2. (a) Discuss some recent trends in operations management.

(b) An investigation into the demand for colour TV sets in 5 towns has resulted in the following data:

Population of the town(in lakhs)	X:	5	7	8	11	14
No of TV sets demanded(in thousands)	Y:	9	13	11	15	19

Fit a linear regression of Y on X and estimate the demand for CTV sets for two towns with population of 10 lakhs and 20 lakhs.

6+10=16

Answer:

2. (a) Recent trends in production/operations management relate to global competition and the impact it has on manufacturing firms. Some of the recent trends are:
1. **Global Market Place:** Globalisation of business has compelled many manufacturing firms to have operations in many countries where they have certain economic advantage. This has resulted in a steep increase in the level of competition among manufacturing firms throughout the world.
 2. **Production/Operations Strategy:** More and more firms are recognising the importance of production/ operations strategy for the overall success of their business and the necessity for relating it to their overall business strategy.
 3. **Total Quality Management (TQM):** TQM approach has been adopted by many firms to achieve customer satisfaction by a never-ending quest for improving the quality of goods and services.
 4. **Flexibility:** The ability to adapt quickly to changes in volume of demand, in the product mix demanded, and in product design or in delivery schedules, has become a major competitive strategy and a competitive advantage to the firms. This is sometimes called as agile manufacturing.
 5. **Time Reduction:** Reduction of manufacturing cycle time and speed to market for a new product provide competitive edge to a firm over other firms. When companies can provide products at the same price and quality, quicker delivery (short lead times) provide one firm competitive edge over the other.
 6. **Technology:** Advances in technology have led to a vast array of new products, new processes and new materials and components. Automation, computerisation, information and communication technologies have revolutionised the way companies operate. Technological changes in products and processes can have great impact on competitiveness and quality, if the advanced technology is carefully integrated into the existing system.

(b) Computation of trend values

Population (in lakhs)	Sales of CTV (in thousands)	Squares of the population	Product of population and sales of colour TV
X	Y	X^2	XY
5	9	25	45
7	13	49	91
8	11	64	88
11	15	121	165
14	19	196	266
$\Sigma X = 45$	$\Sigma Y = 67$	$\Sigma X^2 = 455$	$\Sigma XY = 655$

Regression equation of Y on X

$$Y = a + bX$$

To find the values of a and b, the following two equations are to be solved

$$\Sigma Y = na + b\Sigma X \dots (i)$$

$$\Sigma XY = a\Sigma X + b\Sigma X^2 \dots (ii)$$

By putting the values we get

$$67 = 5a + 45b \dots \text{(iii)}$$

$$655 = 45a + 455b \dots \text{(iv)}$$

Multiplying equation (iii) by 9 and putting it as no. (v) we get,

$$603 = 45a + 405b \dots \text{(v)}$$

By deducting equation (v) from equation (iv); we get $52 = 50b$

$$b = 52 / 50 = 1.04$$

By putting the value of b in equation (iii), we get

$$\text{we get } 67 = 5a + 45 \times 1.04$$

$$\text{or, } 67 = 5a + 46.80$$

$$\text{or, } 67 - 46.80 = 5a$$

$$\text{or, } 5a = 20.20$$

$$\text{or, } a = 20.20 / 5$$

$$\text{or } a = 4.04$$

Now by putting the values of a and b the required regression equation of Y on X, is

$$Y = a + bX \text{ or, } Y = 4.04 + 1.04X$$

When X = 10 lakhs then Y = 4.04 + 1.04 (10)

$$\text{or, } Y = 4.04 + 10.40 \text{ or } 14.44 \text{ thousand CTV sets.}$$

Similarly for town having population of 20 lakhs, by putting the value of X = 20 lakhs in regression equation

$$Y = 4.04 + 1.04 (20)$$

$$= 4.04 + 20.80 = 24.84 \text{ thousands CTV sets.}$$

Hence expected demand for CTV for two towns will be 14.44 thousand and 24.84 thousand CTV sets.

3. (a) Discuss the stages of product life cycle.

(b) What is TQM? What are the underlying principles in TQM?

8+8=16

Answer:

3. (a) Products, like men, are mortal. They flourish for a time, then decline and die. The life cycle of a product has many points of similarity with the human life cycle. A product is born, grows lustily, attains a dynamic maturity, then enters its declining years. The stages taken together are referred to as "the product life cycle". This life cycle of the product comprises of four stages: Introduction, Growth, Maturity and Decline.

The **introduction stage** is preceded by 'production planning and development'. This period requires greater investment. This investment should be gradually recouped as the sales pick up. The concept of life cycle would give the management an idea as to the time within which the original investment could be recouped.

Answer to MTP_Intermediate_Syllabus 2016_June 2020_Set 1

After testing, a product enters the introduction stage and the product will then become available in the national market. Sales would begin gradually as potential buyers come to know about the product through advertising and other selling techniques. But the profits will be low as part of the investment is to be recouped besides heavy expenditure on selling.

In the **growth stage**, both sales and profits will begin to increase. It is here that similar other new products begin to appear in the market as substitutes and offer competition. The management, therefore, should try to change its approach by changing its strategy from "buy my product" to "try my product". At the end of this stage, the distribution arrangement is likely to get completed and the prices, if necessary, are reduced a little.

The third stage is the **maturity stage**. During this stage the manufacturers introduce new models or adopt methods such as trading-in, etc., to promote the sale of their brands with a view to retaining their position in the market. The number of buyers will continue to grow, but more slowly. In economic terms this is the stage where supply exceeds demand. Some of the promotional efforts may lengthen the span of this stage but they will not offer a permanent solution.

At the final stage of **decline**, profit margins touch a low level, competition becomes severe and customers start using newer and better products. It is here that the story of a product ends-a natural but hard end.

The above discussion concentrates only on the life cycle of a product, beginning with its introduction into the market (i.e., post-marketing). But a series of processes are to be undertaken by the management prior to the introduction of a product. The diagram given above is presented in an enlarged form to incorporate the pre-introduction (or pre-marketing) stages also.

(b) TQM is a philosophy that involves everyone in an organisation in a continual effort to improve quality and achieve customer satisfaction. TQM is Japanese approach to quality. The term TQM refers to a quest-for quality in an organization. TQM is a process that underlines three philosophies. One is never-ending push to improve, which is referred to as continuous improvement; the second is the involvement of every employee in the organization and the third is the goal for customer satisfaction, which means meeting or exceeding customer expectations. It often focuses on benchmarking world-class standards, product and service design and purchasing.

Underlying Principles in TQM:

1. Strive for quality in all things (Total Quality)
2. The customer is the creation of quality
3. Improve the process or systems by which products are produced
4. Quality improvement is continuous, never ending activity (continuous improvement - Kaizen)
5. Worker involvement is essential
6. Ground decisions and actions on knowledge
7. Encourage team work and cooperation.

Answer to MTP_Intermediate_Syllabus 2016_June 2020_Set 1

4. (a) Four jobs can be processed on four different machines, with one job on one machine. Resulting profits vary with assignments. They are given below:

		MACHINES			
		A	B	C	D
JOBS	I	42	35	28	21
	II	30	25	20	15
	III	30	25	20	15
	IV	24	20	16	12

Find the optimum assignment of jobs to machines and the corresponding profit.

- (b) A Small retailer has studied the weekly receipts and payments over the past 200 weeks and has developed the following set of information:

Weekly Receipts (₹)	Probability	Weekly Payments (₹)	Probability
3,000	0.20	4,000	0.30
5,000	0.30	6,000	0.40
7,000	0.40	8,000	0.20
12,000	0.10	10,000	0.10

Using the following set of random numbers, simulate the weekly pattern of receipts and payments for the 12 weeks of the next quarter, assuming further that the beginning bank balance is ₹8000. What is the estimated balance at the end of the 12 weekly period? What is the highest weekly balance during the quarter? What is the average weekly balance for the quarter?

Random Numbers

For Receipts	03	91	38	55	17	46	32	43	69	72	24	22
For Payments	61	96	30	32	03	88	48	28	88	18	71	99

According to the given information, the random number interval is assigned to both the receipts and the payments.

8+8=16

Answer:

4. (a) Relative Loss Matrix

M/cs jobs	A	B	C	D	As this is a problem of Maximisation, the same is converted to one of Minimisation by forming a Relative Loss Matrix where all the elements of the given matrix are subtracted from the highest element of the matrix (which is 42 in this case)
I	0	7	14	21	
II	12	17	22	27	
III	12	17	22	27	
IV	18	22	26	30	

Matrix after Row Operation

M/cs Jobs	A	B	C	D
I	0	7	14	21
II	0	5	10	15
III	0	5	10	15
IV	0	4	8	12

Matrix after Column Operation

M/cs Jobs	A	B	C	D	
I	0	3	6	9	
II	0	1	2	3	
III	0	1	2	3	
IV	0	0	0	0	

Here minimum no. of horizontal and vertical straight lines to cover all the zeros = 2 \neq Order of the matrix (4) So the solution is non optimal.

Improved Matrix (Non Optimal)

M/cs Jobs	A	B	C	D	
I	0	2	5	8	
II	0	0	1	2	
III	0	0	1	2	
IV	1	0	0	0	

Here minimum no. of horizontal and vertical straight lines to cover all the zeros = 3 \neq Order of the matrix (4)
So the solution is non optimal.

Further Improved Matrix [Optimal Solution (i)]

M/cs Jobs	A	B	C	D	
I	0	2	4	7	
II	0	0	0	1	
III	0	0	0	1	
IV	2	1	0	0	

Here minimum no. of horizontal and vertical straight lines to cover all the zeros = 4 = Order of the matrix.
So the solution is optimal.

Assignment as per Solution (i)			Assignment as per Solution (ii)		
Jobs	M/cs	Profit(₹)	Jobs	M/cs	Profit(₹)
I	A	42	I	A	42
II	B	25	II	B	20
III	C	20	III	C	25
IV	D	12	IV	D	12
Total	-	₹99	Total	-	₹99

Further Improved Matrix (Optimal Solution-ii)

M/cs Jobs	A	B	C	D
I	0	2	4	7
II	0	0	0	1
III	0	0	0	1

IV	2	1	X	0
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(b)

Range of random numbers							
Receipt (₹)	Probability	Cumulative Probability	Range	Payments (₹)	Probability	Cumulative probability	Range
3,000	0.20	0.20	00-19	4,000	0.30	0.30	00-29
5,000	0.30	0.50	20-49	6,000	0.40	0.70	30-69
7,000	0.40	0.90	50-89	8,000	0.20	0.90	70-89
12,000	0.10	1.00	90-99	10,000	0.10	1.00	90-99

Simulation of Data for a period of 12 weeks					
Week	Random No. for receipt	Expected Receipt (₹)	Random No. for payment	Expected Payment (₹)	Week end Balance (₹)
Opening Balance					8,000
1	03	3,000	61	6,000	5,000 (8000+3000-6000)
2	91	12,000	96	10,000	7,000
3	38	5,000	30	6,000	6,000
4	55	7,000	32	6,000	7,000
5	17	3,000	03	4,000	6,000
6	46	5,000	88	8,000	3,000
7	32	5,000	48	6,000	2,000
8	43	5,000	28	4,000	3,000
9	69	7,000	88	8,000	2,000
10	72	7,000	18	4,000	5,000
11	24	5,000	71	8,000	2,000
12	22	5,000	99	10,000	(3,000)

Estimated balance at the end of 12th week = ₹ (3,000)

Highest balance = ₹ 7,000

Average balance during the quarter = $45,000/12 = ₹ 3,750$

5. (a) A project has the following time schedule

Activity	1-2	1-3	1-4	2-5	3-6	3-7	4-6	5-8	6-9	7-8	8-9
Time (months)	2	2	1	4	8	5	3	1	5	4	3

Construct a PERT network and compute

- Critical path and its duration
- Total float for each activity

Also, find the minimum number of cranes the project must have for its activities 2-5, 3-7, 5-8 and 8-9 without delaying the project given that one crane is sufficient to carry out the work involved in each activity if taken care of individually.

Answer to MTP_Intermediate_Syllabus 2016_June 2020_Set 1

(b) A firm is using a machine whose purchase price is ₹ 15,000. The installation charges amount to ₹ 3,500 and the machine has a scrap value of only ₹ 1,500 because the firm has a monopoly of this type of work. The maintenance cost in various years is given in the following table:

Year	1	2	3	4	5	6	7	8	9
Maintenance Cost(₹)	260	760	1,100	1,600	2,200	3,000	4,100	4,900	6,100

The firm wants to determine after how many years should the machine be replaced on economic considerations, assuming that the machine replacement can be done only at the year end.

$$9+7=16$$

Answer:

5. (a) Steps:

1. Moving forward, find EF times (choosing the Maximum at activity intersection)
2. Maximum EF = LF = Critical Path Time.
3. Return path find LF (Choosing the Minimum at activity intersection)
4. Note LF, EF from network (except activity intersections)

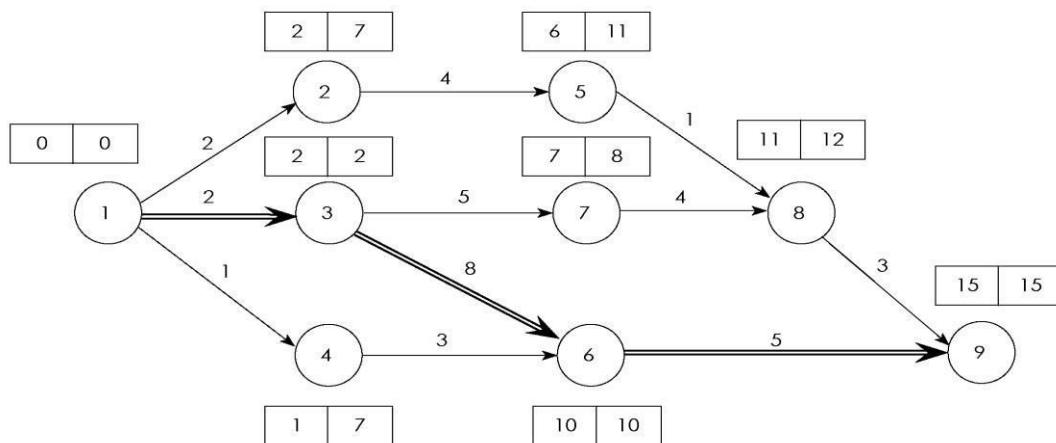


Table: Activity Relationship

Activity	Duration Months (t _{ij})	Earliest Start (ES _{ij})	Earliest Finish (EF _{ij} = ES _{ij} + t _{ij})	Latest Start (LS _{ij} = LF _{ij} - t _{ij})	Latest Finish (LF _{ij})	Total Float (TF _{ij} = LS _{ij} + ES _{ij} = LE _{ij} - EF _{ij})
1-2	2	0	2	5	7	5
1-3	2	0	2	0	2	0
1-4	1	0	1	6	7	6
2-5	4	2	6	7	11	5
3-6	8	2	10	2	10	0
3-7	5	2	7	3	8	1
4-6	3	1	4	7	10	6
5-8	1	6	7	11	12	5
6-9	5	10	15	10	15	0

7-8	4	7	11	8	12	1
8-9	3	11	14	12	15	1

Critical path is 1-3-6-9 with duration 15 months

(b) Cost of machine, $C = ₹ 15,000 + ₹ 3,500 = ₹ 18,500$

Scrap value, $S = ₹ 1,500$.

Year	Maintenance Cost, M_1 (₹)	Cumulative Maintenance Cost, ΣM_1 (₹)	Cost of Machine – Scrap Value (₹)	Total Cost $T(n)$ (₹)	Annual Cost $A(n)$ (₹)
(i)	(ii)	(iii)	(iv)	(v)=(iii)+(iv)	(vi)=(v)/n
1	260	260	17,000	17,260	17,260
2	760	1,020	17,000	18,020	9,010
3	1,100	2,120	17,000	19,120	6,373
4	1,600	3,720	17,000	20,720	5,180
5	2,200	5,920	17,000	22,920	4,584
6	3,000	8,920	17,000	25,920	4,320
7	4,100	13,020	17,000	30,020	4,288*
8	4,900	17,920	17,000	34,920	4,365
9	6,100	24,020	17,000	41,020	4,557

Lowest average cost is ₹ 4,288 approx., which corresponds to $n = 7$ in above table. Thus machine needs to be replaced every 7th year.

Section – II: (Strategic Management)

6. Choose the correct answer from the given alternatives:

1x6=6

- (i) The essential ingredients of Business Process Re-engineering are:
- (a) Continuous improvements of products, processes and technologies.
 - (b) Advanced planning in the areas of technologies, processes and strategic partnerships etc.
 - (c) Fundamental rethinking and radical redesign of business process to achieve dramatic results.
 - (d) Generation, comparison and evolution of many ideas to find out one worthy of development.
 - (e) Identification and selection of layouts most suited for products and processes
- (ii) Innovation strategy is:
- (a) defensive strategy
 - (b) offensive strategy
 - (c) responding to or anticipating customer and market demands
 - (d) guerrilla strategy
 - (e) harvesting strategy
- (iii) The Product Market matrix comprising of Strategies of Penetration, Market Development Product Development and Diversification was first formulated by

- (a) Ansoff
- (b) Drucker
- (c) Porter
- (d) Andrews
- (e) Prahalad

(iv) Outsourcing is the

- (a) Spinning off of a value-creating activity to create a new firm
- (b) Selling of a value-creating activity to other firms
- (c) Purchase of a value-creating activity from an external supplier
- (d) Use of computers to obtain value-creating data from the Internet

(v) Successful 'differential strategy' allows a company to

- (a) Gain buyer loyalty to its brands
- (b) Charge too high a price premium
- (c) Have product quality that exceeds buyers' needs
- (d) Depend only on intrinsic product attributes.

(vi) Risk Management Strategies are

- (a) Avoid Risk, Reduce Risk, Retain Risk, Combine Risk
- (b) Transfer Risk, Share Risk and Hedge Risk
- (c) Both (A) and (B)
- (d) None of the above.

Answer:

6. (i) (c) Fundamental rethinking and radical redesign of business process to achieve dramatic results.
(ii) (c) responding to or anticipating customer and market demands
(iii) (a) Ansoff
(iv) (c) Purchase of a value-creating activity from an external supplier
(v) (a) Gain buyer loyalty to its brands
(vi) (c) Both (A) and (B)

[Answer any two questions from the following]

7. (a) Discuss the major steps in Strategic Management Process.

(b) Enumerate some Corporate Weaknesses.

[6+6=12]

Answer:

7. (a) Steps of Strategic Management Process:

Step 1: Identifying Defining Business Mission, Purpose and Objectives: Identifying or defining an organisation's existing mission, purpose and objectives is the logical starting point as they lay foundation for strategic management. Every organisation has a mission, purpose and objectives, even if these elements are not consciously designed, written & communicated. These elements relate the organisation with the society and states that it has to achieve for itself and to the society.

Step 2: Environmental Analysis: Environmental factors — both internal environment and external environment — are analysed to:

- (i) identify changes in the environment,
- (ii) identify present and future threats and opportunities, and
- (iii) assess critically it's own strengths and weaknesses.

Organisational environment encompasses all factors both inside and outside the organisation that can influence the organisation positively and negatively. Environmental factors may help in building a sustainable competitive advantage.

Step 3: Revise Organisational Direction: A thorough analysis of organisation's environment pinpoints it's strengths, weaknesses, opportunities and threats (SWOT). This can often help management to reaffirm or revise it's organisational direction.

Step 4: Strategic Alternatives and Choice: Many alternative strategies are formulated based on possible options and in the light of organisational analysis and environmental appraisal. Alternative strategies will be ranked based on the SWOT analysis. The best strategy out of the alternatives will be chosen.

The steps from identification of business mission, purpose and objectives of alternative strategies and choice can be grouped into the broad step of strategy formulation.

Step 5: Strategy Implementation: The fifth step of strategic management process is the implementation of strategy. The logically developed strategy is to be put into action. The organisation can not reap the benefits of strategic management, unless the strategy is effectively implemented.

The managers should have clear vision and idea about the competitor's strategy, organisation's culture, handling change, skills of the managers-in-charge of implementation and the like. The progress from the stage of identification of business mission, purpose and objectives to the stage of achieving desired performance must overcome many obstacles.

Step 6: Strategic Evaluation and Control: The final step of strategic management process is strategic evaluation and control. It focuses on monitoring and evaluating the strategic management process in order to improve it and ensure that it functions properly. The managers must understand the process of strategic control and the role of strategic audit to perform the task of control successfully.

(b) Corporate Weaknesses:

Similar to Corporate strengths, there may be corporate weaknesses too. These may be enumerated as under:

- (i) Under-utilisation of capacity due to economic slump
- (ii) High debt burden in the capital structure
- (iii) Poor product-mix
- (iv) Lack of managerial strengths
- (v) Industrial unrest
- (vi) Technology gap
- (vii) Demand gap
- (viii) Poor infrastructures
- (ix) Raw materials source at a distance
- (x) Lack of latest information technology
- (xi) Competition war

(xii) Global threats

8. (a) State the basic differences between strategic management and strategic planning.

(b) State the various advantages and disadvantages of Matrix Organisation Structure.

[4+8=12]

Answer:

8. (a) The basic difference between Strategic management and Strategic planning are as follows:

Strategic Management	Strategic Planning
1. It is focused on producing strategic results; new markets; new products; new technologies etc.	1. It is focused on making optimal strategic decisions.
2. It is management by results.	2. It is management by plans.
3. It is an organizational action process.	3. It is an analytical process.
4. It broadens focus to include psychological, sociological and political variables.	4. It is focused on business, economic and technological variables.

(b) Advantages of Matrix Organisation Structure:

- (i) Useful for some specific industries like Information Technology, Healthcare etc.
- (ii) Employee can see visible results of their efforts
- (iii) Remove barrier to communications
- (iv) Managing projects are easy
- (v) Effective structures when environment is very dynamic

Disadvantages of Matrix Organisation Structure:

- (i) Complex structure as this contains both vertical and horizontal flow of information
- (ii) High cost approach due to more management positions
- (iii) Dual lines of authority
- (iv) Conflicts arises in the allocation of resources

9. Write short notes on any three of the following:

[4x3=12]

(a) Need for Production Strategy.

(b) Hybrid Organization in Strategy Implementation

(c) General Model Stages in BPR

(d) Strategic Planning and Long Range Planning

Answer:

9. (a) Need for a Production Strategy:

The key to successful survival of an enterprise as an independent unit is how efficiently production activity is managed. The two major factors that contribute to business

failures are obsolescence of the product line and excessive production costs. These factors themselves have been the outcome of ineffective production planning.

Production strategy plays crucial role in shaping the ultimate success of a firm. Being based on objective analysis of external environmental forces and corporate strengths and weaknesses, it enables an organisation to make optimal decisions regarding product, production capacity, and plant location, choice of machine and equipment and maintenance of existing facilities. Constant review of manufacturing plan aids in maintaining proper balance of capital investment in plant, equipment and inventory, personnel commitment, efficient operation of the production system by bringing in flexibility and versatility in response to schedule fluctuations, product mix and variations in raw material and quality control, and ensures effective material handling and planning of facilities.

Within the corporate structure, production strategy helps in maintaining full co-ordination with marketing and engineering functions to formulate plans to improve products and services. It calls upon management to keep in constant touch with finance and personnel to achieve the optimal use of assets, cost control, recruitment of suitable production personnel and management of labour disputes and negotiations.

(b) Hybrid Organization in Strategy Implementation:

The successful implementation of Strategy requires an effective organization structure. Organizational structure means the framework in which the organization defines how tasks are divided, resources are deployed and departments are co-ordinated.

A single type of structural design is not always sufficient to meet the requirements of strategy. When this occurs, one opinion is to mix and blend the basic organizations forms, matching structure to strategy, requirement by requirement, and unit by unit, Hybrid structure is a form of departmentalization that adopts parts of both functional and divisional structures at the same level of management.

The major potential advantage of the hybrid structures is that the combination may allow the firm to gain the advantages offered by the primary structure while at least diminishing the impact of the disadvantages.

(c) General Model Stages in BPR:

The Envision stage: the company reviews the existing strategy and business processes and based on that review business processes for improvement are targeted and IT opportunities are identified.

The Initiation stage: project teams are assigned, performance goals, project planning and employee notification are set.

The Diagnosis stage: documentation of processes and sub-processes takes place in terms of process attributes (activities, resources, communication, roles, IT and costs).

The Redesign stage: new process design is developed by devising process design alternatives and through brainstorming and creativity techniques.

The Reconstruction stage: management technique changes occur to ensure smooth migration to the new process responsibilities and human resource roles.

The Evaluation stage: the new process is monitored to determine if goals are met and examine total quality programs.

(d) Strategic Planning and Long Range Planning:

Long range planning is a systematic and formalized process concerned with directing and controlling future operations of an enterprise towards desired objectives for periods spreading generally over 5 or more years. It provides an opportunity to management to anticipate future problems and have got more flexibility in framing the long-range plans.

The basic divergence between strategic planning and long-range planning lies in the difference in the assumption regarding the future environment of an organisation. In case of long-range planning current knowledge about future conditions is known with certainty that can be relied upon by executives. Accordingly, the course of action for achievement of organisational goals is drawn on the basis of this knowledge. In long range planning the future is forecasted through extrapolation of the historical growth.

On the contrary, strategic planning assumes that an organisation must be ready to respond to a dynamic environment and future environmental conditions are not known with perfect certainty. Thus, there is a need to emphasise and understand how the environment assumed is changing. Accordingly, the issue of developing courses of action in response to these changes will have to be taken up. Here, a number of alternatives are generated for several situations for the future. In case of strategic planning, the firm tries to identify opportunities, threats and trends based on which the future prospects are analysed.

Paper 9- OPERATIONS MANAGEMENT & STRATEGIC MANAGEMENT

Paper 9- Operations Management and Strategic Management

Full Marks: 100

Time allowed: 3 hours

The figures in the margin on the right side indicate full marks.

This question paper has two sections.

Both the sections are to be answered subject to instructions given against each.

Section – I : [Operations Management]

1. (a) Choose the correct answer from the given four alternatives.

[1x10=10]

- (i) The material handling cost per unit of product in Continuous production is:**
 - (a) Highest compared to other systems,**
 - (b) Lower than other systems,**
 - (c) Negligible,**
 - (d) Cannot say.**

- (ii) The desired objective of Production and Operations Management is:**
 - (a) Use cheap machinery to produce,**
 - (b) To train unskilled workers to manufacture goods perfectly,**
 - (c) Optimal utilisation of available resources,**
 - (d) To earn good profits.**

- (iii) In aggregate planning, one of the methods in modification of demand is:**
 - (a) Differential Pricing,**
 - (b) Lay off of employees,**
 - (c) Over time working,**
 - (d) Sub contracting.**

- (iv) In a CPM/PERT network a dummy activity is necessary when**
 - (a) two activities have the same starting node**
 - (b) two activities have the same ending node**
 - (c) a node does not actually connect to another node**
 - (d) two activities share the same starting and ending node**

- (v) Fixing the flow lines of materials in production is known as:**
 - (a) Scheduling,**
 - (b) Loading,**
 - (c) Planning,**
 - (d) Routing.**

- (vi) Preferred numbers are used to:**
 - (a) To determine the number of varieties that are to be manufactured,**
 - (b) To test the design of the product,**
 - (c) To ascertain the quality level of the product,**
 - (d) To evaluate the production cost.**

- (vii) When work centers are used in optimal sequence to do the jobs, we can:**
 - (a) Minimise the set up time,**
 - (b) Minimise operation time,**
 - (c) Minimise the breakdown of machines,**
 - (d) Minimise the utility of facility.**

- (viii) Which one of the following standards is associated with the “Quality Assurance in Production and Installation”?
- ISO 9001
 - ISO 9002
 - ISO 9003
 - ISO 9004
- (ix) The time horizon selected for forecasting depends on:
- The salability of the product,
 - The selling capacity of Salesman,
 - Purpose for which forecast is made,
 - Time required for production cycle
- (x) In Continuous manufacturing system, we need:
- General purpose machines and Skilled labours,
 - Special machine tools and highly skilled labours,
 - Semi automatic machines and unskilled labours,
 - General purpose machines and unskilled labours.

(b) Match the following:

[6×1=6]

	Column 'A'		Column 'B'
a.	Normal Curve	i.	Project Funding
b.	Stock level	ii.	Capacity planning
c.	Short Run Average Cost	iii.	Job Evaluation
d	Industrial Finance Corporation of India	iv.	Statistical Quality Control
e.	Ranking Method	v.	Value Analysis
f.	Improvement in productivity	vi.	Inventory Control

(c) State whether the following statements are True/False.

1×6=6

- EOQ formula does not consider storage cost.
- Results available from work sampling study is 100% accurate.
- In a Network Analysis, a job for which the slack time is zero is known as non-critical job.
- Z chart is a chart used in Programme Control.
- When demand does not exist in the market, we should start Production Incentives.
- It is justified to consider the effect of working condition both in Work Measurement and Job-Evaluation.

Answer:

- (a) (i) (b) Lower than other systems
 (ii) (c) Optimal utilisation of available resources
 (iii) (a) Differential Pricing
 (iv) (d) two activities share the same starting and ending node
 (v) (d) Routing
 (vi) (a) To determine the number of varieties that are to be manufactured
 (vii) (a) Minimise the set up time
 (viii) (b) ISO 9002
 (ix) (c) Purpose for which forecast is made
 (x) (b) Special machine tools and highly skilled labours

(b)

	Column 'A'		Column 'B'
a.	Normal Curve	iv.	Statistical Quality Control
b.	Stock level	vi.	Inventory Control
c.	Short Run Average Cost	ii.	Capacity planning
d.	Industrial Finance Corporation of India	i.	Project Funding
e.	Ranking Method	iii.	Job Evaluation
f.	Improvement in productivity	v.	Value Analysis

- (c) (i) (F)
 (ii) (F)
 (iii) (F)
 (iv) (T)
 (v) (F)
 (vi) (T)

[Answer any three questions from the following]

2. (a) What is operations management? Discuss the objectives of operations management.

(b) A manager has to decide about the number of machines to be purchased. He has three options i.e., purchasing one, or two or three machines. The data are given below:

Number of machine	Annual fixed cost	Corresponding range of output
One	₹12,000	0 to 300
Two	₹15,000	301 to 600
Three	₹21,000	601 to 900

Variable cost is ₹20 per unit and revenue is ₹50 per unit

(a) Determine the break-even point for each range

(b) If projected demand is between 600 and 650 units, how many machines should the manager purchase? [6+10=16]

Answer:

2. (a) Operations management is the management of that part of an organization that is responsible for producing goods and/or services. Operations Management concerns with the conversion of inputs into outputs, using physical resources, so as to provide the desired utilities to the customer while meeting the other organizational objectives of effectiveness, efficiency and adoptability.

OBJECTIVES OF OPERATIONS MANAGEMENT

Objectives of operations management can be categorised into (i) Customer service and (ii) Resource utilisation.

(i) Customer service

The first objective is the customer service which means the service for the satisfaction of customer wants. Customer service is therefore a key objective of operations management.

The Operations Management must provide something to a specification which can satisfy the customer in terms of cost and timing. Thus, primary objective can be satisfied by providing the 'right thing at the right price at the right time'.

(ii) Resource Utilization

Another major objective is to utilize resources for the satisfaction of customer wants effectively, i.e., customer service must be provided with the achievement of effective operations through efficient use of resources. Inefficient use of resources or inadequate customer service leads to commercial failure of an operating system.

Operations management is concerned essentially with the utilization of resources, i.e., obtaining maximum effect from resources or minimizing their loss, under utilization or waste. The extent of the utilization of the resources' potential might be expressed in terms of the proportion of available time used or occupied, space utilization, levels of activity, etc. Each measure indicates the extent to which the potential or capacity of such resources is utilized. This is referred as the objective of resource utilization.

Operations management is also concerned with the achievement of both satisfactory customer service and resource utilization. An improvement in one will often give rise to deterioration in the other. Often both cannot be maximized, and hence a satisfactory performance must be achieved on both objectives. All the activities of operations management must be tackled with these two objectives in mind, and many of the problems will be faced by operations managers because of this conflict. Hence, operations managers must attempt to balance these basic objectives.

(b) (i) Break-even point

Let Q be the breakeven point.

FC = Fixed cost, R = Revenue per unit, VC = Variable cost

At, BEP, $TR = FC + TVC$

or, $Revenue \ p.u \times Q = FC + VC \ p.u \times Q$

$Q (R - VC) = FC$

$Q = FC / R - VC$

Let Q_1 be the break-even-point for one machine option

Then, $Q_1 = 12000 / (50 - 20) = 12000 / 30 = 400 \text{ units}$

(Not within the range of 0 to 300)

Let Q_2 be the break-even-point for two machines option.

Then, $Q_2 = 15000 / (50 - 20) = 15000 / 30 = 500 \text{ units}$

(within the range of 301 to 600)

Let Q_3 be the break-even-point for three machines option.

Then, $Q_3 = 21000 / (50 - 20) = 21000 / 30 = 700 \text{ units}$

(within the range of 601 to 900)

(ii) The projected demand is between 600 to 650 units.

The breakeven point for single machine option (i.e., 400 units) is not feasible because it exceeds the range of volume that can be produced with one machine (i.e., 0 to 300).

Also, the breakeven point for 3 machines is 700 units which is more than the upper limit of projected demand of 600 to 650 units and hence not feasible. For 2 machines option the break even volume is 500 units and volume range is 301 to 600.

Hence, the demand of 600 can be met with 2 machines and profit is earned because the production volume of 600 is more than the break even volume of 500. If the manager wants to produce 650 units with 3 machines, there will be loss because the break even volume with three machines is 700 units. Hence, the manager would choose two machines and produce 600 units.

3. (a) Discuss the characteristics of a good product design.

(b) How technological development affects industrial productivity? [9+7=16]

Answer:

3. (a) Characteristics of Good Product Design

A good product design must ensure the following:

(i) Function or performance: The function or performance is what the customer expects the product to do to solve his/her problem or offer certain benefits leading to satisfaction. For example, a customer for a motor bike expects the bike to start with a few kicks on the kick peddle and also expects some other functional aspects such as pick-up, maximum speed, engine power and fuel consumption etc.

(ii) Appearance or aesthetics: This includes the style, colour, look, feel, etc. which appeals to the human sense and adds value to the product.

(iii) Reliability: This refers to the length of time a product can be used before it fails. In other words, reliability is the probability that a product will function for a specific time period without failure.

(iv) Maintainability: Refers to the restoration of a product once it has failed. High degree of maintainability is desired so that the product can be restored (repaired) to be used within a short time after it breaks down. This is also known as serviceability.

(v) Availability: This refers to the continuity of service to the customer. A product is available for use when it is in an operational state. Availability is a combination of reliability and maintainability. High reliability and maintainability ensures high availability.

(vi) Productibility: This refers to the ease of manufacture with minimum cost (economic production). This is ensured in product design by proper specification of tolerances, use of materials that can be easily processed and also use of economical processes and equipments to produce the product quickly and at a cheaper cost.

(vii) Simplification: This refers to the elimination of the complex features so that the intended function is performed with reduced costs, higher quality or more customer satisfaction. A simplified design has fewer parts which can be manufactured and assembled with less time and cost. “

(viii) Standardisation: Refers to the design activity that reduces variety among a group of products or parts. For example, group technology items have standardised design which calls for similar manufacturing process steps to be followed. Standard designs lead to variety reduction and results in economies of scale due

Answer to MTP_Intermediate_Syllabus 2016_June 2020_Set 2

to high volume of production of standard products. However, standardised designs may lead to reduced choices for customers.

(ix) Specification: A specification is a detailed description of a material, part or product, including physical measures such as dimensions, volume, weight, surface finish etc. These specifications indicate tolerances on physical measures which provide production department with precise information about the characteristics of products to be produced and the processes and production equipments to be used to achieve the specified tolerances (acceptable variations).

Interchangeability of parts in products produced in large volumes (mass production and flow-line production) is provided by appropriate specification of tolerances to facilitate the desired fit between parts which are assembled together.

(x) Safety: The product must be safe to the user and should not cause any accident while using or should not cause any health hazard to the user. Safety in storage, handling and usage must be ensured by the designer and a proper package has to be provided to avoid damage during transportation and storage of the product. For example, a pharmaceutical product while used by the patient, should not cause some other side effect threatening the user.

(b) Technical factors including the degree of mechanisation, technical know-how, raw materials, layout and the methods and techniques of work determine the level of technological development in any industry. The principal factors in technological development affecting productivity are:

- (a) **The Size of the Plant:** The size of the plant and the capacity utilisation has direct bearing on productivity. Production below or above the optimum level will be uneconomical and will tend towards lower level of productivity.
- (b) **Research and Development:** Investment in research and development may yield better method of work and better design and quality of products.
- (c) **Plant and Job Layout:** The arrangement of machines and positions in the plant and the set-up of the work-bench of an individual worker will determine, how economically and efficiently production will be carried out.
- (d) **Machine and Equipment Design:** Whether the design of machinery and equipment is modern and in keeping with the limitations and capacities of the workers will also determine the production efficiency and level of productivity.
- (e) **Production Processes:** Advanced production processes involving the use of modern integrated and automatic machinery and semi-processed materials have been known to help in raising levels of productivity.
- (f) **Power, Raw Materials etc.** Improved quality of raw materials and increased use of power have a favourable effect on productivity.
- (g) **Scientific Management Techniques:** Scientific management techniques such as better planning of work, simplification of methods, time and motion study, emphasis for reduced wastage and spoilage have positive effects on productivity.

4. (a) Priyanshu enterprise has three factories at locations A, B and C which supply three warehouses located at D, E and F. Monthly factory capacities are 10,80 and 15 units respectively. Monthly warehouse requirements are 75, 20 and 50 units respectively. Unit shipping costs (in ₹) are given in the following table:

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	To	D	E	F
	A	5	1	7
From	B	6	4	6
	C	3	2	5

The penalty costs for not satisfying demand at the warehouses D, E and F are ₹ 5, ₹ 3 and ₹2 per unit respectively. Determine the optimum distribution for Priyanshu, using any of the known algorithms.

- (b) As a tool service centre the arrival rate is two per hour and the service potential is three per hour. Simple queue conditions exist.

The hourly wage paid to the attendant at the service centre is ₹1.50 per hour and the hourly cost of a machinist away from his work is ₹4.

Calculate:

- The average number of machinists being served or waiting to be served at any given time.
- The average time a machinist spends waiting for service.
- The total cost of operating the system for an eight – hour day.
- The cost of the system if there were two attendants working together as a team, each paid ₹1.50 per hour and each able to service on average 2 per hour.

[10+6=16]

Answer:

4. (a) Here total monthly capacity of Factories A, B & C = $10 + 80 + 15 = 105$ units

Also total monthly requirement of Warehouses D, E & F = $75 + 20 + 50 = 145$ units

So supply \neq Demand i.e. the problem is unbalanced. To make it balanced, we introduce a Dummy Factory having monthly capacity = $145 - 105 = 40$ units and unit cost of transportation to any warehouse from this Dummy is taken to be zero.

Sharing Initial Basic Feasible Solution (Optimal)

Warehouse Factory	D	E	F	Capacity	Row Penalties			Row Nos. (u_i)
					1	2	3	
A	5 2	1 10	7 4	10	4	4*	–	$u_1 = -3$
B	6 60	4 10	6 10	20 10	2	2	2	$u_2 = 0$ (let)
C	3 15	2 1	5 2	15	1	1	1	$u_3 = -3$
Dummy	0 0	0 2	0 40	40	0	–	–	$u_4 = -6$
Requirement	75 60	20 10	50 10					
Column Penalties	1	3	1	5*				
	2	2	1	1				
	3*	2	1					
Column Nos. (v_j)	$v_1 = 6$	$v_2 = 4$	$v_3 = 6$					

Here, m = No. of rows = 4 and n = No. of columns = 3

$m + n - 1 = 4 + 3 - 1 = 6$ = No. of cell allocations

So the solution is nondegenerate

Now Row Nos. (u_i) and Column Nos. (v_j) are calculated using the formula $C_{ij} = u_i + v_j$ for all the Allocated Cells. Also to start with, it is assumed that $u_2 = 0$

Next, Opportunity Costs (Δ_{ij}) are calculated for all the Unallocated Cells using the formula $\Delta_{ij} = C_{ij} - (u_i + v_j)$ and written at the left bottom corner of the Unallocated Cells.

As $\Delta_{ij} \geq 0$, the solution is optimal.

Optimum Distribution Plan

From Factory	To Warehouse	Quantity (Units)	Cost/Unit (')	Total (')	
(1)	(2)	(3)	(4)	(5)=(3)x(4)	
A	E	10	1	10	Minimum total cost = 10 + 360 + 40 + 60 + 45 + 80 = ₹595
B	D	60	6	360	
	E	10	4	40	
	F	10	6	60	
C	D	15	3	45	
Dummy	F	40	2*	80	

This cost is the penalty for not meeting the demand of F.

- b)** Arrival rate = $\lambda = 2$ per hour
Service rate = $\mu = 3$ per hour

- (i) Average number of machinists being served or waiting to be served at any given time:

$$L_s = \frac{\lambda}{\mu - \lambda} = \frac{2}{3-2} = 2$$

- (ii) Average Time a machinist spends waiting for the services:

$$W_q = \frac{\lambda}{\mu} \times \frac{1}{\mu - \lambda} = \frac{2}{3} \times \frac{1}{3-2} = 0.667 \text{ hours}$$

It means a machinist spends 40 minutes (i.e., 60×0.667) in the queue.

- (iii) Average time in the system

$$W_s = \frac{1}{(\mu - \lambda)} = \frac{1}{3-2} = 1 \text{ hour}$$

Average number of machinists in the system = 2 [As per (i) above]

Cost of two machinists being away from work = ₹4 x 2 = ₹8.00 per hour

Attendant cost = 1.50 per hour
9.50 per hour

Cost of 8- hour day = 8 hrs x 9.50 = ₹ 76.00

- (iv) It is assumed that there is still a single service point, but the average service rate with 2 attendants now is 4 per hour

Now $\lambda = 2$ per hour

$\mu = 4$ per hour

$$\text{Average number of machinists in the system} = L_s = \frac{\lambda}{\mu-\lambda} = \frac{2}{4-2} = 1$$

$$\text{Average time spent by a machinist in the system} = W_s = \frac{1}{\mu-\lambda} = \frac{1}{4-2} = \frac{1}{2} \text{ hour}$$

Machinists cost = $1/2 \text{ hr} \times ₹ 4 =$	₹ 2.00
Attendant cost(@1.50 per attendant $\times 2$ attendants)	₹ 3.00
Total Cost	₹ 5.00

Cost per 8 – hour day = ₹ 5 \times 8 hrs. = ₹ 40.00

5. (a) In a factory, there are six jobs to perform, each of which should go through two machines A and B, in the order AB. The processing timings (in hours) for the jobs are given here. You are required to determine the sequence for performing the jobs that would minimise the total elapsed time, T. What is the value of T?

Job	Machine A	Machine B
1	7	3
2	4	8
3	2	6
4	5	6
5	9	4
6	8	1

- (b) An electric company which generates and distributes electricity conducted a study on the life of poles. The repatriate life data are given in the following table:

Life data of electric poles

Year after installation:	1	2	3	4	5	6	7	8	9	10
Percentage poles failing:	1	2	3	5	7	12	20	30	16	4

If the company now installs 5,000 poles and follows a policy of replacing poles only when they fail, how many poles are expected to be replaced each year during the next ten years?

To simplify the computation assume that failures occur and replacements are made only at the end of a year.

If the cost of replacing individually is ₹160 per pole and if we have a common group replacement policy it costs ₹ 80 per pole, find out the optimal period for group replacement.

[7+9=16]

Answer:

5. (a)

- (i) The least of all the times given in the table is for job 6 on machine B. So, perform job 6 in the end. It is last in the sequence. Now delete this job from the given data.
- (ii) Of all timings now, the minimum is for job 3 on machine A. So, do the job 3 first.

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- (iii) After deleting job 3 also, the smallest time of 3 hours is for job 1 on machine B. Thus, perform job 1 in the end (before job 6).
- (iv) Having assigned job 1, we observe that the smallest value of 4 hours is shared by job 2 on machine A and job 5 on machine B. So, perform job 2 first and job 5 in the end.
- (v) Now, the only job remaining is job 4, it shall be assigned the only place left in the sequence. The resultant sequence of jobs is, therefore, as follows:

3	2	4	5	1	6
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This sequence is the optimal one. The total elapsed time, T, is obtained in Table as equal to 36 hours.

Table: Calculation of Total Elapsed Time (T)

Job	Machine A		Machine B	
	In	Out	In	Out
3	0	2	2	8
2	2	6	8	16
4	6	11	16	22
5	11	20	22	26
1	20	27	27	30
6	27	35	35	36

As shown in this table, the first job, job 3, starts at time 0 on the machine A and is over by time 2, when it passes to machine B to be worked on till time 8. The job 2 starts on the machine A at time 2 as the machine is free at that time. It is completed at time 6 and has to wait for 2 hours before it is processed on machine B, starting at time 8 when this machine is free. Similarly, the various jobs are assigned to the two machines and the in and out times are obtained.

(b) Chart showing Optimal Replacement Period

Average life of the pole - $1 \times 0.01 + 2 \times 0.02 + 3 \times 0.03 + 4 \times 0.05 + 5 \times 0.07 + 6 \times 0.12 + 7 \times 0.20 + 8 \times 0.3 + 9 \times 0.16 + 10 \times 0.04 = 7.05$ years.

No. of poles to be replaced every year = $5000/7.05 = 709$

Average yearly cost on individual replacement = $709 \times ₹160 = ₹1,13,440$.

Group Replacement: Initial Cost = $5,000 \times ₹80 = ₹4,00,000$

Year	No. of poles to be replaced	Yearly cost of individual replacement @₹160/pole (₹)	Cumulative Cost of individual replacement (₹)	Total cost of individual replacement as well as group replacement (₹)	Average Annual Cost = Total Cost/Year (₹)
1	$5,000 \times 0.01 = 50$	8,000	8,000	4,08,000	4,08,000
2	$5,000 \times 0.02 + 50 \times 0.01 = 101$	16,160	24,160	4,24,160	2,12,080
3	$5,000 \times 0.03 + 50 \times 0.02 + 101 \times 0.01 = 152$	24,320	48,480	4,48,480	1,49,493
4	$5,000 \times 0.05 + 50 \times 0.03 + 101 \times 0.02 + 152 \times 0.01 = 256$	40,960	89,440	4,89,440	1,22,360
5	$5,000 \times 0.07 + 50 \times 0.05 + 101 \times 0.03 + 152 \times 0.02 + 256 \times 0.01 = 362$	57,920	1,47,360	5,47,360	1,09,472
6	$5,000 \times 1.2 + 50 \times 0.007 + 101 \times 0.05 + 152 \times 0.03 + 256 \times 0.02 + 362 \times 0.01 = 6023$	9,63,680	11,11,040	15,11,040	2,51,840

Optimal replacement at the end of the 5th year.

Section – II: (Strategic Management)

6. Choose the correct answer from the given alternatives:

1x6=6

- (i) New entrants to an industry are more likely when.
 - (a) It is difficult to gain access to distribution channels
 - (b) Economies of scale in the industry are high
 - (c) Product differentiation in the industry is low
 - (d) Capital requirement in the industry are high
- (ii) Typically Profits are highest in which stage of the industry life-cycle ?
 - (a) Introduction
 - (b) Growth
 - (c) Maturity
 - (d) Decline
- (iii) A Question Mark in BCG Matrix is an investment, which
 - (a) Yields low current income but has bright growth prospects.
 - (b) Yields high current income and has bright growth prospects.
 - (c) Yields high current income and has bleak growth prospects.
 - (d) Yields low current income and has bleak growth prospects
- (iv) A supplier group is powerful if
 - (a) It is not concentrated
 - (b) Offers unique products
 - (c) Its customers can backward integrate
 - (d) There are no switching costs
- (v) The strategy which concentrates around a production market is:
 - (a) Vertical Integration
 - (b) Niche
 - (c) Horizontal Expansion
 - (d) Diversification
- (vi) The reason for failure of Strategic Management may be ascribed to
 - (a) Over-estimation of resource competence
 - (b) Failure to obtain senior management commitment
 - (c) Failure to obtain employee commitment
 - (d) All of the above

Answer:

6. (i) (c) Product differentiation in the industry is low
(ii) (b) Growth
(iii) (a) Yields low current income but has bright growth prospects
(iv) (b) Offers unique products
(v) (b) Niche
(vi) (d) All of the above

[Answer any two questions from the following]**7. (a) Discuss the differences between objectives and goals.****(b) What are the factors influencing portfolio strategy?****[4+8=12]****Answer:**

7. (a) The difference between objectives and goals may be drawn in terms of the following four dimensions.

1. **Time Frame.** Objectives are timeless, enduring, and unending; goals are temporal, time-phased, and intended to be superseded by subsequent goals. Because objectives relate to the ongoing activities of an organisation, their achievement tends to be open-ended in the sense of not being bounded by time. For example, the survival objective of a business organisation is never completely attained since failure is always a future possibility.
2. **Specificity.** Objectives are stated in broad, general terms, dealing with matters of image, style, and self-perception. These are aspirations to be worked in the future. Goals are much more specific, stated in terms of a particular result that will be accomplished by a specific date. In the above example, survival as an objective is not very specific because it leads to different interpretation of the stale of survival. On the other hand, goals can be expressed in terms of say achievement of 10 per cent growth in the net sales in the next year. This is more specific and time bound.
3. **Focus.** Objectives are usually stated in terms of some relevant environment which is external to the organisation; goals are more internally focused and carry important implications about how resources of the organisation are utilised or will be utilised in future. Therefore, objectives are more generalised statements like maintaining market leadership, striving continuously for technological superiority, etc. A goal may imply a resource commitment requiring the organisation to use those resources in order to achieve the desired outcomes.
4. **Measurement.** Both objectives and goals can be stated in terms which are quantitatively measured but the character of measurement is different. Generally, quantitative objectives are set in relative terms. For example, Reliance Textiles has put its objectives like this: to acquire top position among the Indian companies. This objective may not be achieved in any one year, but it is timeless and externally focused, providing a continuing challenge for the company. Quantitative goals are expressed in absolute terms. For example, a company has stated its goal to achieve 10 per cent growth in its sales in the next year. The achievement of this goal can be measured irrespective of environmental conditions and competitors' actions.

(b) There are number of factors - historical, personal, strategic, environmental etc. which influence portfolio strategy. Such factors are given below:

1. **Mission/Vision:** The mission of the company is one of the most important factors which influence the portfolio strategy because the mission defines the scope and purpose of the company. Formulation of clear vision about the future has led to restricting the portfolio companies like Glaxo.
2. **Value system:** A factor very much complimentary to the mission that influences the portfolio strategy is the value system of the promoters or major stock holders. After the Murugappa group took over the EID Parry, the liquor business of the EID Parry group was sold off as the Murugappa group management felt that it was unethical to be in the liquor business.

Answer to MTP_Intermediate_Syllabus 2016_June 2020_Set 2

3. **Future of Current Business:** The future prospects of the current business are a very important factor influencing the portfolio strategy. If a current business, particularly the most important one, has a bleak future a company would be tempted to divest or diversify into growing business. Having felt that the future of the tobacco business would be very bleak, the ITC diversified into speciality paper, packaging and printing, hotels, agribusiness, financial services and international business etc. and today the non-tobacco businesses contribute a considerable share of the total turnover of ITC. (Some of these diversifications, however, have not been successful, and the company has, therefore, decided to concentrate more on its core business-tobacco).
4. **Position on the Portfolio Matrix/PLC:** The position of different business on the product portfolio life cycle also may influence the portfolio strategy of a company. Products in the declining stage may be dropped. Similarly some of the dogs or question marks could also be eligible candidates for divestment. Several Indian companies, like the Ceat, have decided to drop businesses which are peripheral or which are not important in terms of business volume or are not otherwise satisfactory in terms of performance and which do not hold out promises for the future of the company. They have adopted the strategy of focusing on the core business (es).
5. **Government Policy:** Government policy sometimes is an important determinant of portfolio strategy. The pre- 1991 regulatory regime did not permit many companies, particularly large ones and foreign firms, to pursue the type of growth and diversification strategies they would have followed in an environment of business freedom, resulting in distorted portfolios. The liberalisation has very significantly transformed the environment. The grant of more autonomy to the Navarathnas has provided them with considerable leeway for charting out their future growth.
6. **Competitive Environment:** The competitive environment too has its influence on the portfolio strategy of many companies. When competition is absent or limited, as in a protected market, even firms which are inefficient may be able to thrive. The protection itself may prompt firms to enter such business.
However, as the market becomes competitive, as has been happening in India because of the liberalisation, things may undergo drastic changes. Many firms which survived or flourished in the protected regime would not be able to survive the competition. Further, for various reasons mentioned under the Case for Focusing, it would become necessary to focus on the core business.

7. **Company Resources:** The resources and strengths of the company, undoubtedly, are important factors influencing the 'portfolio strategy'.
8. **Supply/Demand Conditions:** Problems with input supplies may encourage backward integration. Similarly, problems with marketing the output, or advantages of value addition, may encourage forward integration. When products or services can be obtained cheaply/ more efficiently from outside, it may encourage the dropping of such business and dependence on outside sources.

8. (a) State the benefits of Contingency Planning.

(b) State the various advantages and disadvantages of SBU structure.

[6+6=12]

Answer:**8. (a) Benefits of Contingency Planning**

- (i) It will make the future through their proactive planning and advanced preparation.
- (ii) It will introduce original action by removing present difficulties.
- (iii) It enables to anticipate future problems.
- (iv) It will change the goals to suit internal and external changes.
- (v) It experiments with creative ideas and take initiative.
- (vi) It will attempt to shape the future and create a more desirable environment.
- (vii) It permits quick response to change.
- (viii) It prevents panic in crisis situations.
- (ix) It makes managers more adaptable to unforeseen changes

(b) Advantages of SBU structure:

- (i) Promotes accountability since units' heads are responsible for individual SBU profitability
- (ii) Career development opportunities are further higher in this structure
- (iii) Allow better control of categories of products manufacturing, marketing and distributions
- (iv) Helps to expand in different related and unrelated businesses.

Disadvantages of SBU structure:

- (i) May provide inconsistent approach to tackle customers, etc, because each unit may work in its own way to handle situations.
- (ii) High cost approach.

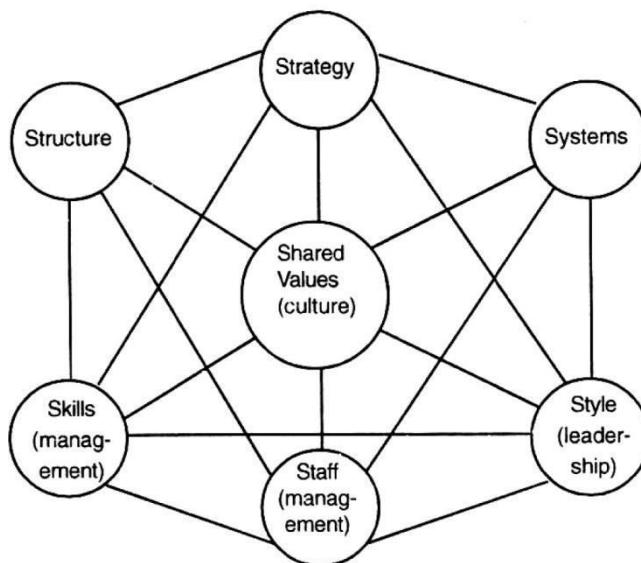
9. Write short notes on any three of the following:**[4x3=12]****(a) Marketing Objectives****(b) Mc Kinsey's 7 -s Frame work****(c) Expected Results from BPR.****(d) Corporate Planning****Answer:****9. (a) Marketing Objectives:**

- (i) Creating awareness and appreciation of the crucial role of consumer in shaping decisions, and of the profit as a basic foundation of corporate existence, stability and growth.
- (ii) Awareness that consumers can only be helped to solve their problems through corporate efforts.
- (iii) Awareness and concern with trans-departmental implications of an individual department's decisions and actions and their effect on the firm's equilibrium with its external environment— consumers, competitors, government, etc.
- (iv) Concern with, and interest in, the innovation of products and services so as to solve select consumer problems.
- (v) Concern with the effect of new product and service introduction on firm's present and potential profit position.
- (vi) Sensing and monitoring information as regards market potential to serve as a base for goal and target setting.

Answer to MTP_Intermediate_Syllabus 2016_June 2020_Set 2

- (vii) Focus in coordinating company effort and in establishing corporate and departmental objectives consistent with the enhancement of the firm's profit position.
- (viii) Awareness and appreciation of the role of formal, periodic, short and long-range planning of company's goals, strategies and tactics resulting in an integrated system of marketing actions.
- (ix) Desire and preparedness for the creation, expansion, contraction, termination, or in any way, restructuring of any corporate function in order to mobilize, utilize and control corporate effort.

(b) McKinsey's 7-S Framework:



McKinsey's 7-S Framework

Strategy is dependent on many variables – Internal as well as external. All factors are interrelated.

The McKinsey Company, a well known management consultancy firm in the United States, towards the end of 1970s was asked to find a solution to this knotty issue. The researchers Peters and Waterman found after examining America's best run companies that the problem in strategy lay in its implementation and structure was only one lever in the hands of management. The other levers were systems, staff, style, skills and superordinate goals. A strategy is usually successful when the other S's in the 7-S framework fit into or support the strategy.

- **Strategy:** A set of decisions and actions aimed at gaining a sustainable competitive advantage.
- **Structure:** The organisation chart and associated information that shows who reports to whom and how tasks are both divided and integrated.
- **Systems:** The flow of activities involved in the daily operation of a business, including its core processes and its support systems.
- **Style:** How managers collectively spend their time and attention and how they use symbolic behaviour. How management acts is more important than what management says.

Answer to MTP_Intermediate_Syllabus 2016_June 2020_Set 2

- **Staff:** How companies develop employees and shape basic values.
- **Shared Values:** Commonly held beliefs, mindsets and assumptions that shape how an organisation behaves— its corporate culture.
- **Skills:** An organisation's dominant capabilities and competencies.

(c) Expected Results from BPR:

The expected results for a company that implements business process reengineering are the following:

- Reallocation of jobs and processes so as to be combined into fewer, to be executed in natural order, simultaneously and by the least possible number of employees.
- Reorganization of the company's structure (downsizing) and employee empowerment.
- Jobs and processes become flexible so as to be executed according to the needs of each case, company's and customer's need's (hybrid centralized / decentralized operations)

The above changes will bring reductions of costs in the company, better quality (as far as price, promptness of delivery and offerings of related services) in the products and services provided to the customers. BPR shows that there is 'more than one way to skin a cat' and enables a fresh view without ingrained prejudice affecting judgement. It can produce huge initial savings where a business is struggling and often has the affect of turning around an unprofitable operation. Also, it leaves the business with a fully documented model of the operation, which is invaluable if embarking on a quality programme.

The expected outcome from a successful BPR process should the desired one for the favor of the business concerned. The dramatic changes that are caused involve people's jobs and working relationships as it is very often that jobs are eliminated and the entire process is not as beneficial for all.

(d) Corporate Planning:

It is concerned with determination of objectives treating the company as a whole. It develops means to achieve the company's overall objectives. The corporate plans may relate to achieve corporate objectives for short-run and/or long-run. It is an integrated systems approach considering different functions, divisions and units of the organization. Such corporate plans are framed at the corporate level by the top management.

Corporate planning is not synonymous with long range planning. Corporate planning is concerned with both short periods as well as long periods. The time span depends on how far ahead a company wants to forecast, depends on nature of business and depends on commitment of resources required for it. Corporate planning in an engineering firm will involve long-term considerations but it will have short-term consideration in case of textile firm. Long range planning necessarily connotes planning with a long time horizon, generally five years or more.

Corporate planning is associated with long range planning in labour intensive industries. Corporate planning is concerned with the existing products in existing markets as well as new products and new markets. Long-range planning takes care of only the existing products in existing markets.

Paper - 9 : Operations Management and Strategic Management

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 1**Paper – 9 : Operations Management and Strategic Management****Full Marks : 100****Time allowed: 3 hours****The figures in the margin on the right side indicate full marks.****This question paper has two sections.****Both the sections are to be answered subject to instructions given against each.****Section – I : [Operations Management]****1. (a) Choose the correct alternatives: $1 \times 10 = 10$**

- (i) This process is used when higher volumes of more standardised goods or services are needed. This process is
 - (a) Batch process
 - (b) Continuous process
 - (c) Repetitive process
 - (d) Job shop process
- (ii) Which of the following is not a method for solving Assignment problem?
 - (a) Complete Enumeration method
 - (b) Hungarian method
 - (c) Simplex method
 - (d) Natural method
- (iii) The objective of application of linear programming in industrial problems is
 - (a) to determine a plan for production and procurement in the time period under consideration
 - (b) to determine an optimal solution of the problem under the given constraints
 - (c) to determine the cost effective solution of the problem under scarce resources
 - (d) to determine a plan for time based solution to the problem for increasing productivity
- (iv) Sustainable competitive advantage in the market place can be achieved through
 - (a) Line Balancing
 - (b) JIT manufacturing
 - (c) Cellular manufacturing
 - (d) Batch production
- (v) Multiple shift operation enhances
 - (a) Firm's Capacity utilisation
 - (b) Demand for firm's product
 - (c) Firm's labour turnover
 - (d) Firm's channel conflict

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 1

- (vi) In a linear programming model feasible solution is
- The basic solution to the general L.P. problem
 - Any solution that also satisfies the non-negative restrictions of the general L.P. problem
 - A solution which optimize (maximize or minimize) the objective function of a general L. P. problem
 - A basic solution to the system of equation if one or more of the basic variables become equal to zero.
- (vii) It is the basis for decisions regarding capacity planning, facilities (or plant) layout, equipment and design of work systems. This is
- Process Design
 - Process Planning
 - Process Strategy
 - Process Selection
- (viii) Which one of the following is not a Sequencing rule for single facility?
- SSRO
 - DSRO
 - MDD
 - LFT
- (ix) The most obvious reason for product design is
- To offer new products to sustain in the market
 - To offer new products to fulfill changing preferences of customers
 - To offer new products to remain competitive in the market
 - To offer new products to cope with changing regulations in the market
- (x) Operations management is concerned essentially with the utilization of resources. Utilisation of resources means
- Obtaining maximum effect from resources
 - Minimizing loss of resources,
 - Minimising under utilization or waste of resources
 - All the above

(b) Match items in column A with that in column B**1×6=6**

Column A	Column B
(a) Degenerate	(i) Process Strategy
(b) Bottleneck	(ii) Job allocation
(c) Repetitive Focus	(iii) Line Balancing
(d) Improved Matrix	(iv) Linear Programming
(e) Cycle time	(v) Manufacturing Resource Planning
(f) MRP II	(vi) Layout

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 1**(c) State whether the following statements are True/False.****1×6=6**

1. The life cycle of a product has many points of similarity with the human life cycle.
2. The Linear Programming problem has two basic parts: the objective function and the constraint set.
3. The most widely used index of productivity is to work out the output per machine-hour.
4. The productivity is a measure of how much input is required to achieve a given output.
5. One of the limitations of Gantt Chart is that it does not clearly indicate the details regarding progress of activities.
6. Preventive maintenance ensures greater safety to workers.

Answer:

1. (a) (i) (c) Repetitive process
(ii) (d) Natural method
(iii) (a) to determine a plan for production and procurement in the time period under consideration
(iv) (b) JIT manufacturing
(v) (a) Firm's Capacity utilization
(vi) (b) Any solution that also satisfies the non-negative restrictions of the general L.P. problem
(vii) (b) Process Planning
(viii) (d) LFT
(ix) (c) To offer new products to remain competitive in the market
(x) (d) All the above

(b)

Column A	Column B
(a) Degenerate	(iv) Linear Programming
(b) Bottleneck	(vi) Layout
(c) Repetitive Focus	(i) Process Strategy
(d) Improved Matrix	(ii) Job allocation
(e) Cycle time	(iii) Line Balancing
(f) MRP II	(v) Manufacturing Resource Planning

(c)

1. (T)
2. (T)
3. (F)
4. (T)
5. (T)

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 1

6. (T)

[Answer any three questions from the following]

2. (a) What do you mean by 'Capacity Planning'? Discuss in brief the types of Capacity Planning.

(b) A department works on 8 hours shift, 250 days a year and has the usage data of a machine, as given below:

Product	Annual demand (units)	Processing time (standard time in hours)
X	300	4.0
Y	400	6.0
Z	500	3.0

Determine the number of machines required.**8+8=16****Answer:**

2. (a) Capacity Planning:

The effective management of capacity is the most important responsibility of production and operations management. The objective of capacity management i.e., planning and control of capacity, is to match the level of operations to the level of demand.

Capacity planning is concerned with finding answers to the basic questions regarding capacity such as:

- (i) What kind of capacity is needed?
- (ii) How much capacity is needed?
- (iii) When this capacity is needed?

Capacity planning is to be carried out keeping in mind future growth and expansion plans, market trends, sales forecasting, etc. Capacity is the rate of productive capability of a facility. Capacity is usually expressed as volume of output per period of time.

Capacity planning is required for the following:

- Sufficient capacity is required to meet the customers demand in time,
- Capacity affects the cost efficiency of operations,
- Capacity affects the scheduling system,
- Capacity creation requires an investment,
- Capacity planning is the first step when an organisation decides to produce more or new products.

Capacity planning is mainly of two types:

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 1

- (i) **Long-term capacity plans** which are concerned with investments in new facilities and equipments. These plans cover a time horizon of more than two years.
- (ii) **Short-term capacity plans** which takes into account work-force size, overtime budgets, inventories etc.

Capacity refers to the maximum load an operating unit can handle. The operating unit might be a plant, a department, a machine, a store or a worker. Capacity of a plant is the maximum rate of output (goods or services) the plant can produce.

- (b) **Step 1:** Calculate the processing time needed in hours to produce product x, y and z in the quantities demanded using the standard time data.

Product	Annual demand (units)	Standard processing time per unit (Hrs.)	Processing time needed (Hrs.)
X	300	4.0	$300 \times 4 = 1200$ Hrs.
Y	400	6.0	$400 \times 6 = 2400$ Hrs.
Z	500	3.0	$500 \times 3 = 1500$ Hrs.
			Total = 5100 Hrs

Step 2 : Annual production capacity of one machine in standard hours = $8 \times 250 = 2000$ hours per year

Step 3 : Number of machines required =
$$\frac{\text{Workload per year}}{\text{Production capacity per machine}} = \frac{5100}{2000} = 2.55$$
 machines = 3 machines.

3. (a) State in brief about Process Design & Selection.

(b) The Taj service station has a central store where service mechanics arrive to take spare parts for the jobs they work upon. The mechanics wait in queue if necessary and are served on a first come first served basis. They store is manned by one attendant who can attend 10 mechanics in an hour on an average. The arrival rate of the mechanics averages 6 per hour. Assuming that the pattern of mechanics' arrivals is Poisson distribution and the servicing time is exponentially distributed, determine W_s , W_q & L_q , where the symbols vary their usual meaning. 6+10=16

Answer:

3. (a) Process Design is concerned with the overall sequences of operations required to achieve the product specifications. It specifies the type of work stations to be used, the machines and equipments necessary to carry out the operations. The sequence of operations are determined by (a) the nature of the product, (b) the materials

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 1

used, (c) the quantities to be produced and (d) the existing physical layout of the plant.

The process design is concerned with the following:

- (i) Characteristics of the product or service offered to the customers.
- (ii) Expected volume of output.
- (iii) Kinds of equipments and machines available in the firm.
- (iv) Whether equipments and machines should be of special purpose or general purpose.
- (v) Cost of equipments and machines needed.
- (vi) Kind of labour skills available, amount of labour available and their wage rates.
- (vii) Expenditure to be incurred for manufacturing processes.
- (viii) Whether the process should be capital-intensive or labour-intensive.
- (ix) Make or buy decision.
- (x) Method of handling materials economically.

- (b) The average arrival time $\lambda = 6$, and the service time $= \mu = 10$

$$So = \frac{\lambda}{\mu} = \frac{5}{20} = 0.6$$

$$So W_s = W_q + \frac{1}{\mu} = \frac{Ls}{\lambda} = \frac{1}{\mu - \lambda} = \frac{1}{10 - 6} = 0.25 \text{ hour}$$

$$W_q = \frac{L_q}{\lambda} = \frac{\lambda}{\mu(\mu - \lambda)} = \frac{6}{10(10 - 6)} = 0.15 \text{ hour}$$

$$L_q = \frac{\lambda^2}{\mu(\mu - \lambda)} = \frac{36}{10(10 - 6)} = 0.90$$

4. (a) A captain of a cricket team has to allot five middle batting positions to five batsmen. The average runs scored by each batsman at these positions are as follows:

		Batting Position				
		III	IV	V	VI	VII
Batsmen	A	40	40	35	25	50
	B	42	30	16	25	27
	C	50	48	40	60	50
	D	20	19	20	18	25
	E	58	60	59	55	53

Make the assignment so that the expected total average runs scored by these batsmen are maximum.

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 1

(b) Wanda's Car Wash & dry is an automatic, five-minute operation with a single bay. On a typical Saturday morning, cars arrive at a mean rate of eight per hour, with arrivals tending to follow a Poisson distribution. Find

- (i) The average number of cars in line.
- (ii) The average time cars spend in line and service.

10+6=16

Answer:

4. (a) This is a problem of Maximisation. To solve it using Assignment technique it has to be converted to a Minimisation problem by forming a Relative Loss Matrix.

		Batting Position				
Batsman	III	IV	V	VI	VII	
A	40	40	35	25	50	
B	42	30	16	25	27	
C	50	48	40	60	50	
D	20	19	20	18	25	
E	58	60	59	55	53	

Relative Loss Matrix*

		Batting Position				
Batsman	III	IV	V	VI	VII	
A	20	20	25	35	10	
B	18	30	44	35	33	
C	10	12	20	0	10	
D	40	41	40	42	35	
E	2	0	1	5	7	

- * This matrix is formed by subtracting all the elements of the given matrix from the highest element (60) of it.

Row Operation Matrix

		Batting Position				
Batsman	III	IV	V	VI	VII	

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 1

A	10	10	15	25	0
B	0	12	26	17	15
C	10	12	20	0	10
D	5	6	5	7	0
E	2	0	1	5	7

Column Operation Matrix

Batsman \ Batting Position	III	IV	V	VI	VII
Batsman					
A	10	10	14	25	0
B	0	12	25	17	15
C	10	12	19	0	10
D	5	6	4	7	0
E	2	0	0	5	7

Minimum no. of horizontal and vertical straight lines to cover all the zeros = 4 \neq Order of the matrix(5). So the solution is non optimal.

Improved Matrix

		Batting Position				
Batsman		III	IV	V	VI	VII
A	10	6	10	25	0	
B	0	8	21	17	15	
C	10	8	15	0	10	
D	5	2	0	7	0	
E	6	0	0	9	11	

Here minimum no. of horizontal and vertical straight lines to cover all the zeros = 5 = Order of the matrix.
So the solution is optimal.

Optimal Assignment

Batsman	Batting Position	Average runs scored
A	VII	50

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 1

B	III	42
C	VI	60
D	V	20
E	IV	60
	Total =	232

Expected maximum total runs = 232

(b) Arrive Rate = $\lambda = 8$ cars per hour

Service Rate = $\mu = 1$ per 5 minutes, or 12 per hour

$$\text{Av. No. of cars waiting in line} = L_q = \frac{\lambda^2}{2\mu(\mu - \lambda)} = \frac{8^2}{2(12)(12 - 8)} = 0.667 \text{ car}$$

Av. time cars spend in line and service = $W_s = \frac{L_q}{\lambda} = \frac{1}{\mu} = \frac{0.667}{8} = \frac{1}{12} = 0.167$ hours, or 10 minutes.

5. (a) State the differences between PERT & CPM.

(b) A Public transport system is experiencing the following number of breakdowns for months over the past 2 years in their new fleet of vehicles:

Number of breakdowns	0	1	2	3	4
Number of months this occurred	2	8	10	3	1

Each break down costs the firm an average of ₹ 2,800. For a cost of ₹ 1,500 per month, preventive maintenance can be carried out to limit the breakdowns to an average of one per month. Which policy is suitable for the firm? 6+10=16

Answer:

5. (a)

PERT	CPM
1. It is a technique for planning scheduling & controlling of projects whose activities are subject to uncertainty in the performance time. Hence it is a probabilistic model.	1. It is a technique for planning scheduling & controlling of projects whose activities not subjected to any uncertainty and the performance times are fixed. Hence it is a deterministic model.
2. It is an Event oriented system	2. It is an Activity oriented system
3. Basically does not differentiate critical and non-critical activities.	3. Differentiates clearly the critical activities from the other activities.

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 1

4. Used in projects where resources (men, materials, money) are always available when required.	4. Used in projects where overall costs is of primarily important. Therefore better utilized resources.
5. Suitable for Research and Development projects where times cannot be predicted.	5. Suitable for civil constructions.

- (b) Converting the frequencies to a probability distribution and determining the expected cost/month of breakdowns we get:

No. of breakdowns (x)	Frequency in months (f)	Probability $p = f / \sum f$	Expected no. of breakdowns (px)
0	2	0.083	0.000
1	8	0.333	0.333
2	10	0.417	0.834
3	3	0.125	0.375
4	1	0.042	0.168
			Total 1.710

Expected Breakdown cost per month; Expected cost = $1.710 \times ₹ 2,800 = ₹ 4,788$.

Preventive maintenance cost per month: -

$$\begin{aligned}
 \text{Average cost of one breakdown/month} &= ₹ 2,800 \\
 \text{Maintenance contract cost/month} &= ₹ 1,500 \\
 \text{Total} &= ₹ 4,300
 \end{aligned}$$

Thus, preventive maintenance policy is suitable for the firm.

Section – II : (Strategic Management)

6. Choose the correct answer from the given alternatives:

1×6=6

- (i) McKinsey's 7-s framework consists of:
- (a) Structure, strategy, software, skills, styles, staff and supervision
 - (b) Structure, strategy, systems, skills, styles, syndication and shared values
 - (c) Structure, strategy, systems, skill, steering power, styles and shared values.
 - (d) Structure, strategy, staff, skills, systems, shared values, super ordinate goal.
 - (e) None of the above.
- (ii) A strategic business unit (SBU) is defined as a division of an organization:
- (a) That help in the marketing operation
 - (b) That enable managers to have better control over the resources
 - (c) That help in the choice of technology

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 1

- (d) That help in the allocation of scarce resources
 (e) That help in identifying talents and potentials of people
- (iii) Intensity of competition is _____ in low return industries.
- (a) Law
 (b) Non - existent
 (c) High
 (d) Not important
 (e) Dependant on industry nature
- (iv) Ansoff proposed that for filling the corporate planning gap, one follows four strategies namely.
- (a) Market penetration, product differentiation, market identification and diversification
 (b) Market penetration, product development, market identification and diversification
 (c) Market penetration, product development, market development and diversification
 (d) Market identification, product development, positioning and diversification
 (e) Differentiation, product innovation, market opportunity and diversification
- (v) For an actress in Bollywood, her pretty face would a/an
- (a) Asset
 (b) Strategic asset
 (c) Core competency
 (d) Capability
 (e) All of the above
- (vi) Corporation vision' is the same as
- (a) Corporate dream
 (b) Corporate mission
 (c) Corporate goal
 (d) Corporate strategy

Answer:

6. (i) (d) Structure, strategy, staff, skills, systems, shared values, super ordinate goal.
 (ii) (b) That enable managers to have better control over the resources
 (iii) (c) High
 (iv) (c) Market penetration, product development, market development and diversification
 (v) (b) Strategic asset
 (vi) (a) Corporate dream

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 1**[Answer any two questions from the following]**

7. (a) State the relationship between 'Strategy' & 'Competitive Advantage'.
 (b) What do you mean by 'Strategic Management'? Why Strategic Management is important? 6+6=12

Answer:

7. (a) A company achieves competitive advantage when it provides buyers with superior value compared to rival sellers or offers the same value at a lower cost to the firm. The advantage is sustainable if it persists despite the best efforts of competitors to match or surpass this advantage. A company's strategy is its action plan for outperforming its competitors and achieving superior profitability. In effect, it represents a managerial commitment to an integrated array of considered choices about how to compete. These include choices about:
- (i) How to attract and please customers?
 - (ii) How to compete against rivals?
 - (iii) How to position the company in the market place?
 - (iv) How best to respond to changing economic and market conditions?
 - (v) How to capitalize on attractive opportunities to grow the business?
 - (vi) How to achieve the company's performance targets?

(b) Strategic Management:

Strategic management according to Alfred D. Chandler is "determination of the basic long-term goals and objectives of an enterprise and adoption of course of action and allocation of resources necessary to carry out these goals."

Strategic Management include understanding the strategic position of an organisation, strategic choices for the future and turning strategy into action. The strategic position is concerned with the impact on strategy of the external environment, internal resources and competences, and the expectations and influence of stakeholders.

Strategic management is a continuous process that appraises the business and industries in which the organization is involved; appraises its competitors; and fixes goals to meet all- the present and future competitor's and then reassesses each strategy.

Importance of Strategic Management:

- (i) Discover organisation strengths and weaknesses
- (ii) Identify the available opportunities and possible threats
- (iii) Discover the objectives and goals in line with organisations strengths and available opportunities
- (iv) Implement changes to overcome weaknesses and manage the threats.

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 1

- (v) Provide vision/mission or direction to future of organisations
- (vi) Build a dynamic and strong organisation
- (vii) Help to achieve growing and stable organisation.

8. (a) What do you mean by 'A strategic vision'?**(b) State the benefits of having a Vision?****6+6=12****Answer:****8. (a) A strategic vision:**

A strategic vision describes management's aspirations for the future and delineates the company's strategic course and long term direction. Well conceived visions are distinctive and specific to a particular organisation; they avoid generic, feel-good statements.

A number of organisations have summed up their visions in a brief phrase for e.g.

- Nike: 'To bring innovation and inspiration to every athlete in the world.'
- Scotland Yard: 'to make London the safest major city in the world'

Strategic vision specifies primarily three elements:

1. Forming a mission statement that defines what business the company presently is in? And "who we are and where we are now?"
2. Using this mission statement as base to define long term path by indicating choices about "Where we are going?"
3. Finally, communicating above strategic vision in clear and committed term.

Strategic Vision has important purposes, such as:

1. Clearly provide the direction that company wants to follow
2. Identify the need of changing from existing direction or products, if stated in vision statement.
3. Create passionate environment in the organisation to steer the company with great excitement in selected direction.
4. Create creativity in every member of company to prepare company for future.
5. Promote entrepreneurship.

(b) The benefits of having a Vision:

According to Parikh and Neubauer (1993), a well construed vision can provide the following benefits:

- Good visions are inspiring and exhilarating.
- Vision represents a discontinuity, a step function and a jump ahead so that the company knows what it is to be.
- Good vision helps in the creation of a common identity and a shared sense of purpose.
- Good visions are competitive, original and unique. They make sense in the market place as they are practical.
- Good visions foster risk taking and experimentation.
- Good visions foster long term thinking

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 1

- Good visions represent integrity: they are truly genuine and can be used to the benefit of the people.

9. Write short notes on any three of the following:**4x3=12**

- (a) Environmental Analysis
- (b) Boston Matrix
- (c) Market Penetration Strategy
- (d) Business Process Re-engineering

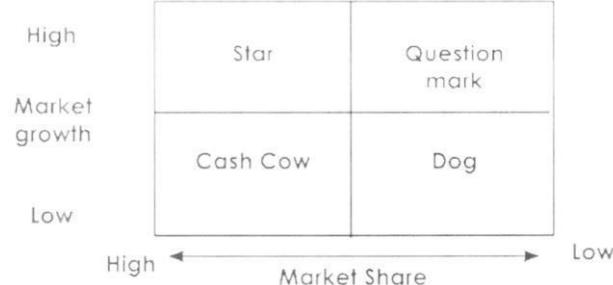
Answer:

9. (a) Environmental factors - both internal environment and external environment - are analysed to:

- (i) identify changes in the environment,
- (ii) identify present and future threats and opportunities, and
- (iii) assess critically its own strengths and weaknesses.

Organisational environment encompasses all factors both inside and outside the organisation that can influence the organisation positively and negatively. Environmental factors may help in building a sustainable competitive advantage.

(b) The Boston Consulting Group (BCG)'s matrix analyses 'products and businesses by market share and market growth.'



This growth/share matrix for the classification of products into cash cows, dogs, rising stars and question marks is known as the Boston classification for product-market strategy.

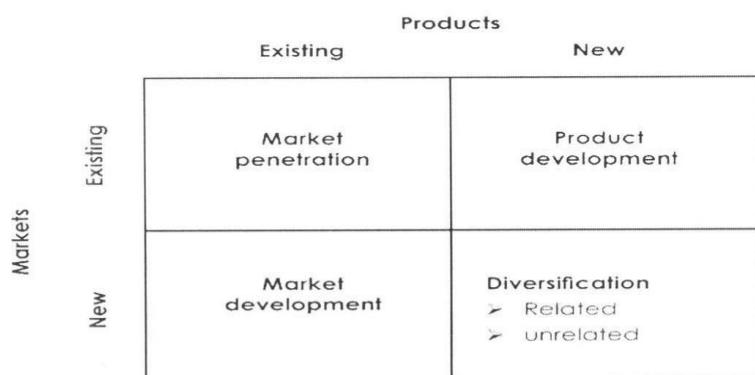
- (i) Stars are products with a high share of a high growth market. In the short term, these require capital expenditure, in excess of the cash they generate, in order to maintain their market position, but promise high returns in the future.
- (ii) In due course, however, stars will become cash cows, with a high share of a low-growth market. Cash cows need very little capital expenditure and generate high levels of cash income. The important strategic feature of cash cows is that they are already generating high cash returns, which can be used to finance the stars.
- (iii) Question marks are products in a high-growth market, but where they have a low market share. A decision needs to be taken about whether the products justify considerable capital expenditure in the hope of increasing their market share, or whether they should be allowed to 'die' quietly as they are squeezed out of the

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 1

expanding market by rival products. Because considerable expenditure would be needed to turn a question mark into a star by building up market share, question marks will usually be poor cash generators and show a negative cash flow.

(iv) Dogs are products with a low share of a low growth market. They may be ex-cash cows that have now fallen on hard times. Dogs should be allowed to die, or should be killed off. Although they will show only a modest net cash outflow, or even a modest net cash inflow, they are 'cash traps' which tie up funds and provide a poor return, on investment, and not enough to achieve the organisation's target rate of return.

(c)



Firm increases its sales in its present line of business. This can be accomplished by:

- (i) price reductions;
- (ii) increases in promotional and distribution support;
- (iii) acquisition of a rival in the same market;
- (iv) modest product refinements.

These strategies involve increasing the firm's investment in a product/market and so are generally only used in markets which are growing, and hence the investment may be recouped. In this respect the strategy is similar to invest to build and holding strategy as described by the Boston Consulting Group.

(d) Business Process Re-engineering:

Business Process Re-engineering/(BPR) is a business management strategy, originally pioneered in the early 1990s, focusing on the analysis and design of workflows and processes within an organization. BPR aimed to help organizations fundamentally rethink how they do their work in order to dramatically improve customer service, cut operational costs, and become world-class competitors. In the mid-1990s, as many as 60% of the Fortune 500 companies claimed to either have initiated reengineering efforts, or to have plans to do so.

BPR is achieving dramatic performance improvements through radical change in organizational processes, re-architecting of business and management processes. Redesign, retooling and re-orchestrating form the key components of BPR that are essential for an organization to focus on the outcome that it needs to achieve.

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 2

Paper - 9 : Operations Management and Strategic Management

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 2**Paper – 9 : Operations Management and Strategic Management****Full Marks : 100****Time allowed: 3 hours****The figures in the margin on the right side indicate full marks.****This question paper has two sections.****Both the sections are to be answered subject to instructions given against each.****Section – I : [Operations Management]****1. (a) Choose the correct alternatives: $1 \times 10 = 10$**

- (i) Which one of the following is not a factor in determining Economic Lot Size for manufacturing?
 - (a) Production Schedule
 - (b) Usage rate
 - (c) Manufacturing Cost
 - (d) Cost of Deterioration

- (ii) Negative float signifies
 - (a) Reduction in target time to finish the work in time
 - (b) Adjustment of target time to finish the work before schedule
 - (c) Reduction in target time to crash the critical path
 - (d) Adjustment of target time to maintain the most likely time of activities

- (iii) On which of the following areas ISO 9003 is applicable?
 - (a) Procurement
 - (b) Production
 - (c) Installation
 - (d) Servicing

- (iv) To truly reap the benefits of TQM
 - (a) Quality of production of organisation must change
 - (b) Productivity of organisation must change
 - (c) Culture of organisation must change
 - (d) Environment of organisation must change

- (v) Which one of the following is the benefit of keeping standby machines?
 - (a) Requirement of Additional space
 - (b) Interest on additional capital
 - (c) Availability of Additional depreciation
 - (d) Protection against a complete shutdown

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 2

- (vi) Which one of the following is not a factor on which Scheduling depends?
- Production Method
 - Production Quantity
 - Production Capacity
 - Production Site
- (vii) Quality of conformance is
- The degree to which quality of design is achieved in manufacturing
 - The degree to which quality of product is achieved through customer's preferences
 - The degree to which quality of human resources is achieved through training
 - The degree to which quality of assets is achieved through technological innovation
- (viii) A public sector industry is started in a remote place. With respect to this information which one of the following is correct?
- Industry follows transportation
 - Industry & transportation come in together
 - Transportation follows industry
 - Transportation increases mobility of industry
- (ix) Machine time of a machine is 22 minutes. If productivity increases by 10% the new machine time is
- 12
 - 5
 - 19.8
 - 20
- (x) Which one of the following is Administrative Application of Linear Programming?
- Application for forming financial mix strategy
 - Application for scheduling production
 - Application for finding optimal usage of resources
 - Application for portfolio selection

(b) Match items in column A with that in column B:

1×6=6

Column A	Column B
(a) Horizontal line of the Gantt chart	(i) Are where more than one Activity ends and from where more than one Activity starts
(b) Dummy Activities	(ii) Represent the difference between the maximum time available to finish the activity and the time required to complete it.
(c) Merger and Brust Events	(iii) Consume no time or resource & are represented by dashed arrows

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 2

(d) Floats	(iv) Fraction from total float of an activity which can be used for rescheduling the activity without affecting the succeeding activity.
(e) Free Float	(v) Solution to Transportation problem
(f) Vogel's Approximation Method	(vi) Represents the time taken to complete an activity

(c) State whether the following statements are True/False.

1×6=6

- (i) No handling is the best handling.**
- (ii) Increased productivity leads to cost reduction.**
- (iii) Job evaluation is used to measure absolute job worth.**
- (iv) Multiple activity chart deals with layout problems.**
- (v) Training boosts employee morale.**
- (vi) Production planning is an essential function in a factory.**

Answer:

1. (a) (i) (a) Production Schedule
(ii) (a) Reduction in target time to finish the work in time
(iii) (b) Production
(iv) (c) Culture of organization must change
(v) (d) Protection against a complete shutdown
(vi) (d) Production site
(vii) (a) The degree to which quality of design is achieved in manufacturing
(viii) (c) Transportation follows industry
(ix) (d) 20
(x) (c) Application for portfolio selection

(b)

Column A	Column B
(a) Horizontal line of the Gantt chart	(vi) Represents the time taken to complete an activity
(b) Dummy Activities	(iii) Consume no time or resource & are represented by dashed arrows
(c) Merger and Brust Events	(i) Are where more than one Activity ends and from where more than one Activity starts
(d) Floats	(ii) Represent the difference between the maximum time available to finish the activity and the time required to complete it.
(e) Free Float	(iv) Is that fraction from total float of an activity which can be used for rescheduling the activity without affecting the succeeding activity.

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 2

(f) Vogel's Approximation Method	(v) Solution to Transportation problem
----------------------------------	--

(c)

- (i) T
- (ii) T
- (iii) F
- (iv) F
- (v) T
- (vi) T

[Answer any three questions from the following]

2. (a) What do you mean by MRP? State the objectives of MRP.
 (b) M/s Kobo Bearings Ltd., is committed to supply 24,000 bearings per annum to M/s Deluxe Fans on a steady daily basis. It is estimated that it costs 10 paisa as inventory holding cost per bearing per month and that the setup cost per run of bearing manufacture is ₹ 324.
 (i) What is the optimum run size for bearing manufacture?
 (ii) What should be the interval between the consecutive optimum runs?
 (iii) Find out the minimum inventory holding cost.

6+10=16**Answer:**

2. (a) Material requirement planning (MRP) refers to the basic calculations used to determine component requirements from end item requirements. It also refers to a broader information system that uses the dependence relationship to plan and control manufacturing operations.
 MRP is a technique of working backward from the scheduled quantities and needs dates for end items specified in a master production schedule to determine the requirements for components needed to meet the master production schedule. The technique determines what components are needed, how many are needed, when they are needed and when they should be ordered so that they are likely to be available as needed. The MRP logic serves as the key component in an information system for planning and controlling production operations and purchasing. The information provided by MRP is highly useful in scheduling because it indicates the relative priorities of shop orders and purchase orders.

“Materials Requirement Planning (MRP) is a technique for determining the quantity and timing for the acquisition of dependent demand items needed to satisfy master production schedule requirements.”

MRP is one of the powerful tools that, when applied properly, helps the managers in achieving effective manufacturing control.

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 2

MRP Objectives:

1. **Inventory reduction:** MRP determines how many components are required, when they are required in order to meet the master schedule. It helps to procure the materials/components as and when needed and thus avoid excessive build up of inventory.
2. **Reduction in the manufacturing and delivery lead times:** MRP identifies materials and component quantities, timings when they are needed, availabilities and procurements and actions required to meet delivery deadlines. MRP helps to avoid delays in production and priorities production activities by putting due dates on customer job orders.
3. **Realistic delivery commitments:** By using MRP, production can give marketing timely information about likely delivery times to prospective customers.
4. **Increased efficiency:** MRP provides a close coordination among various work centres and hence helps to achieve uninterrupted flow of materials through the production line. This increases the efficiency of production system.

- (b) (i) Optimum run size or Economic Batch Quantity (EBQ)

$$= \frac{2 \times \text{Annual Output} \times \text{Setup cost}}{\text{Annual Cost of Carrying one Unit}} = \sqrt{\frac{2 \times 24000 \times 324}{0.10 \times 12}} = 3600 \text{ units}$$

- (ii) Interval between two consecutive optimum runs

$$= \frac{\text{EBQ}}{\text{Monthly Output}} \times 30 = \frac{3600}{24000 \div 12} \times 30 = 54 \text{ Calendar days}$$

- (iii) Minimum inventory holding cost = Average inventory \times Annual carrying cost of one unit of inventory $= (3600 \div 2) \times 0.10 \times 12 = ₹ 2,160$.

3. (a) What does Product Design do?

- (b) The processing times (t_i) in hrs for the five jobs of a single machine scheduling is given. Find the optimal sequence which will minimize the mean flow time and find the mean flow time.

Determine the sequence which will minimize the weighted mean flow time and also find the mean flow time

Job (j)	1	2	3	4	5
Processing time (t_i) hrs	30	8	10	28	16
Weight (w_j)	1	2	1	2	3

4+12=16

Answer:

3. (a) The activities and responsibilities of product design include the following:
- (i) Translating customer needs and wants into product and service requirements (marketing).
 - (ii) Refining existing products (marketing).

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 2

- (iii) Developing new products (marketing, product design and production).
- (iv) Formulating quality goals (quality assurance, production).
- (v) Formulating cost targets (accounting).
- (vi) Constructing and testing prototype (marketing, production).
- (vii) Documenting specifications (product design).

- (b) (i) First arrange the jobs as per the shortest processing time (SPT) sequence.

Job (j)	2	3	5	4	1
Processing time (t_j) hrs	8	10	16	28	30

Therefore, the job sequence that minimises the mean flow time is 2-3-5-4-1.

Computation of minimum flow time (F_{\min})

The flow time is the amount of time the job 'j' spends in the system. It is a measure which indicates the waiting of jobs in the system. It is the difference between the completion time (C_j) and ready time (R_j) for job j.

$$F_j = C_j - R_j$$

Job (j)	2	3	5	4	1
Processing time (t_j) hrs	8	10	16	28	30
Completion time (C_j)	8	18	34	62	92

Since the ready time (R_j) = 0 for all j, the flow time (\bar{F}_j) is equal to C_j for all j.

$$\text{Mean flow time} = (\bar{F}) = \frac{1}{n} \sum_{j=1}^n F_j = \frac{1}{5} [8+18+34+62+92] = \frac{1}{5} [214] = 42.8 \text{ hours}$$

- (ii) The weights are given as follows:

Job (j)	1	2	3	4	5
Processing time (t_j) hrs	30	8	10	28	16
Weight (W_j)	1	2	1	2	3

$$\text{The weighted processing time} = \frac{\text{Processing time} (t_j)}{\text{Weight} (W_j)}$$

The weighted processing time is represented as

Job (j)	1	2	3	4	5
Processing time (t_j hrs)	30	8	10	28	16
Weight (W_j)	1	2	1	2	3
Weighted Processing time (t_j/W_j)	30	4	10	14	5.31

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 2

Thus, arranging the jobs in the increasing order of t_j/W_j (weighted shortest processing time WSPT) we have

Job (j)	2	5	3	4	1
Weighted Processing line (t_j/W_j)	4	5.31	10	14	30

Optimal sequence that minimises the weighted mean flow time is 2-5-3-4 -1.

$$\text{Weighted Mean flow time } (\bar{F}_w) : \bar{F}_w = \frac{\sum_{j=1}^n W_j F_j}{\sum_{j=1}^n W_j}$$

Job (j)	2	5	3	4	1
Processing time (t_j) hrs	8	16	10	28	30
$F_j = (C_j - R_j)$	8	24	34	62	92
W_j	2	3	1	2	1
$F_j \times W_j$	16	72	34	124	92

The weighted mean flow time is computed as follows for optimal sequence.

Weighted mean flow time (\bar{F}_w) is computed as

$$\bar{F}_w = \frac{(16+72+34+124+92)}{(2+3+1+2+1)} = 37.55 \text{ hrs.}$$

4. (a) Linear Programming tools can be used in Management Application – Explain.

(b) Ladies fashion shop wishes to purchase the following quantity of summer dresses:

Dress size	I	II	III	IV
Quantity	100	200	450	150

Three manufacturers are willing to supply dresses.

The quantities given below are the maximum that they are able to supply of any given combination of orders for dresses:

Manufacturers	A	B	C
Total quantity	150	450	250

The shop expects the profit per dress to vary with the manufacturer as given below:

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 2

	Size			
	I	II	III	IV
A	₹2.5	₹4.0	₹5.0	₹2.0
B	₹3.0	₹3.5	₹5.5	₹1.5
C	₹2.0	₹4.5	₹4.5	₹2.5

Required:

- (a) Use the transportation technique to solve the problem of how the orders should be placed with the manufacturers by the fashion shop in order to maximise profit.
- (b) Explain how you would know there is no further improvement possible. 6+10=16

Answer:

4. (a) Management Application of Linear Programming Tools:
- (i) Portfolio Selection
 - (ii) Financial Mix Strategy.
 - (iii) Profit Planning
 - (iv) Media Selection
 - (v) Travelling Salesmen Problem
 - (vi) Determination of equitable salaries
 - (vii) Staffing problem

(b)

Table: 1 Profit Matrix

Manufacturer	Dress Size				Supply
	I	II	III	IV	
A	2.5	4	5	2	150
B	3	3.5	5.5	1.5	450
C	2	4.5	4.5	2.5	250
Demand	100	200	450	150	850
					900

Maximum possible supply capability of manufacturer = 850 units

Total Demand = 900 units

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 2

As Supply \neq demand, the problem is an unbalanced one. To make it balanced, a 'Dummy' manufacturer of supply capacity $= 900 - 850 = 50$ units. is introduced. The profit figures for it are all zeros.

Also it is a problem of maximisation, to convert it to a problem of minimisation, a Relative Loss matrix is formed by subtracting all the profit figures given in the above matrix as well as those of Dummy from the highest profit (5.5) figure of the given matrix.

Table : 2 Relative Loss Matrix with Basic Feasible Solution

Dress Size Manu- facturer					Supply	Row Penalties		
	I	II	III	IV		1st	2nd	3rd
A	(100) 3	1.5	0.5	(50) 3.5	150	1	1.5	0.5*
B	2.5	2	(450) 0	4	450	2*	-	-
C	3.5	(200) 1	1	(50) 3	250	0	2*	0.5
Dummy	5.5	5.5	5.5	(50) 5.5	50	0	0	0
Demand	100	200	450	150	900			
Column Penalties	1st	0.5	0.5	0.5	0.5			
	2nd	0.5	0.5	-	0.5			
	3rd	0.5	-	-	0.5			

Here, $m = \text{No. of rows of the matrix} = 4$ and $n = \text{No. of columns of the matrix} = 4$

$$\therefore m + n - 1 = 4 + 4 - 1 = 7$$

Also no. of allocated cells $= 6 \neq (m + n - 1)$

So the solution is a **degenerate** one. To resolve this, we make use of an artificial quantity ' ϵ ' and allocate this quantity at the unallocated cell which is having least cost among all the unallocated cells. It can be mentioned that the quantity ' ϵ ' is very small and for all practical purposes its value can be taken as zero.

Least cost unallocated cell is (A-III) where allocation of ' ϵ ' has to be made.

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 2

Table : 3 Showing Basic Feasible Solution (Optimal)

Dress Size Manufacturer	I	II	III	IV	Supply	Row Nos. (u_i)		
A	(100) 3		1.5	(ε) 0.5	(50) 3.5	150	$u_1 = 0$	
B		2.5	2	(450) 0		4	450	$u_2 = -0.5$
C		3.5	(200) 1		1 (50) 3	250	$u_3 = -0.5$	
Dummy	5.5	5.5	5.5	(50) 5.5	50	$u_4 = 2$		
Demand	100	200	450	150	900			
Column Nos. (v_j)	$v_1 = 3$	$v_2 = 1.5$	$v_3 = 0.5$	$v_4 = 3.5$				

To test optimality of the Basic Feasible Solution, Row Nos. (u_i) and Column Nos. (v_j) are calculated using the equation $C_{ij} = u_i + v_j$ for the allocated cells, where C_{ij} = Relative Loss figure of the cell $i - j$.

Allocated cell	A-I	A-III	A-IV	B-III	C-II	C-IV	Dummy-IV
C_{ij}	$C_{11} = 3$	$C_{13} = 0.5$	$C_{14} = 3.5$	$C_{23} = 0$	$C_{32} = 1$	$C_{34} = 3$	$C_{44} = 5.5$

$$C_{11} = u_1 + v_1 \quad \text{or, } 3 = 0 + v_1 \quad [u_1 = 0, \text{ Assumed}] \quad \text{or, } v_1 = 3$$

$$C_{13} = u_1 + v_3 \quad \text{or, } 0.5 = 0 + v_3 \quad \text{or, } v_3 = 0.5 ; \quad C_{14} = u_1 + v_4 \quad \text{or, } 3.5 = 0 + v_4 \quad \text{or, } v_4 = 3.5$$

$$C_{23} = u_2 + v_3 \quad \text{or, } 0 = u_2 + 0.5 \quad \text{or, } u_2 = -0.5 ; \quad C_{34} = u_3 + v_4 \quad \text{or, } 3 = u_3 + 3.5 \quad \text{or, } u_3 = -0.5$$

$$C_{32} = u_3 + v_2 \quad \text{or, } 1 = -0.5 + v_2 \quad \text{or, } v_2 = 1.5 ; \quad C_{44} = u_4 + v_4 \quad \text{or, } 5.5 = u_4 + 3.5 \quad \text{or, } u_4 = 2$$

Opportunity Loss figures (Δ_{ij}) for all the unallocated cells are calculated using the equation $\Delta_{ij} = C_{ij} - (u_i + v_j)$

Unallocated Cell

A - II

B - I

B - II

B - IV

C - I

C - III

Dummy - I

Dummy - II

Dummy - III

Opportunity Loss (Δ_{ij})

$$\Delta_{12} = C_{12} - (u_1 + v_2) = 1.5 - (0 + 1.5) = 0$$

$$\Delta_{21} = C_{21} - (u_2 + v_1) = 2.5 - (-0.5 + 3) = 0$$

$$\Delta_{22} = C_{22} - (u_2 + v_2) = 2 - (-0.5 + 1.5) = 1$$

$$\Delta_{24} = C_{24} - (u_2 + v_4) = 4 - (-0.3 + 3.5) = 1$$

$$\Delta_{31} = C_{31} - (u_3 + v_1) = 3.5 - (-0.5 + 3) = 1$$

$$\Delta_{33} = C_{33} - (u_3 + v_3) = 1 - (-0.5 + 0.5) = 1$$

$$\Delta_{41} = C_{41} - (u_4 + v_1) = 5.5 - (2 + 3) = 0.5$$

$$\Delta_{42} = C_{42} - (u_4 + v_2) = 5.5 - (2 + 1.5) = 2$$

$$\Delta_{43} = C_{43} - (u_4 + v_3) = 5.5 - (2 + 1.5) = 3$$

As all the opportunity loss values are non negative, the solution is optimal.

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 2

Table Showing Optimum allocation of orders quantities

From Manufacturer	Dress Size	Allocated Quantity	Profit/unit (₹)	Total (₹)
(i)	(ii)	(iii)	(iv)	(v) = (iii) × (iv)
A	I	100 units	2.5	250
	IV	50 units	2	100
B	III	450 units	5.5	2475
	II	200 units	4.5	900
C	IV	50 units	2.5	125
	IV	50 units	0	0
Total	-	900 units	-	₹ 3850

Maximum Profit = ₹ 3850/-

5. (a) Product A has a Mean Time Between Failures (MTBF) of 30 hours and has a Mean Time To Repairs (MTTR) of 5 hours. Product B has a MTBF of 40 hours and has a MTTR of 2 hours.

- (i) Which product has the higher reliability?
- (ii) Which product has greater maintainability?
- (iii) Which product has greater availability?

(b) The following activities must be accomplished in order to complete a construction project:

Activity	A	B	C	D	E	F	G	H	I	J
Time	3	8	4	2	1	7	5	6	8	9
Predecessors	—	—	AB	B	A	C	EF	DF	GH	I

- Construct a network diagram for this project. Find the CP and the duration of the project.
- Assume that you are project manager of the project mentioned above. The project has progressed for 10 weeks and the status is follows:

Activities completed: A, B, E. Other activities have not started as yet.

- If no managerial action is taken at all when will the project get completed?
- What action might you take to get the project back to a schedule that can be completed by the end of week 42?

6+10=16

Answer:

5. (a) (i) Product B, with higher MTBF (i.e. 40 hours) than Product A (i.e. 30 hours), is more reliable since it has lesser chance of failure during servicing.

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 2

- (ii) By MTTR we mean the time taken to repair a machine and put it into operation. Thus Product B, with lesser MTTR (i.e., 2 hours) than Product A (i.e., 5 hours), has greater maintainability.

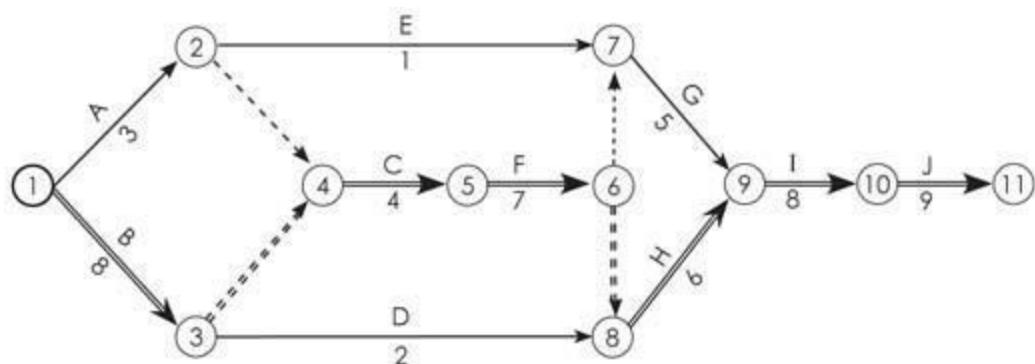
(iii) Availability of a machine/product = $\frac{\text{MTBF}}{\text{MTBF} + \text{MTTR}}$

Therefore, Availability of Product A = $30 / (30+5) = 30/35 = 85.714\%$

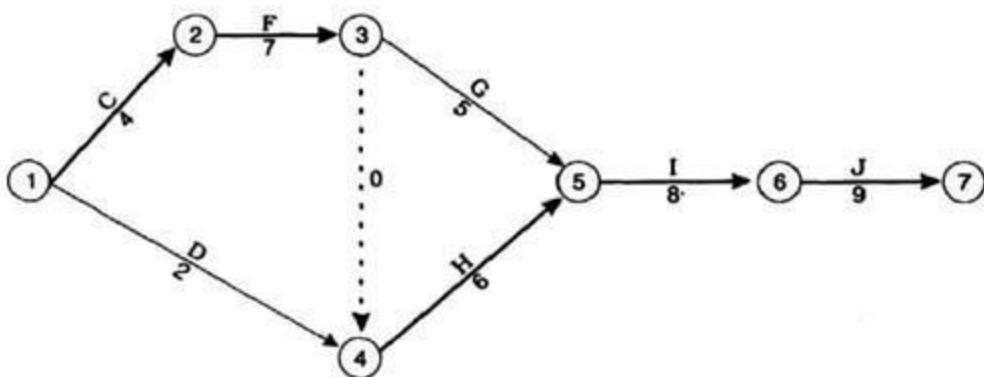
Availability of Product B = $40 / (40+2) = 40/42 = 95.238\%$

Hence, Product B has more availability.

(b)



Paths	Duration (weeks)	Paths	Duration (weeks)
1-2-7-9-10-11	26	1-3-4-5-6-7-9-10-11	41
1-2-4-5-6-7-9-10-11	36	1-3-4-5-6-8-9-10-11	42
1-2-4-5-6-8-9-10-11	37	1-3-8-9-10-11	33
Critical Path: BCFHIJ. Duration 42 weeks.			



Paths	1-2-3-5-6-7	1-2-3-4-5-6-7	1-4-5-6-7
Duration (weeks)	33	34	Critical Path: CFHIJ

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 2

For completing the project as per original schedule, the project activities on the critical path should be reduced by 2 weeks. For example, we may reduce any one of the activities CFHIJ by 2 weeks or any two activities by one week each.

Section – II : (Strategic Management)**6. Choose the correct answer:**

- (i) Price fixation for the first time takes place when: 1×6=6
 (a) A company develops or acquires a new product;
 (b) Introducing existing product into a new geographic area or a new distribution channel;
 (c) A service, the company bids for a new contract work;
 (d) All of the above
- (ii) Organization culture is:
 (a) Appreciation for the arts in the organization
 (b) Ability of the organization to act in a responsible manner to its employees
 (c) Combination of (a) and (b) above
 (d) Deeper level of basic assumptions and beliefs that are shared by the members of the firm
 (e) None of the above
- (iii) What are enduring statements of purpose that distinguish one business from other similar Firms?
 (a) Policies
 (b) Mission statements
 (c) Objectives
 (d) Rules
 (e) Nature of ownership
- (iv) The BCG growth matrix is based on the two dimensions:
 (a) Market Size and Market Share
 (b) Market Size and Profit Margins
 (c) Market Size and Competitive Intensity
 (d) None of the above.
- (v) For an entrepreneur:
 (a) Vision is before the mission
 (b) Mission is before the vision
 (c) Both are developed simultaneously
 (d) Vision or mission are un-important issue
 (e) Profitability is most crucial
- (vi) Directional Policy Matrix is the same as:

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 2

- (a) The BCG model;
- (b) The 9-cell GE matrix;
- (c) The Life cycle portfolio analysis;
- (d) The PIMS matrix;
- (e) The 3X3 competitive positioning matrix

Answer:

6. (i) (d) All of the above
 (ii) (d) Deeper level of basic assumptions and beliefs that are shared by the members of the firm
 (iii) (b) Mission statements
 (iv) (d) None of the above
 (v) (a) Vision is before the mission
 (vi) (b) The 9-cell GE matrix

[Answer any two questions from the following]

7. (a) Discuss in brief about the areas of attention for SWOT appraisal. State the purpose of such appraisal.
 (b) What is a Company Mission?

8+4=12**Answer:**

7. (a) SWOT appraisal should give particular attention to the following:

- (i) **A study of past accounts and the use of ratios.** By looking at trends, or by comparing ratios (if possible) with those of other firms in a similar industry, it might be possible to identify strengths and weaknesses in major areas of the business. The assistance of a management accountant should be of great value in this work.
- (ii) **Product position and product-market mix.**
- (iii) **Cash and financial structure.** If a company intends to expand or diversify, it will need cash or sufficient financial standing in order to acquire subsidiaries by issuing shares.
- (iv) **Cost structure.** If a company operates with high fixed costs and relatively low variable costs, it might be in a relatively weak position with regard to production capacity. High volumes of production and sale might be required to break even. In contrast, a company with low fixed costs might be more flexible and adaptable so that it should be able to operate at a lower breakeven point.
- (v) **Managerial ability.** There may be a problem in attempting to assess this and objective measurements should be sought. The danger is that a poor management might overestimate their own ability and incorrectly analyse their weakness as strength.

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 2

The purpose of such appraisal is to express, qualitatively or quantitatively, which areas of the business have strengths to exploit, and which areas have weaknesses which must be improved. Although every area of the business should be investigated, only the areas of significant strength or weakness should warrant further attention.

While finalising the corporate plan together with corporate objectives, growth strategies, it would be necessary to make a review of the corporate strengths and weaknesses in connection with its mission and objectives. This is an important managerial task linked with corporate planning process.

- (b) The mission is a broadly framed but enduring statement of company intent. It embodies the business philosophy of strategic decision makers; implies the image the company seeks to project; reflects the firm's self-concept; indicates the principal product or service areas and primary customer needs the company will attempt to satisfy. In short, the mission describes the product, market, and technological areas of emphasis for the business. And it does so in a way that reflects the values and priorities of strategic decision makers.

The mission of a business is the fundamental, unique purpose that sets it apart from other firms of its type and identifies the scope of its operations in product and market terms. The mission is a general, enduring statement of company intent. It embodies the business philosophy of strategic decision makers, implies the image the company seeks to project, reflects the firm's self-concept, and indicates the principal product or service areas and primary customer needs the company will attempt to satisfy. In short, the mission describes the product, market, and technological areas of emphasis for the business in a way that reflects the values and priorities of the strategic decision makers.

- 8. (a) Discuss about Strategic Business Units (SBU) & Core Competence. State the major reasons of using SBU approach.**
(b) State the different approaches in Strategic Planning. **(4+4)=12**

Answer:

8.

- (a) **Strategic Business Units (SBU) & Core Competence:**
- SBU is a grouping of related businesses, which is open to complex planning treatment.
 - Multi-business enterprise groups its various businesses into a few distinct business units in a scientific way known as SBUs.
 - The purpose is to provide effective strategic planning treatment to each one of its products /businesses.
 - SBU concept is relevant to a multi-product, multi-business enterprises like Unilever Limited
 - In other words, the SBU concept helps a multi-business corporation in scientifically grouping its businesses into a few distinct business units. Such a grouping would in

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 2

it's turn, help the corporation to carry out it's strategic management practices in better manner.

Some of major reasons of using SBU approach are as follow:

- A scientific method of grouping the businesses of a multi-business corporation which helps the firm in strategic planning.
- An improvement over the geographical grouping of businesses and strategic planning based on locational units.
- An SBU is a grouping of related businesses that can be taken up for strategic planning distinct from the rest of the businesses.
- Grouping the businesses on SBU lines helps the firm in strategic planning by removing the ambiguity and confusion generally seen in grouping businesses.
- Each SBU is a separate business from the strategic planning standpoint. In the basic factors, viz., mission, objectives, competition and strategy-one SBU will be distinct from another.
- Each SBU will have it's own distinct set of competitors and it's own distinct strategy.
- Each SBU will have a CEO. He will be responsible for strategic planning for the SBU and it's profit performance; he will also have control over most of the factors affecting the profit of the SBU.

(b) There are three approaches that can be adopted to strategic planning:

- (i) A top-down process, in which managers are given targets to achieve which they pass on down the line.
- (ii) A bottom-up process, in which functional and line managers in conjunction with their staff submit plans, targets and budgets for approval by higher authority.
- (iii) An iterative process, which involves both the top-down and bottom-up setting of targets. There is a to-and-from movement between different levels until agreement is reached. However, this agreement will have to be consistent with the overall mission, objectives and priorities and will have to be made within the context of the financial resources available to the organization. The iterative approach, which involves the maximum number of people, is the one most likely to deliver worthwhile and acceptable strategic plans.

9. Write short notes on any three of the following:

4x3=12

(a) Strategic Planning

(b) Marketing Mix

(c) Participative Management

(d) Types of firms/organisations for which BPR can be applied

Answer:

9. (a) Strategic Planning

It is important to operate a planning process which will not only produce realistic and potentially rewarding plans but will also secure the support of all those involved in

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 2

implementing them. There are three approaches that can be adopted to strategic planning:

- (i) A top-down process, in which managers are given targets to achieve which they pass on down the line.
- (ii) A bottom-up process, in which functional and line managers in conjunction with their staff submit plans, targets and budgets for approval by higher authority.
- (iii) An iterative process, which involves both the top-down and bottom-up setting of targets. There is a to-and-from movement between different levels until agreement is reached. However, this agreement will have to be consistent with the overall mission, objectives and priorities and will have to be made within the context of the financial resources available to the organization. The iterative approach, which involves the maximum number of people, is the one most likely to deliver worthwhile and acceptable strategic plans.

(b) Marketing Mix:

Marketing mix is the pack of four sets of variables namely, product variables, price variables, promotion variables and place variable.

Marketing Mix refers to the appointment of effort, the combination, designing and integration of the elements of marketing into a programme or mix which, on the basis of an appraisal of the market forces will best achieve the objectives of an enterprise at a given time.

Philip Kotler defines the marketing mix as the set of controllable variables and their levels that the firm uses to influence the target market. Such variables are:

- (i) Product
- (ii) Place
- (iii) Price and
- (iv) Promotion In addition, for service-there are three more P's They are:
 - (a) People
 - (b) Processes and
 - (c) Physical evidence.

(c) Participative Management: Another strategic approach to employee's motivation is to adopt the system of involving employees in decision making. This will elicit employee's commitment in executing decisions. Further, the successful process of making a decision, executing it and then seeing the positive consequences can help satisfy one's need for achievement, provides recognition and responsibility and enhance self esteem.

Maintenance aspect of human resources is concerned with creation and maintenance of such working conditions in the organisation as are necessary to attract the most talented people, retain them and motivate them to give their best.

Answer to MTP_Intermediate_Syllabus 2016_Dec2019_Set 2

For this purpose, existing system of grade salary structure, fixed annual increments and automatic adjustments to inflation has to be replaced by performance linked reward system. Under the new system, employee's reward will be linked to the corporate objectives by pegging it to the employees' contribution towards achieving them. Time has come to develop a comprehensive reward system that splits employees' compensation between company standards, individual merit and team performance. Individual reward system based on attainment of functional specific targets bearing no relationship to corporate performance should give way to team based reward system which pegs rewards of entire manpower of the business division to the achievement of its goals.

(d) Types of firms / organisations for which BPR can be applied:

BPR could be implemented to all firms (manufacturing firms, retailers, services, etc.) and public organizations that satisfy the following criteria:

- Minimum Number of employees: 20 (at least 4 in management positions).
- Strong management commitment to new ways of working and innovation.
- Well formed IT infrastructure.

Business Process Reengineering could be applied to companies that confront problems such as the following:

- High operational costs
- Low quality offered to customers
- High level of "bottleneck" processes at pick seasons
- Poor performance of middle level managers
- Inappropriate distribution of resources and jobs in order to achieve maximum performance, etc.

Paper 9 – Operations Management & Strategic Management

Answer_MTP_Intermediate_Syllabus-2016_June 2019_Set -1**Paper 9 – Operations Management & Strategic Management****Full Marks : 100****Time allowed: 3 hours****The figures in the margin on the right side indicate full marks.****This question paper has two sections.****Both the sections are to be answered subject to instructions given against each.****Section – I: (Operations Management)****1. (a) Choose the most correct alternatives: [1×10=10]**

- (i) Application of technology or process to the raw material to add use value is known as:
 - (a) Product,
 - (b) Production,
 - (c) Application of technology,
 - (d) Combination of technology and process.

- (ii) In Process Planning we plan:
 - (a) Different machines required,
 - (b) Different operations required,
 - (c) We plan the flow of material in each department,
 - (d) We design the product.

- (iii) Example of production by disintegration is
 - (a) Automobile,
 - (b) Locomotive,
 - (c) Crude oil,
 - (d) Mineral water.

- (iv) This aims at finding the best and most efficient way of using the available resources - men, materials, money and machinery:
 - (a) Time Study
 - (b) Work Study
 - (c) Method Study
 - (d) Job Evaluation

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- (v) Long range forecasting is useful in
- (a) Plan for Research and Development,
 - (b) To Schedule jobs in production,
 - (c) In purchasing the material to meet the present production demand,
 - (d) To assess manpower required in the coming month.
- (vi) Which one of the following standards is associated with the "Quality Assurance in Final Inspection Test"?
- (a) ISO 9001
 - (b) ISO 9002
 - (c) ISO 9003
 - (d) ISO 9004
- (vii) Regularly occurring periodic fluctuations are known as:
- (a) Regular trend,
 - (b) Random element,
 - (c) Seasonal component,
 - (d) Trend.
- (viii) In Operation Planning:
- (a) The planner plans each operation to be done at work centers and the sequences of operations,
 - (b) Decide the tools to be used to perform the operations,
 - (c) Decide the machine to be used to perform the operation,
 - (d) Decide the materials to be used to produce the product.
- (ix) One of the important charts used in Programme control is:
- (a) Material chart,
 - (b) Gantt chart,
 - (c) Route chart,
 - (d) Inspection chart.
- (x) The act of releasing the production documents to production department is known as:
- (a) Routing,
 - (b) Scheduling,
 - (c) Expediting,
 - (d) Dispatching.

Answer_MTP_Intermediate_Syllabus-2016_June 2019_Set - 1**(b) Match the terms in Column I with the relevant terms in Column II****[1×6=6]**

Column I	Column II
(A) Furniture	(i) Assembly line
(B) Tools	(ii) Method study
(C) Television set	(iii) Carpentry
(D) Cement	(iv) Machine shop
(E) Aviation Fuel	(v) Rotary Kiln
(F) Motion Economy	(vi) Refinery

(c) State whether the following statements are True/False?**[1×6=6]**

- (i) Merit Rating is used to determine the cost of a product ()
- (ii) Increase in productivity leads to retrenchment of work force ()
- (iii) Project costs increase as the duration of the project increases ()
- (iv) Job Evaluation is a systematic approach to ascertain the labour worth of a job ()
- (v) Production planning and control is essentially concerned with the control of Finished goods ()
- (vi) Breakdown maintenance doesn't require use of standby machines ()

Answer:

1. (a) (i) (b) Production
(ii) (c) We plan the flow of material in each department
(iii) (c) Crude oil
(iv) (b) Work Study
(v) (c) In purchasing the material to meet the present production demand
(vi) (c) ISO 9003
(vii) (c) Seasonal component
(viii) (a) The planner plans each operation to be done at work centers and the sequences of operations,
(ix) (b) Gantt chart
(x) (d) Dispatching

(b)

Column I	Column II
(A) Furniture	(i) Carpentry
(B) Tools	(ii) Machine shop
(C) Television set	(iii) Assembly line
(D) Cement	(iv) Rotary Kiln
(E) Aviation Fuel	(v) Refinery
(F) Motion Economy	(vi) Method Study

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- (c) (i) (False)
 (ii) (False)
 (iii) (True)
 (iv) (True)
 (v) (False)
 (vi) (False)

Answer any three questions from the following:

2. (a) Define plant layout. What are the factors influencing layout choices? [6]
- (b) The monthly requirement of raw material for a company is 3000 units. The carrying cost is estimated to be 20% of the purchase price per unit, in addition to ₹ 2 per unit. The purchase price of raw material is ₹ 20 per unit. The ordering is ₹ 25 per order.
- (i) You are required to find EOQ.
 (ii) What is the total cost when the company gets a concession of 5% on the purchase price if it orders 3000 units or more but less than 6000 units per month. [4+6]

Answer:

2. (a) Plant Layout, also known as layout of facility refers to the configuration of departments, work-centres and equipment and machinery with focus on the flow of materials or work through the production system.
- Plant layout or facility layout means planning for location of all machines, equipments, utilities, work stations, customer service areas, material storage areas, tool servicing areas, tool cribs, aisles, rest rooms, lunch rooms, coffee/tea bays, offices, and computer rooms and also planning for the patterns of flow of materials and people around, into and within the buildings.

Factors influencing layout choices:

Primarily the layout of a plant is influenced by the relationship among materials, machinery and men. Other factors influencing layout are type of product, type of workers, the type of industry, management policies etc.

Some of these factors are discussed in detailed below:

- **Location:** The size and type of the site selected for the plant, influences the type of buildings (single story or multi story) which in turn influences the layout design. Also, the location of the plant determines the mode of transportation from and into the plant (such as by goods trains, truck, or ships) and the layout should provide facilities for mode of transport used. Also, the layout should provide for storage of fuel, raw materials, future expansion needs, power generation requirements etc.
- **Machinery and Equipments:** The type of product, the volume of production, type of processes and management policy on technology, determines the type of machines and equipments to be installed
- **Managerial Policies:** regarding volume of production, provision for future expansion, extent of automation, make-or-buy decisions, speed of delivery of goods to customers,

Answer_MTP_Intermediate_Syllabus-2016_June 2019_Set -1

purchasing and inventory policies and personnel policies influence the plant layout design.

- **Materials:** Plant layout includes provision for storage and handling of raw materials, supplies and components used in production. The type of storage areas, racks, handling equipments such as cranes, trolleys, conveyors or pipelines etc., used - all depend on the type of materials used - such as solid, liquid, light, heavy, bulky, big, small etc.
- **Product:** The type of product i.e., whether the product is light or heavy, big or small, liquid or solid etc., it influences the type of layout. For example, Ship building, Aircraft assembly, Locomotive assembly etc., requires a layout type different from that needed to produce refrigerators, cars, scooters, television sets, soaps, detergents, soft drinks etc. The manufacturing process equipments and machines used and the processing steps largely depend on the nature of the product and hence the layout design depends, very much on the product.

- (b)** We are given that,

$$D = 3,000 \times 12 = 36,000 \text{ units per annum}$$

$$S = ₹ 25$$

$$C = 2 + 20\% \text{ of } ₹ 20$$

$$= 2 + 4 = ₹ 6$$

$$\begin{aligned} \text{(i) EOQ} &= \sqrt{\frac{2DS}{C}} \\ &= \sqrt{\frac{2 \times 36,000 \times 25}{6}} \\ &= \sqrt{3,00,000} \\ &= 548 \text{ units app.} \end{aligned}$$

$$\begin{aligned} \text{Total cost} &= \text{Ordering Cost} + \text{Cost of raw material} + \text{Storage cost} \\ &= \left(\frac{36,000}{548} \times 25 \right) + (36,000 \times 20) + \left(\frac{548}{2} \times 6 \right) \\ &= ₹ 1,642.33 + 7,20,000 + 1,644 \\ &= ₹ 7,23,286 \end{aligned}$$

- (ii)** When the company has an option to order between 3000 and 6000 units, the EOQ should be calculated with a reduction in price by 5% (due to concession)

The purchase price = 95% of ₹ 20

$$= ₹ 19.$$

$$D = 36,000 \text{ units per annum}$$

$$S = ₹ 25$$

$$C = 2 + 20\% \text{ of } 19$$

$$= 2 + 3.80$$

$$= ₹ 5.80$$

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$$\begin{aligned} EOQ &= \sqrt{\frac{2 \times 36,000 \times 25}{5.80}} \\ &= \sqrt{\frac{18,00,000}{5.80}} = 557 \text{ units app.} \end{aligned}$$

$$\begin{aligned} \text{Total cost} &= \left(\frac{36,000}{557} \times 25 \right) + (36,000 \times 19) + \left(\frac{557}{2} \times 5.80 \right) \\ &= ₹ 1,615.79 + 6,84,000 + 1,615.30 \\ &= ₹ 6,87,231.09 \end{aligned}$$

3. (a) What does Product Design do? Discuss – Process design and selection. [6]

(b) Machine A costs of ₹ 80,000. Annual operating costs are ₹ 2,000 for the first year, and they increase by ₹ 15,000 every year (for example, in the fourth year the operating costs are ₹ 47,000). Determine the lease age at which to replace the machine. If the optimal replacement policy is followed; what will be the average yearly cost of operating and owning the machine? (Assume that the resale value of the machine is zero when replaced, and that future costs are not discounted.

- (i) Another machine B costs ₹ 1,00,000. Annual operating cost for the first year is ₹ 4,000 and they increase by ₹ 7,000 every year. The firm has a machine of type A which is one year old. Should the firm replace it with B and if so, when?
- (ii) Suppose the firm is just ready to replace the machine A with another machine of the same type, just then the firm gets an information that the machine B will become available in a year. What should the firm do? [10]

Answer:

3. (a) The activities and responsibilities of product design include the following:

- (i) Translating customer needs and wants into product and service requirements (marketing).
- (ii) Refining existing products (marketing).
- (iii) Developing new products (marketing, product design and production).
- (iv) Formulating quality goals (quality assurance, production).
- (v) Formulating cost targets (accounting).
- (vi) Constructing and testing prototype (marketing, production).
- (vii) Documenting specifications (product design).

Process Design is concerned with the overall sequences of operations required to achieve the product specifications. It specifies the type of work stations to be used, the machines and equipments necessary to carry out the operations. The sequence of operations are determined by (a) the nature of the product, (b) the materials used, (c) the quantities to be produced and (d) the existing physical layout of the plant.

The process design is concerned with the following:

- (i) Characteristics of the product or service offered to the customers.

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- (ii) Expected volume of output.
- (iii) Kinds of equipments and machines available in the firm.
- (iv) Whether equipments and machines should be of special purpose or general purpose.
- (v) Cost of equipments and machines needed.
- (vi) Kind of labour skills available, amount of labour available and their wage rates.
- (vii) Expenditure to be incurred for manufacturing processes.
- (viii) Whether the process should be capital-intensive or labour-intensive.
- (ix) Make or buy decision.
- (x) Method of handling materials economically.

(b) The operating cost of machine A in successive years are as follows:

Year	1	2	3	4	5
Operating Cost (₹)	2,000	17,000	32,000	47,000	62,000

Calculations for average cost of Machine A

Replacement at the end of year	Cumulative operating cost (in ₹)	Depreciation Cost (in ₹)	Total Cost (in ₹)	Average Cost per year (in ₹)
1	2,000	80,000	82,000	82,000
2	19,000	80,000	99,000	49,500
3	51,000	80,000	1,31,000	43,666
4	98,000	80,000	1,78,000	44,500
5	1,60,000	80,000	2,40,000	48,000

It is clear from the table that machine A should be replaced at the end of third year. The average yearly, cost of owning & operating machine A in this situation will be ₹ 43,666.

(i) The operating cost of machine B are as follows:

Year	1	2	3	4	5	6
Operating Cost (₹)	4,000	11,000	18,000	25,000	32,000	39,000

Calculations for average cost of Machine B

Replacement at the end of year	Cumulative operating cost (in ₹)	Depreciation Cost (in ₹)	Total Cost (in ₹)	Average Cost per year (in ₹)
1	4,000	1,00,000	1,40,000	1,04,000
2	15,000	1,00,000	1,15,000	57,500
3	33,000	1,00,000	1,33,000	44,333
4	88,000	1,00,000	1,58,000	39,500
5	90,000	1,00,000	1,90,000	38,000
6	1,29,000	1,00,000	2,29,000	38,166

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It is clear from the above Table that if machine B is replaced after 5 years then its average cost per year is ₹ 38,000. Since the lowest average cost for machine B (₹38,000) is less than the lowest average cost for machine A (₹.s 43,666), the machine A should be replaced by machine B. Now to find the time of replacement of Machine A by Machine B, we proceed as follows:

The machine A is replaced by machine B at the time (age), when its running cost of the next year exceed the lowest average yearly cost ₹ 38,000 of machine B. Further, the total cost of the machine A in the successive years are computed as follows:

Year	1	2	3	4	5
Total cost in the year (₹)	82,000	99,000 – 82,000 = 17,000	1,31,000 – 99,000 = 32,000	1,78,000 – 1,31,000 = 47,000	2,40,000 – 1,78,000 = 62,000

The running cost of fourth year of machine A is ₹ 47,000 which is more than the lowest average yearly cost ₹ 38,000 of machine B. therefore, the machine A should be replaced by machine B, when its age is 1 year. Since the machine A is one year old now, it should be replaced just now.

Install new machine now and replace it with machine B during the third year.

4. (a) Without standby equipment, a shutdown will cost ₹ 200 a day. It is estimated that an average of 2.5 days a year can be lost due to shutdowns. A standby machine can be purchased for ₹ 4,000 with an economic life of 10 years and ₹ 500 salvage value at that data. Its annual costs including 2.5 days of actual operation would be ₹ 100. Make a choice. [6]
- (b) Describe the objective of Time Study. [6]
- (c) What are the elements of lean production? [4]

Answer:

4. (a) Annual cost of shutdown = $200 \times 2.5 = ₹ 500$

Annual cost of standby equipment

$$\text{Depreciation} = \frac{4,000 - 5,000}{10} = ₹ 350$$

$$\begin{array}{ll} \text{Opening cost} = & ₹ 100 \\ \text{Total} & 450 \end{array}$$

Therefore, standby equipment is preferable.

- (b) Time study is concerned with the determination of the amount of time required to perform a unit of work. It consists of the process of observing and recording the time required to perform each element of an operation so as to determine the reasonable time in which the work should be completed. Time study is defined by ILO as below 'Time study is a work measurement technique for recording the times and rates of working for the elements of a specified job carried out under specified conditions and for analyzing

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the data so as to obtain the time necessary for carrying out the job at a defined level of performance'.

Objective of time study:

The main objective is 'to determine by direct observation, the quantity of human work in a specified task and hence to establish the standard time, within which an average worker working at a normal pace should complete the task using a specified method'.

The other objectives are:

- (i) To furnish a basis of comparison for determining operating effectiveness.
- (ii) To set labour standard for satisfactory performance.
- (iii) To compare alternative methods in method study in order to select the best method.
- (iv) To determine standard costs.
- (v) To determine equipment and labour requirements.
- (vi) To determine basic times/normal times.
- (vii) To determine the number of machines an operator can handle.
- (viii) To balance the work of operators in production or assembly lines.
- (ix) To provide a basis for setting piece rate or incentive wages.
- (x) To set the completion schedules for individual operations or jobs.

(c) The elements of lean production are:

- (i) To consider the organisation in terms of supply chain of value streams that extends from suppliers of raw materials, through transformation to the final customer.
- (ii) To organise workers in teams and to have everyone in the organisation conscious of his or her work.
- (iii) To produce products of perfect quality and to have continuous quality improvement as a goal.
- (iv) To organise the operation by product or cellular manufacturing, rather than using a functional or process lay-out.
- (v) To operate the facility in a just-in-time mode.

5. (a) Draw the network for the following activities and find critical path and total duration of project.

Activity	Duration (months)	Activity	Duration (months)
1-2	2.5	4-5	2.0
2-3	2.5	5-6	3.0
2-4	1.5	6-7	1.5
3-4	1.0	5-7	1.5
3-5	1.0		

[8]

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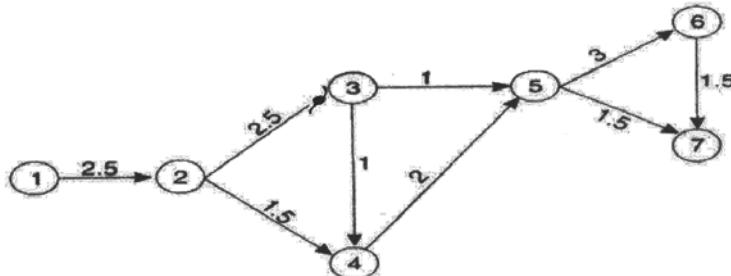
(b) A public transport system is experiencing the following number of breakdowns for months over the past 2 years in their new fleet of vehicles:

Number of breakdowns	0	1	2	3	4
Number of months this occurred	2	8	10	3	1

Each break down costs the firm an average of ₹ 2,800. For a cost of ₹ 1,500 per month, preventive maintenance can be carried out to limit the break-downs to an average of one per month. Which policy is suitable for the firm? [8]

Answer:

5. (a)



Paths	Duration
1-2-3-5-6-7	$2.5+2.5+1+3+1.5 = 10.5$
1-2-3-5-7	$2.5+2.5+1+1.5 = 7.50$
1-2-3-4-5-6-7	$2.5+2.5+1+2+3+1.5 = 12.5$ (Critical Path)
1-2-3-4-5-7	$2.5+2.5+1+2+1.5 = 9.5$
1-2-4-5-7	$2.5+1.5+2+1.5 = 7.5$
1-2-4-5-6-7	$2.5+1.5+2+3+1.5 = 10.5$

(b) Converting the frequencies to a probability distribution and determining the expected cost/month of breakdowns we get:

No. of breakdowns (X)	Frequency in months (FX)	Frequency in per cen P(X)	Expected value X.P(X)
0	2	0.083	0
1	8	0.333	0.333
2	10	0.417	0.834
3	3	0.125	0.375
4	1	0.042	0.168
Total			1.710

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Breakdown cost per months

$$\text{Expected} = \left(\frac{1.71 \text{breakdowns}}{\text{month}} \right) \left(\frac{\text{₹ } 2,800}{\text{breakdown}} \right)$$

$$= \frac{\text{₹ } 4,788}{\text{month}}$$

Preventive maintenance cost per month

Average cost of one breakdown/month	=	₹ 2,800
Maintenance contract cost/month	=	₹ 1,500
Total		₹ 4,300

Thus, preventive maintenance policy is suitable for the firm.

Section – II: (Strategic Management)

6. Choose the correct answer from the given alternatives:

[1×6=6]

- (i) Business Process Re-engineering is
- (a) Eliminating loss-making process;
 - (b) Redesigning operational processes;
 - (c) Redesigning the product and services;
 - (d) Recruiting the process engineers.
- (ii) Strategic choice makes a statement about the corporate strategy as well as business strategy:
- (a) They are one and the same;
 - (b) One is an external planning and another resources planning statement;
 - (c) Corporate strategy is a general statement and business strategy defines how a SBU shall operate;
 - (d) Both states certain course of action – one for the total unit and another for a particular business agent;
 - (e) One refers to the whole business and another helps in the formulation of marketing decisions.
- (iii) Benchmarking is:
- (a) The analytical tool to identify high cost activities based on the 'Pareto Analysis'.
 - (b) The search for industries best practices that lead to superior performance;
 - (c) The simulation of cost reduction schemes that help to build commitment and improvement of actions;

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- (d) The process of marketing and redesigning the way a typical company works;
- (e) The framework that earmarks a linkage with suppliers and customers.
- (iv) The conditional of Low share, Negative growth and negative cash flow indicates -
- (a) Dogs.
 - (b) Dodos.
 - (c) Donkey.
 - (d) Dinosaurs.
- (v) Offensive strategy is a strategy:
- (a) For small companies that consider offensive attacks in the market.
 - (b) For those companies that search for new inventory opportunities to create competitive advantage.
 - (c) For the market leader who should attack the competitor by introducing new products that make existing ones obsolete.
 - (d) For those companies who are strong in the market but not leaders and might capture a market share from the leader.
 - (e) None of the above.
- (vi) A strategic business unit (SBU) is defined as a division of an organization:
- (a) That help in the marketing operation;
 - (b) That enable managers to have better control over the resources;
 - (c) That help in the choice of technology;
 - (d) That help in the allocation of scarce resources;
 - (e) That help in identifying talents and potentials of people.

Answer:

6. (i) (b) Redesigning operational processes.
- (ii) (c) Strategic choice makes a statement about the corporate strategy as well as business strategy : the former refers to the whole business while the latter helps in the formulation of marketing and other decisions.
- (iii) (b) The search for industries best practices that lead to superior performance.
- (iv) (b) Dodos
- (v) (d) For those companies who are strong in the market but not leaders and might capture a market share from the leader.
- (vi) (d) A strategic business unit (SBU) is defined as a division of an organization: that enable managers to have better control over the resources.

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Answer any two question from the following:

7. (a) Discuss the advantages of Strategic Management?

(b) Discuss “Strategic levels in the organizations”

[6+6]

Answer:

(a) The Advantages of Strategic Management

• Discharges Board Responsibility

The first reason that most organizations state for having a strategic management process is that it discharges the responsibility of the Board of Directors.

• Forces an Objective Assessment

Strategic management provides a discipline that enables the board and senior management to actually take a step back from the day-to-day business to think about the future of the organization. Without this discipline, the organization can become solely consumed with working through the next issue or problem without consideration of the larger picture.

• Provides a Framework for Decision-Making

Strategy provides a framework within which all staff can make day-to-day operational decisions and understand that those decisions are all moving the organization in a single direction. It is not possible (nor realistic or appropriate) for the board to know all the decisions the executive director will have to make, nor is it possible (nor realistic or practical) for the executive director to know all the decisions the staff will make. Strategy provides a vision of the future, confirms the purpose and values of an organization, sets objectives, clarifies threats and opportunities, determines methods to leverage strengths, and mitigate weaknesses (at a minimum). As such, it sets a framework and clear boundaries within which decisions can be made. The cumulative effect of these decisions (which can add up to thousands over the year) can have a significant impact on the success of the organization. Providing a framework within which the executive director and staff can make these decisions helps them better focus their efforts on those things that will best support the organization's success.

• Supports Understanding & Buy-In

Allowing the board and staff participation in the strategic discussion enables them to better understand the direction, why that direction was chosen, and the associated benefits. For some people simply knowing is enough; for many people, to gain their full support requires them to understand.

• Enables Measurement of Progress

A strategic management process forces an organization to set objectives and measures of success. The setting of measures of success requires that the organization first determine what is critical to its ongoing success and then forces the establishment of objectives and keeps these critical measures in front of the board and senior management.

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- **Provides an Organizational Perspective**

Addressing operational issues rarely looks at the whole organization and the interrelatedness of its varying components. Strategic management takes an organizational perspective and looks at all the components and the interrelationship between those components in order to develop a strategy that is optimal for the whole organization and not a single component.

(b) There are primarily three levels of strategies in the organisation.

1. Corporate Level
2. Business Level
3. Functional Level

1. Corporate Level:

The corporate level of management consists of the chief executive officer (CEO), other senior executives, the board of directors, and corporate staff. These individuals occupy the top-committee of decision making within the organisation. The CEO is the principal general manager. In consultation with other senior executives, the role of corporate-level managers is to oversee the development of strategies for the whole organisation. This role includes defining the mission and goals of the organisation, determining what businesses it should be in, allocating resources among the different businesses, formulating and implementing strategies that span individual businesses, and providing leadership for the organisation. For example, strategies formed for Unilever Limited would be at corporate level.

2. Business Level:

A business unit is a self-contained division (with its own functions-for example, finance, purchasing, production, and marketing departments) that provides a product or service for a particular market. The principal general manager at the business level, or the business-level manager, is the head of the division. The strategic role of these managers is to translate the general statements of direction and intent that come from the corporate level into concrete strategies for individual businesses. Thus, whereas corporate-level general managers are concerned with strategies that span individual businesses, business-level general managers are concerned with strategies that are specific to a particular business. At GE, a major corporate goal is to be first or second in every business in which the corporation competes. Then the general managers in each division work out for their business the details of a strategy that is consistent with this objective. For example, strategies formed for Kwality Walls, a subsidiary of Unilever Limited would be at business level.

3. Functional Level:

Functional-level managers are responsible for the specific business functions or operations (human resources, purchasing, product development, customer service, and so on) that constitute a company or one of its divisions. Thus, a functional manager's sphere of responsibility is generally confined to one organisational activity, whereas general managers oversee the operation of a whole company or division. Although they are not responsible for the overall performance of the organisation, functional managers nevertheless have a major strategic role: to develop functional strategies in their area that help fulfill the strategic objectives set by business & corporate-level general managers. Moreover, functional managers provide most of the information that makes it possible for business & corporate-level general managers to, formulate realistic and attainable strategies. Indeed,

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because they are closer to the customer than the typical general manager is, functional managers themselves may generate important ideas that subsequently may become major strategies for the company. Thus, it is important for general managers to listen closely to the ideas of their functional managers. An equally great responsibility for managers at the operational level is strategy implementation: the execution of corporate and business-level plans. For example, strategies formed for employee retention by HR manager at Kwality Walls would be at functional level.

8. (a) Discuss the differences in Strategic Management & Strategic Planning.**(b) Define SBU. What are its merits & demerits?****[6+6]****Answer:**

(a) The basic difference between Strategic management and Strategic planning are as follows:

Strategic Management	Strategic Planning
1. It is focused on producing strategic results; new markets; new products; new technologies etc.	1. It is focused on making optimal strategic decisions
2. It is management by results.	2. It is management by plans
3. It is an organizational action process	3. It is an analytical process
4. It broadens focus to include psychological, sociological and political variables.	4. It is focused on business, economic and technological variables
5. It is about choosing things to do and also about the people who will do them.	5. It is about choosing things to do

(b) SBU groups similar divisions into "Strategic Business Units" and then delegate's authority and responsibility of each unit to a senior executive who is normally identified as CEO or MD of that SBU. It is an extension of Divisional structure.

SBU Structure

Big organisation like Unilever, etc have many SBUs for their different categories of products like Cosmetics, Food products and Beverages, etc, and each is managed through separate unit head.

Advantages:

- (i) Promotes accountability since units" heads are responsible for individual SBU profitability
- (ii) Career development opportunities are further higher in this structure
- (iii) Allow better control of categories of products manufacturing, marketing and distributions
- (iv) Helps to expand in different related and unrelated businesses

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Disadvantages:

- (i) May provide inconsistent approach to tackle customers, etc, because each unit may work in its own way to handle situations
- (ii) High cost approach

9. Write short notes on any three of the following four questions:

[4×3=12]

- (a) Structural Driver's of Change;**
- (b) Approaches in Strategic Planning;**
- (c) SWOT Analysis;**
- (d) Plant location.**

Answer:

(a) Structural Drivers of Change are forces likely to affect the structure of an industry, sector or market. The following are some of the factors

- **Increasing convergence of markets**

In some markets the customers' needs and preferences are becoming more similar. As some markets globalise, those operating in such markets become global customers and may search for suppliers. Moreover marketing policies need to be developed all over again.

- **Cost advantage of global operations**

This benefit might accrue to industries that operate in large volume, standardised production and enjoy economies of scale. In order to realise location economies businesses search globally for low cost operations and enjoying competitive edge.

- **Activities and policies of the governments**

The government policies and activities have also resulted in influencing the globalisation of industry. The moves towards free trade and technical standardisation of many products between countries have resulted in increasing competition.

- **Global competition**

It is the global competition that acts as a driver to globalisation. It may be mentioned that high level of import and export between countries increase interaction between competitors on a more global scale. The interdependence of companies across the world promotes global trade.

(b) Approaches in Strategic Planning

It is important to operate a planning process which will not only produce realistic and potentially rewarding plans but will also secure the support of all those involved in implementing them. There are three approaches that can be adopted to strategic planning:

- (i) A top-down process, in which managers are given targets to achieve which they pass on down the line.

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- (ii) A bottom-up process, in which functional and line managers in conjunction with their staff submit plans, targets and budgets for approval by higher authority.
- (iii) An iterative process, which involves both the top-down and bottom-up setting of targets. There is a to-and-from movement between different levels until agreement is reached. However, this agreement will have to be consistent with the overall mission, objectives and priorities and will have to be made within the context of the financial resources available to the organization. The iterative approach, which involves the maximum number of people, is the one most likely to deliver worthwhile and acceptable strategic plans.

(c) SWOT Analysis:

Gathering data about the general, operating, and internal environments provides the raw material from which to develop a picture of the organisational environment.

SWOT analysis refines this body of information by applying a general framework for understanding and managing the environment in which an organisation operates. (The acronym SWOT stands for Strengths, Weaknesses, Opportunities, and Threats.) In many respects, the sophisticated analytical techniques discussed throughout the text are further refinements of basic SWOT analysis. In addition, students have repeatedly told us that SWOT is an excellent way to begin a case analysis. SWOT analysis attempts to assess the internal strengths and weaknesses of an organisation and the opportunities and threats that its external environment presents. SWOT seeks to isolate the major issues facing an organisation through careful analysis of each of these four elements. Managers can then formulate strategies to address key issues.

(d) Plant Location:

Plant location is essentially an investment decision having long-term significance and implied economic effects. A good decision plays off; a bad decision can cause grim financial difficulties. Once a plant is acquired, it is a permanent site that cannot readily be sold. The management may also contemplate relocation of the plant when business expansion and advanced technology require additional facilities to serve new market areas, to produce new products, or simply to replace the old, obsolete plants to increase the company's production capacity.

Before a location for a plant is sought, long range forecasts should be made anticipating the future needs of the company. These should be based on the company's expansion policy, the anticipated diversification of products, the trends in market demand, geographical distribution, material and labour supply, and any other foreseeable influences. Thus, plant location decisions require intensive study of economic and socio-political circumstances.

The accuracy of forecasting is essential regarding rising demand and anticipated sales increases. Miscalculation in this respect may post serious problems before the company can occupy the new facilities once built and expand the new facilities subsequently due to land and environmental constraints.

The selection of an appropriate plant site calls for location study of the region in which the factory is to be situated, the community in which it should be placed and finally, the exact site in the city or countryside.

Paper 9 – Operations Management & Strategic Management

Answer_MTP_Intermediate_Syllabus-2016_June 2019_Set -2**Paper 9 – Operations Management & Strategic Management****Full Marks : 100****Time allowed: 3 hours****The figures in the margin on the right side indicate full marks.****This question paper has two sections.****Both the sections are to be answered subject to instructions given against each.****Section – I : (Operations Management)****1. (a) Choose the most correct alternatives:****[1×10=10]**

- (i) The starting point of Production cycle is:
 - (A) Product design,
 - (B) Production planning,
 - (C) Routing,
 - (D) Market research.
- (ii) The act of assessing the future and make provisions for it is known as:
 - (A) Planning,
 - (B) Assessment,
 - (C) Forecasting,
 - (D) Scheduling.
- (iii) In Production by service, the product undergoes the changes in:
 - (a) Shape and size of the surface,
 - (b) Shape of the surface only,
 - (c) Size of the surface only,
 - (d) Chemical and Mechanical properties.
- (iv) Which of the following aims at finding the best and most efficient way of using the available resources — men, materials, money and machinery?
 - (A) Method Study,
 - (B) Work Study,
 - (C) Time Study,
 - (D) Motion Study.
- (v) Most suitable layout for continuous production is:
 - (a) Process layout,
 - (b) Line layout,
 - (c) Group Technology,
 - (d) Matrix layout.

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- (vi) Reliability and per unit cost of which of the following spares are less?
- (a) Regular spares
 - (b) Insurance spares
 - (c) Capital spares
 - (d) Rotable spares
- (vii) Issuing necessary orders, and taking necessary steps to ensure that the time targets set in the schedules are effectively achieved is known as:
- (a) Routing,
 - (b) Dispatching,
 - (c) Scheduling,
 - (d) Inspection.
- (viii) Preventive maintenance is useful in reducing:
- (a) Inspection Cost,
 - (b) Shutdown Cost,
 - (c) Cost of pre-mature replacement,
 - (d) Set-up cost of machine
- (ix) MRP stands for:
- (a) Material Requirement Planning,
 - (b) Material Recording Planning,
 - (c) Material Requisition Procedure
 - (d) Material Recording Procedure.
- (x) Which one of the following standards is associated with the “Quality Assurance in Design, Production, Installation and Servicing”?
- (a) ISO 9001
 - (b) ISO 9002
 - (c) ISO 9003
 - (d) ISO 9004

(b) Match the terms in Column I with the relevant terms in Column II**[1×6=6]**

Column I	Column II
(A) Inventory Control	(i) Turbo-Alternator
(B) TQM focus	(ii) Network Analysis
(C) Aviation Fuel	(iii) Examination of Human work
(D) Hydro-electricity	(iv) Customer Satisfaction
(E) Work Study	(v) Refinery
(F) Systematic Quantitative structural approach to the problem of managing a project through to successful completion	(vi) Stock Level

Answer_MTP_Intermediate_Syllabus-2016_June 2019_Set -2**(c) State whether the following statements are True or False?****[1×6=6]**

- (i) A Productivity Index is a device of expressing the ratio between outputs and the inputs of the resources numerically. ()
- (ii) The Linear Programming problem has two basic parts: the objective function and the constraint set. ()
- (iii) Increase in productivity leads to retrenchment of work force. ()
- (iv) The term "aesthetics" which appeals to the human sense does not add value to the product. ()
- (v) PERT is designed for repetitive projects, whereas CPM is suitable for non-repetitive projects. ()
- (vi) Production planning and control is essentially concerned with the control of finished goods. ()

Answer:

1. (a) (i) (d) Market Research
 (ii) (c) Forecasting
 (iii) (d) Chemical and Mechanical properties
 (iv) (b) Work Study
 (v) (b) Line layout
 (vi) (a) Regular spares
 (vii) (b) Dispatching
 (viii) (b) Shutdown Cost
 (ix) (a) Material Requirement Planning
 (x) (a) ISO 9001

(b)

Column I	Column II
(A) Inventory Control	(vi) Stock Level
(B) TQM focus	(iv) Customer Satisfaction
(C) Aviation Fuel	(v) Refinery
(D) Hydro-electricity	(i) Turbo-Alternator
(E) Work Study	(iii) Examination of Human work
(F) Systematic Quantitative structural approach to the problem of managing a project through to successful completion	(ii) Network Analysis

- (c) (i) (True)
 (ii) (True)
 (iii) (False)

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- (iv) (False)
 (v) (False)
 (vi) (False)

Answer any three questions from the following:

2. (a) What are the importance of a layout? [6]

- (b) (i) A workshop operates on 2 shifts of 8 hours per day. It has 10 machines. It works for 5 days in a week. Machine utilization is 90% and the efficiency of the machines is 85%. Calculate the designed/rated capacity of the workshop in standard hours.**
- (ii) The present layout is shown in the figure. The manager of the department is intending to interchange the departments C and F in the present layout. The handling frequencies between the departments is given. All the departments are of the same size and configuration. The material handling cost per unit length travel between departments is same. What will be the effect of interchange of departments C and F in the layout?**

A	C	E
B	D	F

From / To	A	B	C	D	E	F
A	-	0	90	160	50	0
B	-	-	70	0	100	130
C	-	-		20	0	0
D	-	-	-		180	10
E		-	-	-	-	40
F	-	-	-	-	-	-

[10]

Answer:

2. (a) Importance of layout:

The importance of a layout can be described as under:

- Avoidance of Bottlenecks:** Bottlenecks refer to any, place in a production process where materials tend to pile up or produced at rates of speed less rapid than the previous or subsequent operations. Bottlenecks are caused by inadequate machine capacity, inadequate storage space or low speed on the part of the operators. The results of bottlenecks are delays in production schedules, congestion, accidents and wastage of floor area. All these may be overcome with an efficient layout.
- Avoidance of Unnecessary and Costly Changes:** A planned layout avoids frequent changes which are difficult and costly. The incorporation of flexibility elements in the layout would help in the avoidance of revisions.
- Better Production Control:** Production control is concerned with the production of a product of the right type at the right time and at reasonable cost. A good plant layout is a requisite of good production control and provides the plant control officers with a systematic basis upon which to build organisation and procedures.

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- **Better Supervision:** A good plant layout ensures better supervision in two ways: (a) Determining the number of workers to be handled by a supervisor and (b) Enabling the supervisor to get a full view of the entire plant at one glance. A good plant layout is, therefore, the first step in good supervision.
 - **Economies in Handling:** Nearly 30 per cent to 40 per cent of the manufacturing costs are accounted for by materials handling. Every effort should, therefore, be made to cut down this cost. Long distance movements should be avoided and specific handling operations must be eliminated.
 - **Effective Use of Available Area:** Every unit of the plant area is valuable, especially in urban areas. Efforts should therefore, be made to make use of the available area by planning the layout properly.
 - **Improved Employee Morale:** Employee morale is achieved when workers are cheerful and confident. This state of mental condition is vital to the success of any organisation. Morale depends on better working conditions; better employee facilities; reduced number of accidents; and increased earnings.
 - **Improved Quality Control:** Timely execution of orders will be meaningful when the quality of the output is not below expectations. To ensure quality, inspection should be conducted at different stages of manufacture. An ideal layout provides ample space to carryout inspection to ensure better quality control.
 - **Improved Utilisation of Labour:** A good plant layout is one of the factors in effective utilisation of labour. It makes possible individual operations, the process and flow of materials handling in such a way that the time of each worker is effectively spent on productive operations.
 - **Minimisation of Production Delays:** Repeat order and new customers will be the result of prompt execution of orders. Every management should try to keep to the delivery schedules by minimising delays in production.
 - **Minimum Equipment Investment:** Investment on equipment can be minimised by planned machine balance and location, minimum handling distances, by the installation of general purpose machines and by planned machine loading. A good plant layout provides all these advantages.

(b) (i) Rated capacity of the workshop = No. of shifts \times No. of hour's in each shift \times No. of days / Week \times No. of Machines \times Utilization factor \times Efficiency
 $= 2 \times 8 \times 5 \times 10 \times 0.90 \times 0.85$
 $= 612$ standards hour per week.

(ii) The distance matrix of the present layout:

From / To	A	B	C	D	E	F
A		1	1	2	2	3
B			2	1	3	2
C				1	1	2
D					2	1
E						1
F						-

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Computation of total cost matrix (combining the inter departmental material handling frequencies and distance matrix.

From / To	A	B	C	D	E	F	Total
A		0	90	320	100	0	510
B			140	0	300	260	700
C				20	0	0	20
D					360	10	370
E						40	40
F							—
Total							1,640

If the departments are interchanged, the layout will be represented as shown below.

A	F	E
B	D	C

The distance matrix and the cost matrix are represented as shown.

From / To	A	B	C	D	E	F
A		1	3	2	2	1
B			2	1	3	2
C				1	1	2
D					2	1
E						1
F						

Total cost matrix for the modified layout.

From / To	A	B	C	D	E	F	Total
A	—	0	270	320	100	0	690
B			140	0	300	260	700
C				20	0	0	20
D					360	10	370
E						40	40
F							—
Total							1,820

The interchange of departments C and F increases the total material handling cost. Thus, it is not a desirable modification.

3. (a) Linear Programming tools can be used in Management Application - Explain. [6]
- (b) After observing heavy congestion of customers over a period of time in a petrol station, Mr. Petro has decided to set up a petrol pump facility on his own in a nearby site. He has compiled statistics relating to the potential customer arrival pattern and service pattern as given below. He has also decided to evaluate the operations by the using the simulation technique.

Answer_MTP_Intermediate_Syllabus-2016_June 2019_Set -2

Arrivals		Service	
Inter-arrival time (minutes)	Probability	Service time (minutes)	Probability
2	0.22	4	0.28
4	0.30	4	0.40
6	0.24	8	0.22
8	0.24	10	0.10

[10]

Assume:

- (i) The clock starts at 8 : 0 hours.
- (ii) Only one pump is set up.
- (iii) The following 12 Random Numbers are to be used to depict the customer arrival pattern:
78, 26, 94, 08, 46, 63, 18, 35, 59, 12, 97 and 82
- (iv) The following 12 Random Numbers are to be used to depict the service pattern:
44, 21, 73, 96, 63, 35, 57, 31, 84, 24, 05 and 37

You are required to find out the

- (i) probability of the pump being idle, and
- (ii) average time spent by a customer waiting in queue.

Answer:

3. (a) Management Application of Linear Programming Tools

- (a) Portfolio Selection.
- (b) Financial Mix Strategy.
- (c) Profit Planning.
- (d) Media Selection.
- (e) Travelling Salesmen Problem.
- (f) Determination of equitable salaries.
- (g) Staffing problem.

(b)

Minutes	Inter -arrival time				Service time			
	Probability	Cumulative probability	Range	Minutes	Probability	Cumulative probability	Range	
2	0.22	0.22	00-21	4	0.28	0.28	00-17	
4	0.30	0.52	22-51	6	0.40	0.68	28-67	
6	0.24	0.76	52-75	8	0.22	0.90	68-89	
8	0.24	1.00	76-99	10	0.10	1.00	90-99	

Answer_MTP_Intermediate_Syllabus-2016_June 2019_Set -2

Sl. No	Random No. for inter arrival	Inter arrival time	Entry time in queue	Service start time	Random no for service	Service time	Service end time	Waiting Time of customer	Idle time
1	78	8	8.08	8.08	44	6	8.14	-	8
2	26	4	8.12	8.14	21	4	8.18	2	-9
3	94	8	8.20	8.22	73	8	8.30	-	-
4	08	2	8.22	8.30	96	10	8.40	8	-
5	46	4	8.26	8.40	63	6	8.46	14	-
6	63	6	8.32	8.46	35	6	8.52	14	-
7	18	2	8.34	8.52	57	6	8.58	18	-
8	35	4	8.38	8.58	31	6	9.04	20	-
9	59	6	8.44	9.04	84	8	9.12	20	-
10	12	0	8.46	9.12	24	4	9.16	26	-
11	97	8	8.54	9.16	05	4	9.20	22	-
12	82	8	9.02	9.20	37	6	9.26	18	10
	Total time							162	10

Average waiting time spent by the customer = $162/12 = 13.5$ minutes Probability of idle time of petrol station = $10/86 = 0.1163$

4. (a) A captain of a cricket team has to allot five middle batting positions to five batsmen. The average runs scored by each batsman at these positions are as follows:

Batting Position						
Batsmen		III	IV	V	VI	VII
	A	40	40	35	25	50
	B	42	30	16	25	27
	C	50	48	40	60	50
	D	20	19	20	18	25
	E	58	60	59	55	53

Make the assignment so that the expected total average runs scored by these batsmen are maximum. [8]

- (b) An airline is planning to open a satellite ticket desk in a new shopping plaza, staffed by one ticket agent. It is estimated that requests for tickets and information will average 15 per hour, and requests will have a Poisson distribution. Service time is assumed to be exponentially distributed. Previous experience with similar satellite operations suggests that mean service time should average about three minutes per request.

Determine each of the following:

- System utilization.
- Percentage of time the server (agent) will be idle.
- The expected number of customers waiting to be served.
- The average time customers will spend in the system.

[8]

Answer_MTP_Intermediate_Syllabus-2016_June 2019_Set -2**Answer:**

- (a) This is a problem of Maximisation. To solve it using Assignment technique it has to be converted to a Minimisation problem by forming a Relative Loss Matrix.

Batsman	Batting Position				
	III	IV	V	VI	VII
A	40	40	35	25	50
B	42	30	16	25	27
C	50	48	40	60	50
D	20	19	20	18	25
E	58	60	59	55	53

Relative Loss Matrix*

Batsman	Batting Position				
	III	IV	V	VI	VII
A	20	20	25	35	10
B	18	30	44	35	33
C	10	12	20	0	10
D	40	41	40	42	35
E	2	0	1	5	7

* This matrix is formed by subtracting all the elements of the given matrix from the highest element (60) of it.

Row Operation Matrix

Batsman	Batting Position				
	III	IV	V	VI	VII
A	10	10	15	25	0
B	0	12	26	17	15
C	10	12	20	0	10
D	5	6	5	7	0
E	2	0	1	5	7

Column Operation Matrix

Batting Position	III	IV	V	VI	VII
Batsman	10	10	14	25	0
A	10	10	14	25	0
B	0	12	25	17	15
C	10	12	19	0	10
D	5	6	4	7	0
E	2	0	0	5	7

Answer_MTP_Intermediate_Syllabus-2016_June 2019_Set -2

Minimum no. of horizontal and vertical straight lines to cover all the zeros = 4 \neq Order of the matrix(5). So the solution is non optimal.

Improved Matrix

Batsman	Batting Position				
	III	IV	V	VI	VII
A	10	6	10	25	0
B	0	3	21	17	15
C	10	3	15	0	10
D	5	2	0	7	0
E	6	0	0	9	11

Here minimum no. of horizontal and vertical straight lines to cover all the zeros = 5 = Order of the matrix.

So the solution is optimal.

Optimal Assignment

Batsman	Batting Position	Average runs scored
A	VII	50
B	III	42
C	VI	60
D	V	20
E	IV	60
Total =		232

Expected maximum total runs = 232

(b) Arrival Rate = $\lambda = 15$ customers per hour

Service Rate = $\mu = \frac{1}{\text{Service time}} = \frac{1 \text{ customer}}{3 \text{ minutes}} \times 60 \text{ minutes per hour} = 20 \text{ customers per hour}$

a. System Utilisation = $\rho = \frac{\lambda}{M\mu} = \frac{15}{1(20)} = 0.75$

b. Percentage of time the server will be idle = $1 - \rho = 1 - 0.75 = 0.25$, or 25 percent

c. Expected no. of customers waiting to be served $L_q = \frac{\lambda}{\mu(\mu - \lambda)} = \frac{225}{20(20-15)} = \frac{225}{(20 \times 5)} = \frac{225}{100} = 2.25$ customers

d. Average time customers will spend in the system = $w_s = \frac{L_q}{\lambda} + \frac{1}{\mu} = \frac{2.25}{15} + \frac{1}{20} = 0.20$ hours, or 12 minute

Answer_MTP_Intermediate_Syllabus-2016_June 2019_Set -2

5. (a) Draw the network for the following activities and find critical path and total duration of the project.

Activity	Duration (months)
1-2	3
2-3	4
2-4	2
3-4	3
4-5	4
5-6	3
5-7	5
6-8	2
7-8	4
8-9	5

[3+2+3=8]

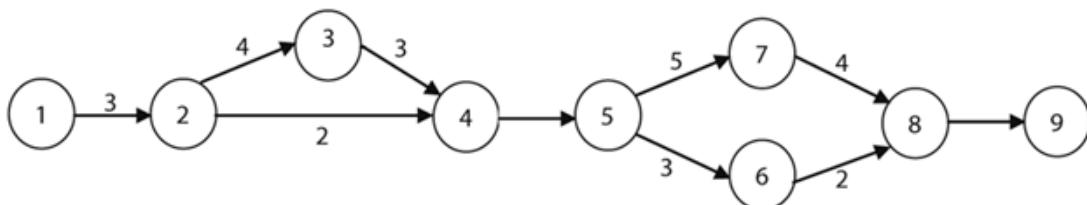
- (b) PQR company has kept records of breakdowns of its machines for 300 days work year as shown below:

No. of breakdown	Frequency in days
0	40
1	150
2	70
3	30
4	10
	300

The firm estimates that each breakdown costs ₹ 650 and is considering adopting a preventive maintenance program which would cost ₹ 200 per day and limit the number of breakdown to an average of one per day. What is the expected annual savings from preventive maintenance program? [8]

Answer:

- (a) Net work diagram



Paths	Duration (months)
1-2-3-4-5-7-8-0	3+4+3+4+5+4+5=28 (Critical Path)
1-2-3-4-5-6-8-9	3+4+3+4+3+2+5=24
1-2-4-5-7-8-9	3+2+4+5+4+5=23
1-2-4-5-6-8-9	3+2+4+3+2+5=19

Answer_MTP_Intermediate_Syllabus-2016_June 2019_Set -2

(b) Step 1 : To determine the expected number of breakdowns per year:

No. of breakdowns (x)	Frequency of breakdowns in days i.e, f(x)	Probability distribution of breakdowns P(x)	Expected value of breakdowns X P(x)
0	40	$40/300 = 0.133$	Nil
1	150	$150/300 = 0.500$	0.500
2	70	$70/300 = 0.233$	0.466
3	30	$30/300 = 0.100$	0.300
4	10	$10/300 = 0.033$	0.132
Total	300	1.000	1.400

Step 2 :

Total no. of breakdowns per day = 1.40

Cost of breakdown per day = $1.40 \times 650 = ₹ 910$

Cost of preventive maintenance programme per day = ₹ 200 + ₹ 650 = ₹ 850

Expected annual savings from the preventive maintenance programme = $(910 - 850) \times 300$ days
 $= 60 \times 300 = ₹ 18,000$

Section – II: (Strategic Management)

6. Choose the correct answer from the given alternatives:

[1×6=6]

(i) For an entrepreneur

- (A) mission is before the vision
- (B) vision is before the mission
- (C) both are developed simultaneously
- (D) profitability is most crucial

(ii) Marketing Research Studies are undertaken:

- (A) to understand product-price relationships.
- (B) to measure brand loyalty of a class of consumers.
- (C) to predict market potential of a product on a future date.
- (D) All of the above.

(iii) For an actor in Bollywood, his outstanding performance would be a /an

- (A) Asset
- (B) Strategic Asset
- (C) Core competency
- (D) Capability.

Answer_MTP_Intermediate_Syllabus-2016_June 2019_Set -2

(iv) Intensity of competition is _____ in low return industries

- (A) low.
- (B) non-existent.
- (C) high.
- (D) not important dependent on industry nature.

(v) A company's actual strategy is

- (A) mostly hidden to outside view and is known only to top-level managers.
- (B) partly proactive and partly reactive to changing circumstances.
- (C) typically planned well in advance and usually deviates little from the planned set of actions and business approaches because of the risks of making on-the-spot changes.
- (D) mostly a function of the strategies being used by rival companies (particularly those companies that are industry leaders).

(vi) Blue Ocean Strategy is concerned with

- (A) moving into new market with new products
- (B) creating a new market places where there is no competition
- (C) developments of products and markets in order to ensure survival
- (D) making the product unique in terms of attributes

Answer:

6. (i) (B)
- (ii) (D)
- (iii) (C)
- (iv) (C)
- (v) (B)
- (vi) (B)

Answer any two question form the following:

7. (a) Enlist the advantage of strategic Management

(b) In SWOT analysis, list the threats that may occur in business. What step is necessary if a threat does arise? [6+6]

Answer:

(a) The Advantages of Strategic Management

- Discharges Board Responsibility The first reason that most organizations state for having a strategic management process is that it discharges the responsibility of the Board of Directors.

Answer_MTP_Intermediate_Syllabus-2016_June 2019_Set -2

- Forces an Objective Assessment

Strategic management provides a discipline that enables the board and senior management to actually take a step back from the day-to-day business to think about the future of the organization. Without this discipline, the organization can become solely consumed with working through the next issue or problem without consideration of the larger picture.

- Provides a Framework for Decision-Making

Strategy provides a framework within which all staff can make day-to-day operational decisions and understand that those decisions are all moving the organization in a single direction.

- Supports Understanding & Buy-In

Allowing the board and staff participation in the strategic discussion enables them to better understand the direction, why that direction was chosen, and the associated benefits. For some people simply knowing is enough; for many people, to gain their full support requires them to understand.

- Enables Measurement of Progress

A strategic management process forces an organization to set objectives and measures of success. The setting of measures of success requires that the organization first determine what is critical to its ongoing success and then forces the establishment of objectives and keeps these critical measures in front of the board and senior management.

(b) Threats:

- (i) Globalisation
- (ii) Competition
- (iii) Price cutting war
- (iv) Free imports
- (v) Industrial unrest
- (vi) Political instability
- (vii) Quality thrusts
- (viii) High and adverse debt equity ratio
- (ix) Increase in financing cost
- (x) Economic slowdown due to international recession impact

Each and every threat of the SWOT would be analysed critically to find out a best alternative out of various alternatives available.

Each such threat as and when arises must be examined and necessary action taken to be free from these or to solve these prudently so that loss to the organisation may be minimum.

Answer_MTP_Intermediate_Syllabus-2016_June 2019_Set -2

8. (a) Discuss the approaches in Strategic Planning.

(b) Discuss about “Types of Strategic Control System”.

[6+6]

Answer:

(a) Approaches in Strategic Planning

It is important to operate a planning process which will not only produce realistic and potentially rewarding plans but will also secure the support of all those involved in implementing them. There are three approaches that can be adopted to strategic planning:

- (i) A top-down process, in which managers are given targets to achieve which they pass on down the line.
- (ii) A bottom-up process, in which functional and line managers in conjunction with their staff submit plans, targets and budgets for approval by higher authority.
- (iii) An iterative process, which involves both the top-down and bottom-up setting of targets. There is a to-and-from movement between different levels until agreement is reached. However, this agreement will have to be consistent with the overall mission, objectives and priorities and will have to be made within the context of the financial resources available to the organization. The iterative approach, which involves the maximum number of people, is the one most likely to deliver worthwhile and acceptable strategic plans.

(b) Types of Strategic Control Systems:

- **Personal Control**

It is the desire to shape and influence the behaviour of a person in a face to face interaction in order to achieve the organisation's goals. Direct supervision is the most common form of personal control as it helps in identifying the problems faced by subordinates and better man management. Personal control may also come from group of peers when people work in teams. Here personal control is all about possibility of learning to occur and competencies to develop.

- **Output control**

This system involves the estimation and forecasting of appropriate performance goals for each unit/division, department and employees and then measure the actual performance relative to these goals. It is often observed that the organisation's reward system is linked to performance on these goals. It can therefore be concluded that the output control system also provides an incentive structure for motivating employees at all levels of the organisation.

- **Behaviour control**

The establishment of a comprehensive system of rules and procedures to direct the actions or behaviour of divisions, functions and individuals is called behaviour control. The main purpose of having behaviour control is not to specify goals but to standardise the way of reaching them. It is felt that if rules are standardised then outcomes are predictable. It is of utmost importance that the management reviews behaviour controls over time. The rules that have been established tend to increase over time leading to inflexibility to react to the changing environment thereby adversely affecting the organisation's competitive advantage.

Answer_MTP_Intermediate_Syllabus-2016_June 2019_Set -2

9. Write short notes on any three of the following four questions:

[4×3=12]

- (a) Related Diversification;
- (b) Mc Kinsey's 7 -s Frame work;
- (c) Importance of Strategic Management
- (d) Theory X and Theory Y.

Answer:**(a) Related Diversification**

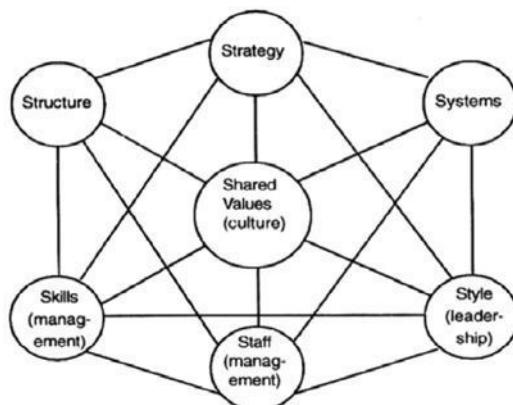
Related diversification

Here there is some relationship, and therefore potential synergy, between the firm's existing business and the new product/market space:

- (i) Concentric divers ideation means that there is a technological similarity between the industries which means that the firm is able to leverage its technical know-how to gain some advantage.
- (ii) Vertical integration means that the firm is moving along the value system of its existing industry towards its customers (forward vertical integration) or towards its suppliers (backward vertical integration). The benefits of this are assumed to be:
 - Taking over the profit margin presently enjoyed by suppliers or distributors;
 - Securing a demand for the product or a supply of key inputs;
 - Better synchronization of the value system;
 - Reduction in buyer or supplier power.

(b) Mc Kinsey's 7 -s Frame work;

Strategy is dependent on many variables – Internal as well as external. All factors are interrelated.



The McKinsey Company, a well known management consultancy firm in the United States, towards the end of 1970s was asked to find a solution to this knotty issue. The researchers Peters and Waterman found after examining America's best run companies that the problem in strategy lay in its implementation and structure was only one lever in the hands of management. The other levers were systems, staff, style, skills and super ordinate goals.

Answer_MTP_Intermediate_Syllabus-2016_June 2019_Set -2

A strategy is usually successful when the other S's in the 7-S framework fit into or support the strategy.

Strategy: A set of decisions and actions aimed at gaining a sustainable competitive advantage

- Structure: The organisation chart and associated information that shows who reports to whom and how tasks are both divided and integrated.
- Systems: The flow of activities involved in the daily operation of a business, including its core processes and its support systems.
- Style: How managers collectively spend their time and attention and how they use symbolic behaviour. How management acts is more important than what management says.
- Staff: How companies develop employees and shape basic values.

(c) Importance of Strategic Management:

- (i) Discover organisation strengths and weaknesses
- (ii) Identify the available opportunities and possible threats
- (iii) Discover the objectives and goals in line with organisations strengths and available opportunities
- (iv) Implement changes to overcome weaknesses and manage the threats.
- (v) Provide vision/mission or direction to future of organisations
- (vi) Build a dynamic and strong organisation
- (v) Help to achieve growing and stable organisation.

(d) Theory X and Theory Y: Another motivation strategy involves manager's assumptions about the nature of people. Douglas McGregor identified two sets of assumptions. According to him, Theory X involves negative assumptions that managers often use as the basis for dealing with people. Theory Y represents positive assumptions which managers strive to use. The basic rationale for using Theory Y rather than Theory X in most situations is that managerial activities reflect Theory X assumptions. As such, the activities based on Theory Y assumptions generally are more successful in motivating organisation people than those based on Theory X assumptions.

Paper 9 – Operations Management & Strategic Management

MTP_Intermediate_Syllabus-2016_December2018_Set - 1**Paper 9 – Operations Management & Strategic Management****Full Marks : 100****Time allowed: 3 hours****The figures in the margin on the right side indicate full marks.****This question paper has two sections.****Both the sections are to be answered subject to instructions given against each.****Section – I: (Operations Management)****1. (a) Choose the most correct alternatives: [1×10=10]**

- (i) The activity of specifying when to start the job and when to end the job is known as:
 - (a) Planning,
 - (b) Scheduling,
 - (c) Timing,
 - (d) Follow-up.
- (ii) Routine and Scheduling becomes relatively complicated in
 - (a) Job production,
 - (b) Batch production,
 - (c) Flow production,
 - (d) Mass production
- (iii) Conducting occasional check-ups of the products manufactured or assembled to ensure high quality of the production is known as:
 - (a) Planning
 - (b) Scheduling
 - (c) Inspection
 - (d) Routing
- (iv) This aims at finding the best and most efficient way of using the available resources - men, materials, money and machinery:
 - (a) Time Study
 - (b) Work Study
 - (c) Method Study
 - (d) Job Evaluation
- (v) The time by which an activity can be rescheduled without affecting the other activities - preceding or succeeding is called as
 - (a) Slack
 - (b) Independent Float
 - (c) Free Float
 - (d) Total Float
- (vi) Which one of the following standards is associated with the "Quality Assurance in Final Inspection Test"?
 - (a) ISO 9001
 - (b) ISO 9002
 - (c) ISO 9003
 - (d) ISO 9004
- (vii) The lead time is
 - (a) Time for placeholders for materials
 - (b) Time of receiving materials
 - (c) Time between receipt of material and using materials
 - (d) Time between placing the order and receiving the materials

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- (viii) Which of the following models deals with the physical movement of goods from different supply origins to a number of different demand destinations?
- Simulation
 - Transportation
 - Lean operations
 - Line balancing
- (ix) The recent trend in the Production/Operations management which suggests the use of minimal amount of resources to produce a high volume of high quality goods with some variety is referred to as:
- SCM
 - TQM
 - Lean Production
 - Just-In-Time
- (x) With reference to project management, identify which of the following statement is NOT correct?
- Gantt chart is a principal tool used in scheduling and also in some methods of loading.
 - Routing is the first step in the production planning.
 - The cost of any activity is proportional to its time of completion.
 - The free float can be calculated by subtracting EFT from EST.

(b) Match the terms in Column I with the relevant terms in Column II**[1×6=6]**

Column I	Column II
(A) Furniture	(i) Assembly line
(B) Hydro-electricity	(ii) Job Evaluation
(C) Television set	(iii) Carpentry
(D) Cement	(iv) Turbo-alternator
(E) Aviation Fuel	(v) Rotary Kiln
(F) Ranking Method	(vi) Refinery

(c) State whether the following statements are True/False?**[1×4=4]**

- Merit Rating is used to determine the cost of a product ()
- Increase in productivity leads to retrenchment of work force ()
- Project costs increase as the duration of the project increases ()
- Job Evaluation is a systematic approach to ascertain the labour worth of a job ()
- Production planning and control is essentially concerned with the control of Finished goods ()
- Breakdown maintenance doesn't require use of standby machines ()

Answer:

- (a) (i) (b)
(ii) (b)
(iii) (c)
(iv) (b)
(v) (b)
(vi) (c)
(vii) (d)
(viii) (b)
(ix) (c)
(x) (d)

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(b)

Column I	Column II
(A) Furniture	(i) Carpentry
(B) Hydro-electricity	(ii) Turbo-alternator
(C) Television set	(iii) Assembly line
(D) Cement	(iv) Rotary Kiln
(E) Aviation Fuel	(v) Refinery
(F) Ranking Method	(vi) Job Evaluation

- (c) (i) (False)
 (ii) (True)
 (iii) (True)
 (iv) (True)
 (v) (False)
 (vi) (False)

2. (a) Define forecasting. Why sales forecasting is the most important activity in the business? [6]

(b) An investigation into the use of scooters in 5 towns has resulted in the following data:
Population in town

Population in town (in lakhs)	(X)	4	6	7	10	13
No. of scooters	(Y)	4,400	6,600	5,700	8,000	10,300

Fit a linear regression of Y on X and estimate the number of scooters to be found in a town with a population of 16 lakhs. [10]

Answer:

2. (a) Forecasting means peeping into the future. As future is unknown and is anybody's guess but the business leaders in the past have evolved certain systematic and scientific methods to know the future by scientific analysis based on facts and possible consequences. Thus, this systematic method of probing the future is called forecasting.

All business and industrial activities revolve around the sale and its future planning. To know what a business will do we must know its future sales. All other activities depend upon the sales of the concern. Sales forecasting as a guiding factor for a firm because it enables the firm to concentrate its efforts to produce the required quantities, at the right time at reasonable price and of the right quality. Sales forecasting is the basis of planning the various activities i.e.; production activities, pricing policies, programme policies and strategies, personnel policies as to recruitment, transfer, promotion, training, wages etc.

(b)

Computation of trend value

Population (in lakhs) (X)	No. of scooters Demanded (Y)	Squares of Population (X ²)	Product of population and No. of scooters demanded (XY)
4	4,400	16	17,600
6	6,600	36	39,600
7	5,700	49	39,900
10	8,000	100	80,000
13	10,300	169	1,33,900
$\Sigma X = 40$	$\Sigma Y = 35,000$	$\Sigma X^2 = 370$	$\Sigma XY = 3,11,000$

MTP_Intermediate_Syllabus-2016_December2018_Set - 1

Regression equation of Y on X

$$Y = a + bX$$

To find the values of a and b we will have to solve the following two equations

$$\begin{aligned}\Sigma Y &= na + b\Sigma X & \dots (i) \\ \Sigma XY &= a\Sigma X + b\Sigma X^2 & \dots (ii)\end{aligned}$$

By putting the values, we get

$$\begin{aligned}35,000 &= 5a + 40b & \dots (iii) \\ 3,11,000 &= 40a + 370b & \dots (iv)\end{aligned}$$

By multiplying equation no. (iii) by 8 putting as equation (v) we get,

$$2,80,000 = 40a + 320b \dots (v)$$

By subtracting equation (v) from equation (iv), we get

$$\begin{aligned}31,000 &= 50b \\ \text{or, } 50b &= 31,000 \\ \text{or, } b &= 31000/50 = 620\end{aligned}$$

By substituting the value of b in equation no. (iii), we get

$$\begin{aligned}35,000 &= 5a + 40b \\ \text{or } 35,000 &= 5a + 40 \times 620 \\ \text{or } 35,000 &= 5a + 24,800 \\ \text{or } 10,200 &= 5a \\ \text{or } a &= 10200/5 = 2040\end{aligned}$$

Now putting the values of a and b the required regression equation of Y on X, is

$$Y = a + bX \quad \text{or, } Y = 2040 + 620 X$$

When X = 16 lakhs then $Y = 2040 + 620 (16)$

$$\text{or } Y = 2040 + 9920$$

$$\text{or } Y = 11,960$$

Hence, the expected demand of scooters for a town with a population of 16 lakhs will be 11,960 scooters.

3. (a) What does Product Design do? Discuss – Process design and selection.

[6]

(b) Machine A costs of ₹ 80,000. Annual operating costs are ₹ 2,000 for the first year, and they increase by ₹ 15,000 every year (for example, in the fourth year the operating costs are ₹ 47,000). Determine the lease age at which to replace the machine. If the optimal replacement policy is followed; what will be the average yearly cost of operating and owning the machine? (Assume that the resale value of the machine is zero when replaced, and that future costs are not discounted.

(i) Another machine B costs ₹ 1,00,000. Annual operating cost for the first year is ₹ 4,000 and they increase by ₹ 7,000 every year. The firm has a machine of type A which is one year old. Should the firm replace it with B and if so, when?

(ii) Suppose the firm is just ready to replace the machine A with another machine of the same type, just then the firm gets an information that the machine B will become available in a year. What should the firm do?

[10]

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3. (a) The activities and responsibilities of product design include the following:

- (i) Translating customer needs and wants into product and service requirements (marketing).
- (ii) Refining existing products (marketing).
- (iii) Developing new products (marketing, product design and production).
- (iv) Formulating quality goals (quality assurance, production).
- (v) Formulating cost targets (accounting).
- (vi) Constructing and testing prototype (marketing, production).
- (vii) Documenting specifications (product design).

Process Design is concerned with the overall sequences of operations required to achieve the product specifications. It specifies the type of work stations to be used, the machines and equipments necessary to carry out the operations. The sequence of operations are determined by (a) the nature of the product, (b) the materials used, (c) the quantities to be produced and (d) the existing physical layout of the plant.

The process design is concerned with the following:

- (i) Characteristics of the product or service offered to the customers.
- (ii) Expected volume of output.
- (iii) Kinds of equipments and machines available in the firm.
- (iv) Whether equipments and machines should be of special purpose or general purpose.
- (v) Cost of equipments and machines needed.
- (vi) Kind of labour skills available, amount of labour available and their wage rates.
- (vii) Expenditure to be incurred for manufacturing processes.
- (viii) Whether the process should be capital-intensive or labour-intensive.
- (ix) Make or buy decision.
- (x) Method of handling materials economically.

(b) The operating cost of machine A in successive years are as follows:

Year	1	2	3	4	5
Operating Cost (₹)	2,000	17,000	32,000	47,000	62,000

Calculations for average cost of Machine A

Replacement at the end of year	Cumulative operating cost (in ₹)	Depreciation Cost (in ₹)	Total Cost (in ₹)	Average Cost per year (in ₹)
1	2,000	80,000	82,000	82,000
2	19,000	80,000	99,000	49,500
3	51,000	80,000	1,31,000	43,666
4	98,000	80,000	1,78,000	44,500
5	1,60,000	80,000	2,40,000	48,000

It is clear from the table that machine A should be replaced at the end of third year. The average yearly, cost of owning & operating machine A in this situation will be ₹ 43,666.

(i) The operating cost of machine B are as follows:

Year	1	2	3	4	5	6
Operating Cost (₹)	4,000	11,000	18,000	25,000	32,000	39,000

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Calculations for average cost of Machine B

Replacement at the end of year	Cumulative operating cost (in ₹)	Depreciation Cost (in ₹)	Total Cost (in ₹)	Average Cost per year (in ₹)
1	4,000	1,00,000	1,40,000	1,04,000
2	15,000	1,00,000	1,15,000	57,500
3	33,000	1,00,000	1,33,000	44,333
4	88,000	1,00,000	1,58,000	39,500
5	90,000	1,00,000	1,90,000	38,000
6	1,29,000	1,00,000	2,29,000	38,166

It is clear from the above Table that if machine B is replaced after 5 years then its average cost per year is ₹ 38,000. Since the lowest average cost for machine B (₹ 38,000) is less than the lowest average cost for machine A (₹ 43,666), the machine A should be replaced by machine B. Now to find the time of replacement of Machine A by Machine B, we proceed as follows:

The machine A is replaced by machine B at the time (age), when its running cost of the next year exceed the lowest average yearly cost ₹ 38,000 of machine B. Further, the total cost of the machine A in the successive years are computed as follows:

Year	1	2	3	4	5
Total cost in the year (₹)	82,000	99,000 – 82,000 = 17,000	1,31,000 – 99,000 = 32,000	1,78,000 – 1,31,000 = 47,000	2,40,000 – 1,78,000 = 62,000

The running cost of fourth year of machine A is ₹ 47,000 which is more than the lowest average yearly cost ₹ 38,000 of machine B. therefore, the machine A should be replaced by machine B, when its age is 1 year. Since the machine A is one year old now, it should be replaced just now.

- (ii) Install new machine now and replace it with machine B during the third year.

4. (a) A farmer has a firm with 125 acres. He produces Carrot, Beetroot and Potato. Whatever he produces is fully sold in the market. He gets ₹ 5 per kg for carrot, ₹ 4 per kg for Beetroot and ₹ 5 per kg for potato. The average yield is 1500 kg for Carrot per acre, 1800 kg of Beetroot per acre and 1200 kg of potato per acre. To produce each 100 kg of Carrot and Beetroot and 80 kg of Potato, a sum of ₹ 12.50 has to be spent for manure. Labour required for each acre to raise the crop is 6 men – days for carrot and Potato each and 5 man-days for Beetroot. A total of 500 man days of labour of the rate of ₹ 40 per man – day are available. Formulate a LPP to maximize the farmer's total profit. [10]

- (b) Describe the objective of Time Study. [6]

Answer:

4. (a) Let X_1 , X_2 and X_3 be the number of acres allotted for cultivating carrot, beetroot and potato respectively. The profit from the produces is determined in the following manner -

Particulars per acre	Carrot	Beetroot	Potato
Selling Price	₹ 5 per Kg × 1500Kgs = ₹ 7500	₹ 4 per Kg. × 1800 Kgs. = ₹ 7200	₹ 5 per Kg × 1200 Kgs = ₹ 6000
Less: Manure Cost	1500 Kgs × ₹ 12.50/100 = ₹ 187.50	1800 Kgs × 12.50/100 = ₹ 225.00	1200 Kgs. × ₹ 12.50/80 = ₹ 187.50
Less: Labour Cost	₹ 40 × 6 = ₹ 240	₹ 40 × 5 = ₹ 200	₹ 40 × 6 = ₹ 240
Profit per acre	₹ 7072.50	₹ 6775	₹ 5572.50

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Maximize Profit $Z = 7072.50 X_1 + 6775 X_2 + 5572.5 X_3$

Subject to $X_1 + X_2 + X_3 \leq 125$ (Land availability)

$6X_1 + 5X_2 + 6X_3 \leq 500$ (Man days availability)

$X_1, X_2, X_3 \geq 0$ (Non-Negativity assumption)

(b) Time study is concerned with the determination of the amount of time required to perform a unit of work. It consists of the process of observing and recording the time required to perform each element of an operation so as to determine the reasonable time in which the work should be completed. Time study is defined by ILO as below 'Time study is a work measurement technique for recording the times and rates of working for the elements of a specified job carried out under specified conditions and for analyzing the data so as to obtain the time necessary for carrying out the job at a defined level of performance'.

Objective of time study:

The main objective is 'to determine by direct observation, the quantity of human work in a specified task and hence to establish the standard time, within which an average worker working at a normal pace should complete the task using a specified method'.

The other objectives are:

- (i) To furnish a basis of comparison for determining operating effectiveness.
- (ii) To set labour standard for satisfactory performance.
- (iii) To compare alternative methods in method study in order to select the best method.
- (iv) To determine standard costs.
- (v) To determine equipment and labour requirements.
- (vi) To determine basic times/normal times.
- (vii) To determine the number of machines an operator can handle.
- (viii) To balance the work of operators in production or assembly lines.
- (ix) To provide a basis for setting piece rate or incentive wages.
- (x) To set the completion schedules for individual operations or jobs.

5. (a) Draw the network for the following activities and find critical path and total duration of project.

Activity	Duration (months)	Activity	Duration (months)
1-2	2.5	4-5	2.0
2-3	2.5	5-6	3.0
2-4	1.5	6-7	1.5
3-4	1.0	5-7	1.5
3-5	1.0		

[8]

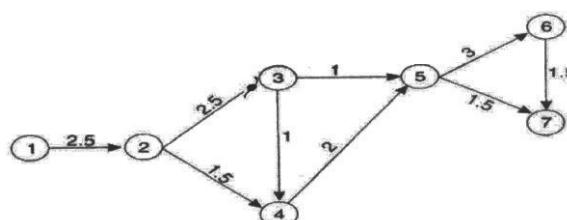
(b) Product A has a Mean Time Between Failures (MTBF) of 30 hours and has a Mean Time to Repairs (MTTR) of 5 hours. Product B has a MTBF of 40 hours and has a MTTR of 2 hours.

- (i) Which product has the higher reliability?
- (ii) Which product has greater maintainability?
- (iii) Which product has greater availability?

[8]

Answer:

5. (a)



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Paths	Duration
1-2-3-5-6-7	$2.5+2.5+1+3+1.5 = 10.5$
1-2-3-5-7	$2.5+2.5+1+1.5 = 7.50$
1-2-3-4-5-6-7	$2.5+2.5+1+2+3+1.5 = 12.5$ (Critical Path)
1-2-3-4-5-7	$2.5+2.5+1+2+1.5 = 9.5$
1-2-4-5-7	$2.5+1.5+2+1.5 = 7.5$
1-2-4-5-6-7	$2.5+1.5+2+3+1.5 = 10.5$

- (b) (i) Product B, with higher MTBF (i.e., 40 hours) than Product A (i.e., 30 hours), is more reliable since it has lesser chance failure during servicing.
- (ii) By MTTR we mean the time taken to repair a machine and put it into operation. Thus Product B, with lesser MTTR (i.e., 2 hours) than Product A (i.e., 5 hours), has greater maintainability.
- (iii) Availability of a machine/product = $MTBF/(MTBF+MTTR)$
 Therefore, availability of Product A = $30/(30+5) = 30/35 = 85.714\%$
 Availability of product B = $40/(40+2) = 40/42 = 95.238\%$
 Hence, Product B has more availability.

Section – II: (Strategic Management)**6. Choose the correct answer from the given alternatives:****[1×6=6]**

- (i) A strategic business unit (SUB) is defined as a division of an organisation:
 (a) That help in the marketing operation;
 (b) That enable managers to have better control over the resources;
 (c) That help in the choice of technology;
 (d) That help in the allocation of scarce resources;
 (e) That help in identifying talents and potentials of people.
- (ii) The essential ingredients of Business Process Re-engineering are:
 (a) Continuous improvements of products, processes and technologies.
 (b) Advanced planning in the areas of technologies, processes and strategic partnerships etc.
 (c) Fundamental rethinking and radical redesign of business process to achieve dramatic results.
 (d) Generation, comparison and evolution of many ideas to find out one worthy of development.
 (e) Identification and selection of layouts most suited for products and processes.
- (iii) Matrix structure
 (a) Structural grouping is geographic
 (b) Simultaneous combination of similar activities on the basis of function
 (c) Adopts parts of both functional and divisional structures at the same level of management
 (d) Creates a dual chain of command
- (iv) The conditional of Low share, Negative growth and negative cash flow indicates -
 (a) Dogs.
 (b) Dodos.
 (c) Donkey.
 (d) Dinosaurs.

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- (v) McKinsey's 7-s framework consists of:
- Structure, strategy, software, skills, styles, staff and supervision
 - Structure, strategy, systems, skills, styles, syndication and shared values.
 - Structure, strategy, systems, skills, steering power, styles and shared values.
 - Structure, strategy, staff, skills, systems, shared values, super ordinate goal.
 - None of the above.
- (vi) A product line is a group of product that
- are closely related
 - are marketed through the same channel
 - performance a similar function for being sold to the same customers
 - all of the above

Answer:

6. (i) (b)
(ii) (c)
(iii) (d)
(iv) (b)
(v) (d)
(vi) (d)

Answer any one question from the following:**7. (a) What do you mean by Strategies? State its features.****(b) Discuss contingency planning & its seven steps.****[6+6]****Answer:**

7. (a) Strategy is all about integrating organizational activities and utilizing and allocating the scarce resources within the organizational environment so as to meet the present objectives. While planning a strategy it is essential to consider that decisions are not taken in a vacuum and that any act taken by a firm is likely to be met by a reaction from those affected, competitors, customers, employees or suppliers.

Strategy can also be defined as knowledge of the goals, the uncertainty of events and the need to take into consideration the likely or actual behavior of others. Strategy is the outline of decisions in an organization that shows its objectives and goals, reduces the key policies, and plans for achieving these goals, and defines the business the company is to carry on, the type of economic and human organization it wants to be, and the contribution it plans to make to its shareholders, customers and society at large.

Features of Strategy:

- Strategy is important to foresight, the uncertain events of firms/industries.
- Strategy deals with long term developments rather than routine operations. For example innovations or new products, new methods of productions, or new markets to be developed in future.
- Strategy is created to deal behavior of customers and competitors.
- Strategy is a well defined roadmap of an organization. It defines the overall mission, vision and direction of an organization. The objective of a strategy is to maximize an organization's strengths and to minimize the strengths of the competitors.

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(b) Contingency plans can be defined as alternative plans that can be put into effect if certain key events do not occur as expected. Only high-priority areas require the insurance of contingency plans. Strategists cannot and should not try to cover all bases by planning for all possible contingencies. But in any case, contingency plans should be as simple as possible.

Steps in Contingency Planning

Robert Linnemam and Rajan Chandran have suggested that a seven step process as follows:

Step 1 - Identify the beneficial and unfavourable events that could possibly derail the strategy or strategies.

Step 2 - Specify trigger points. Calculate about when contingent events are likely to occur.

Step 3 - Assess the impact of each contingent event. Estimate the potential benefit or harm of each contingent event.

Step 4 - Develop contingency plans. Be sure that contingency plans are compatible with current strategy and are economically feasible.

Step 5 - Assess the counter impact of each contingency plan. That is, estimate how much each contingency plan will capitalize on or cancel out its associated contingent event. Doing this will quantify the potential value of each contingency plan.

Step 6 - Determine early warning signals for key contingency event. Monitor the early warning signals.

Step 7 - For contingent event with reliable early warning signals, develop advance action plans to take advantage of the available lead time.

8. (a) Discuss the differences in Strategic Management & Strategic Planning.

(b) Define SBU. What are its merits & demerits?

[6+6]

Answer:

8. (a) The basic difference between Strategic management and Strategic planning are as follows:

Strategic Management	Strategic Planning
1. It is focused on producing strategic results; new markets; new products; new technologies etc.	1. It is focused on making optimal strategic decisions
2. It is management by results.	2. It is management by plans
3. It is an organizational action process	3. It is an analytical process
4. It broadens focus to include psychological, sociological and political variables.	4. It is focused on business, economic and technological variables
5. It is about choosing things to do and also about the people who will do them.	5. It is about choosing things to do

(b) SBU groups similar divisions into "Strategic Business Units" and then delegate's authority and responsibility of each unit to a senior executive who is normally identified as CEO or MD of that SBU. It is an extension of Divisional structure.

MTP_Intermediate_Syllabus-2016_December2018_Set - 1**SBU Structure**

Big organisation like Unilever, etc have many SBUs for their different categories of products like Cosmetics, Food products and Beverages, etc, and each is managed through separate unit head.

Advantages:

- (i) Promotes accountability since units' heads are responsible for individual SBU profitability
- (ii) Career development opportunities are further higher in this structure
- (iii) Allow better control of categories of products manufacturing, marketing and distributions
- (iv) Helps to expand in different related and unrelated businesses

Disadvantages:

- (i) May provide inconsistent approach to tackle customers, etc, because each unit may work in its own way to handle situations
- (ii) High cost approach

9. Write short notes on any three of the following four questions:

[4×3=12]

- (a) PEST Framework;**
- (b) Approaches in Strategic Planning;**
- (c) SWOT Analysis;**
- (d) Plant location.**

Answer:

9. (a) PEST analysis refers to Political, Economical, Social, and Technological factors which manipulate the business environment. SWOT analysis refers to Strengths, Weaknesses, Opportunity and Threats. These factors are prime determinants of strategic planning. Without SWOT and PEST analysis companies might fail to achieve desired goals.

PEST Analysis looks at external factors and is primarily used for market research. It is used as an alternative to SWOT analysis:

- (i) Political – These are the external factors that influence the business environment. Government decisions and policies affect a firm's position and structure, Tax laws, monetary and fiscal policies as well as reforms of labor and workforce, all influence companies in future. These factors are important and need to be managed in order to overcome uncertainty.
- (ii) Economical – Economical factors are the most important since it impacts business in the long run. Inflation, interest rates, economic growth and demand/supply trends are to be considered and analyzed effectively before planning and implementing. Economic factors affect both consumers and enterprises.
- (iii) Social – Social factors involve the trends of population, domestic markets, cultural trends and demographics. These factors help businesses assess the market and improve their products/service accordingly.
- (iv) Technological – This analyses the technology trends and advancements in business environment, innovations and advancements lowers barriers to entry plus decreased production levels as it results in unemployment. This includes research and development activity, automation and incentives.

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- (i) It presents a business' standing and position, i.e. whether it is weak or strong
- (ii) It informs about both internal and external factors that affect a firm's success and/or failure
- (iii) It helps firms assess the report and take counter measures for improvement and analyzing threats
- (iv) It forecasts the future and sheds light on the current situation
- (v) Evaluates business environment and allows firms to make strategic decisions
- (vi) Prevents future failure and creates a system of continuous success
- (vii) Provides companies with a reality check on their performance and shortcoming
- (viii) Enables firms to understand the economy and market and expand
- (ix) Provides a mechanism to identify threats and opportunities
- (x) Enables companies to learn about markets and enter new markets nationally or globally.

(b) Approaches in Strategic Planning

It is important to operate a planning process which will not only produce realistic and potentially rewarding plans but will also secure the support of all those involved in implementing them. There are three approaches that can be adopted to strategic planning:

- (i) A top-down process, in which managers are given targets to achieve which they pass on down the line.
- (ii) A bottom-up process, in which functional and line managers in conjunction with their staff submit plans, targets and budgets for approval by higher authority.
- (iii) An iterative process, which involves both the top-down and bottom-up setting of targets. There is a to-and-from movement between different levels until agreement is reached. However, this agreement will have to be consistent with the overall mission, objectives and priorities and will have to be made within the context of the financial resources available to the organization. The iterative approach, which involves the maximum number of people, is the one most likely to deliver worthwhile and acceptable strategic plans.

(c) SWOT Analysis:

Gathering data about the general, operating, and internal environments provides the raw material from which to develop a picture of the organisational environment.

SWOT analysis refines this body of information by applying a general framework for understanding and managing the environment in which an organisation operates. (The acronym SWOT stands for Strengths, Weaknesses, Opportunities, and Threats.) In many respects, the sophisticated analytical techniques discussed throughout the text are further refinements of basic SWOT analysis. In addition, students have repeatedly told us that SWOT is an excellent way to begin a case analysis. SWOT analysis attempts to assess the internal strengths and weaknesses of an organisation and the opportunities and threats that its external environment presents. SWOT seeks to isolate the major issues facing an organisation through careful analysis of each of these four elements. Managers can then formulate strategies to address key issues.

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(d) Plant Location:

Plant location is essentially an investment decision having long-term significance and implied economic effects. A good decision plays off; a bad decision can cause grim financial difficulties. Once a plant is acquired, it is a permanent site that cannot readily be sold. The management may also contemplate relocation of the plant when business expansion and advanced technology require additional facilities to serve new market areas, to produce new products, or simply to replace the old, obsolete plants to increase the company's production capacity.

Before a location for a plant is sought, long range forecasts should be made anticipating the future needs of the company. These should be based on the company's expansion policy, the anticipated diversification of products, the trends in market demand, geographical distribution, material and labour supply, and any other foreseeable influences. Thus, plant location decisions require intensive study of economic and socio-political circumstances.

The accuracy of forecasting is essential regarding rising demand and anticipated sales increases. Miscalculation in this respect may post serious problems before the company can occupy the new facilities once built and expand the new facilities subsequently due to land and environmental constraints.

The selection of an appropriate plant site calls for location study of the region in which the factory is to be situated, the community in which it should be placed and finally, the exact site in the city or countryside.

Paper 9 – Operations Management & Strategic Management

MTP_Intermediate_Syllabus-2016_December2018_Set -2**Paper 9 – Operations Management & Strategic Management****Full Marks : 100****Time allowed: 3 hours****The figures in the margin on the right side indicate full marks.****This question paper has two sections.****Both the sections are to be answered subject to instructions given against each.****Section – I : (Operations Management)****1. (a) Choose the most correct alternatives: [1×10=10]**

- (i) The activity of specifying when to start the job and when to end the job is known as:
 (A) Planning,
 (B) Scheduling,
 (C) Timing,
 (D) Follow-up.
- (ii) In an organization, the Production Planning and Control department comes under
 (A) Planning department,
 (B) Manufacturing department,
 (C) personnel department,
 (D) R&D department
- (iii) In Production by service, the product undergoes the changes in:
 (a) Shape and size of the surface,
 (b) Shape of the surface only,
 (c) Size of the surface only,
 (d) Chemical and Mechanical properties.
- (iv) Which of the following stages of Product Life cycle does attribute beginning of substantial increase in Sales and Profits?
 (A) Introduction
 (B) Growth
 (C) Maturity
 (D) Decline
- (v) In an organisation the production planning and control department comes under:
 (a) Planning department,
 (b) Manufacturing department,
 (c) Personal department,
 (d) R & D department.
- (vi) Reliability and per unit cost of which of the following spares are less?
 (a) Regular spares
 (b) Insurance spares
 (c) Capital spares
 (d) Rotable spares
- (vii) Issuing necessary orders, and taking necessary steps to ensure that the time targets set in the schedules are effectively achieved is known as:
 (a) Routing,
 (b) Dispatching,
 (c) Scheduling,
 (d) Inspection.

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(viii) Preventive maintenance is useful in reducing:

- (a) Inspection Cost,
- (b) Shutdown Cost,
- (c) Cost of pre-mature replacement,
- (d) Set-up cost of machine

(ix) Which one is NOT an index of productivity?

- (a) Man-hour output
- (b) Productivity ratio
- (c) TQM
- (d) Use of Financial Ratios

(x) Which of the following stages of Product Life Cycle does attribute beginning of substantial increase in Sales and Profits?

- (a) Introduction.
- (b) Growth.
- (c) Maturity.
- (d) Decline.

(b) Match the terms in Column I with the relevant terms in Column II

[1×5=5]

Column I	Column II
(A) Inventory Control	(i) Turbo-Alternator
(B) Network Analysis	(ii) Crashing
(C) Aviation Fuel	(iii) Value Analysis
(D) Hydro-electricity	(iv) Stock Level
(E) Improvement in productivity	(v) Refinery

(c) State whether the following statements are True or False?

[1×6=6]

- (i) A Productivity Index is a device of expressing the ratio between outputs and the inputs of the resources numerically. ()
- (ii) It is desirable to conduct work measurement after method study. ()
- (iii) Increase in productivity leads to retrenchment of work force. ()
- (iv) The term "aesthetics" which appeals to the human sense does not add value to the product. ()
- (v) In general short term forecasting will be more useful in production planning. ()
- (vi) Production planning and control is essentially concerned with the control of finished goods. ()

Answer:

1. (a) (i) (b)
- (ii) (b)
- (iii) (d)
- (iv) (b)
- (v) (b)
- (vi) (a)
- (vii) (b)
- (viii) (b)
- (ix) (c)
- (x) (b)

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(b)

Column I	Column II
(A) Inventory Control	(iv) Stock Level
(B) Network Analysis	(ii) Crashing
(C) Aviation Fuel	(v) Refinery
(D) Hydro-electricity	(i) Turbo-Alternator
(E) Improvement in productivity	(iii) Value Analysis

- (c) (i) (True)
 (ii) (True)
 (iii) (False)
 (iv) (False)
 (v) (True)
 (vi) (False)

2. (a) What are the characteristics of modern operation function?**[6]**

(b) (i) A workshop operates on 2 shifts of 8 hours per day. It has 10 machines. It works for 5 days in a week. Machine utilization is 90% and the efficiency of the machines is 85%. Calculate the designed/rated capacity of the workshop in standard hours.

(ii) An assembly line of an item A has the following output in a 10 week period:

Week No	Standard hours produced
1	350
2	375
3	380
4	400
5	300
6	325
7	340
8	370
9	390
10	350

Calculate the demonstrated capacity of the assembly line per week.

[10]**Answer:****2. (a) Characteristics of Modern Operation Function:**

The production management of today presents certain characteristics which make it look totally different from what it was during the past. Specifically, today's production system is characterised by at least four features.

1. Manufacturing as Competitive Advantage

In the past production was considered to be like any other function in the organisation. Where demand was high and production capacities were inadequate, the concern was to somehow muster all inputs and use them to produce goods which would be grabbed by market. But today's scenario is contrasting. Plants have excess capacities, competition is mounting and firms look and gain competitive advantage to survive and succeed. Interestingly, production system offers vast scope to gain competitive edge and firms intend to exploit the potential. Total Quality Management (TQM), Time-Based Competition, Business Process Re-engineering (BPRE), Just-in-Time (JIT), Focused Factory, Flexible Manufacturing Systems (FMS), Computer Integrated Manufacturing (CIM), and The Virtual Corporation are but only some techniques which the companies are employing to gain competitive advantage.

MTP_Intermediate_Syllabus-2016_December2018_Set -2**2. Services Orientation**

- As was stated earlier, service sector is gaining greater relevance these days. The production system, therefore, needs to be organised keeping in mind the peculiar requirements of the service component. The entire manufacturing needs to be geared to serve (i) intangible and perishable nature of the services, (ii) constant interaction with clients or customers, (iii) small volumes of production to serve local markets, and (iv) need to locate facilities to serve local markets. There is increased presence of professionals on the production, instead of technicians and engineers.
3. Disappearance of Smokestacks Protective labour legislation, environmental movement and gradual emergence of knowledge based organisations have brought total transformation in the production system. Today's factories are aesthetically designed and built, environment friendly - in fact, they are homes away from homes. Going to factory everyday is no more excruciating experience, it is like holidaying at a scenic spot. A visit to ABB, L & T or Smith Kline and Beecham should convince the reader about the transformation that has taken place in the wealth creation system.

4. Small has Become Beautiful It was E.F. Schumacher who, in his famous book *Small is Beautiful*, opposed giant organisations and increased specialisation. He advocated, instead, intermediate technology based on smaller working units, community ownership, and regional workplaces utilising local labour and resources. For him, small was beautiful. Businessmen, all over the world, did not believe in Schumacher's philosophy. Inspired by economies of scale, industrialists went in for huge organisations and mass production systems.

(b) (i) Rated capacity of the workshop = No. of shifts \times No. of hour's in each shift \times No. of days / Week \times No. of Machines \times Utilization factor \times Efficiency
 $= 2 \times 8 \times 5 \times 10 \times 0.90 \times 0.85$
 $= 612$ standards hour per week.

- (ii) Demonstrated capacity is the average of the total standard hours produced over a number of periods.
 Total number of weeks = 10
 Total standard hours produced = 3,580 standard hours.
 Average per week = $3,580/10 = 358$ standard hours.

3. (a) Linear Programming tools can be used in Management Application - Explain. [6]**(b) Solve the following assignment problem and obtain the minimum cost at which all the jobs can be performed.**

Machinist	Job (Cost in '00 ₹)				
	1	2	3	4	5
A	25	18	32	20	21
B	34	25	21	12	17
C	20	17	20	32	16
D	20	28	20	16	27

[10]

Answer:

3. (a) Management Application of Linear Programming Tools
 (a) Portfolio Selection.
 (b) Financial Mix Strategy.
 (c) Profit Planning.
 (d) Media Selection.
 (e) Travelling Salesmen Problem.
 (f) Determination of equitable salaries.
 (g) Staffing problem.

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(b) This problem is unbalanced since number of jobs is 5 while the number of workers is 4. We first balance it by introducing a dummy worker E, as shown Table in below:

Table: Balancing the Assignment Problem

Worker	Job				
	1	2	3	4	5
A	25	18	32	20	21
B	34	25	21	12	17
C	20	17	20	32	16
D	20	28	20	16	27
E	0	0	0	0	0

Obtain reduce cost values by subtracting the minimum value in each row from every cell in the row. This Table is given in below:

Table: Reduced Cost Table 1

Worker	Job				
	1	2	3	4	5
A	7	0	14	2	3
B	22	13	9	0	5
C	4	1	4	16	0
D	4	12	4	0	11
E	0	0	0	0	0

Since there is at least one zero in each row and column, we test it for optimality. Accordingly, lines are drawn. All zeros are covered by 4 lines, which is less than 5 (the order of the given matrix). Hence, we proceed to improve the solution. The least uncovered value is 4. Subtracting from every uncovered value and adding it to every value lying at the intersection of lines, we get the revised values as shown in Table.

Table: Reduced Cost Table 2

Worker	Job				
	1	2	3	4	5
A	7	0	14	6	3
B	18	9	5	0	1
C	4	1	4	20	0
D	0	8	0	0	7
E	0	0	0	4	0

The solution given in above table is optimal since the number of lines covering zeros matches with the order of the matrix. We can, therefore, proceed to make assignments. To begin with, since each of the columns has multiple zeros, we cannot start making assignments considering columns and have, therefore, to look through rows. The first row has a single zero. Thus, we make assignment A-2 and cross out zero at E-2. Further, the second and the third rows have one zero each. We make assignments B-4 and C-5, and cross out zeros at D-4 and E-5. Now, both the rows left have two zeros each and so have both the columns. This indicates existence of multiple optimal solutions. To obtain the solutions, we select zeros arbitrarily and proceed as discussed below:

- Select the zero at D-1, make assignment and cross out zeros at D-3 and E-1 (as both, worker D and job, 1, are not available any more). Next, assign worker E to job 3, corresponding to the only zero left. Evidently, selecting the zero at E-3 initially would have the effect of making some assignments.
- Select the zero at D = 3, make assignment and cross out zeros at D-1 and E-3. Next, make assignment of the only zero left at E-1. Obviously, selecting the zero at E-1 making assignment in the first place would lead to the same assignments.

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To conclude, the problem has two optimal solutions as given below:

Solution 1		('00 ₹) Cost	Solution 2		('00 ₹) Cost
Worker	Job		Worker	Job	
A	2	18	A	2	18
B	4	12	B	4	12
C	5	16	C	5	16
D	1	20	D	3	20
Job Left	3		Job Left	1	
	Total	66		Total	66

4. (a) The following jobs have to be shipped a week from now (week has 5 working days):

Job	A	B	C	D	E	F
Number of day's work remaining	2	4	7	6	5	3

Sequence the jobs according to priority established by (a) least slack rule (b) critical ratio rule. [8]

- (b) A company manufactures around 150 mopeds. The daily production varies from 146 to 154 depending upon the availability of raw materials and other working conditions.

Production per day	Probability
146	0.04
147	0.09
148	0.12
149	0.14
150	0.11
151	0.10
152	0.20
153	0.12
154	0.08

The finished mopeds are transported in a specially arranged lorry accommodating only 150 mopeds. Using following random numbers 80, 81, 76, 75, 64, 43, 18, 26, 10, 12, 65, 68, 69, 61, 57, simulate the process to find out:

- (i) What will be the average number of mopeds waiting in the factory?
(ii) What will be the average number of empty spaces on the lorry? [8]

Answer:

4. (a) Calculation of slack:

Number of days unit due date is 5 days for all jobs

Job	Slack	(days)
A	5 - 2	=3
B	5 - 4	=1
C	5 - 7	=(-2)
D	5 - 6	=(-1)
E	5 - 5	=0
F	5 - 3	=2

Sequence:

C	D	E	B	F	A
-2	-1	0	1	2	3

$$\begin{aligned}
 \text{Critical ratio} &= (\text{Due Date} - \text{Date Now}) / \text{Lead Time Remaining} \\
 &= (\text{DD} - \text{DN}) / \text{LTR} \\
 &= \text{Available Time} / \text{Operation Time}
 \end{aligned}$$

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Critical ratio for job A = $5/2 = 2.5$
 Critical ratio for job B = $5/4 = 1.25$
 Critical ratio for job C = $5/7 = 0.71$
 Critical ratio for job D = $5/6 = 0.83$
 Critical ratio for job E = $5/5 = 1.0$
 Critical ratio for job A = $5/3 = 1.67$

Job having least critical ratio is given the first priority and so on.

Sequence:	C	D	E	B	F	A
Critical Ratio:	0.71	0.83	1.0	1.25	1.67	2.5

- (b) (i) As a first step, we allocate random numbers 00-99 in proportion to the probabilities associated with the production of scooters per day, as shown in table

Table: Allocation of Random Numbers

Production per day	Probability	Cumulative Probability	Random Number Internal
146	0.04	0.04	00-03
147	0.09	0.13	04-12
148	0.12	0.25	13-24
149	0.14	0.39	25-38
150	0.11	0.50	39-49
151	0.10	0.60	50-59
152	0.20	0.80	60-79
153	0.12	0.92	80-91
154	0.08	1.00	92-99

Based on the given random numbers, we may simulate the production per day as shown in Table. Along with, the number of scooters waiting or number of empty spaces in the lorry for each day are indicated.

Table: Simulation Worksheet

Sl. No.	Random Number	Production	No. of Scooters waiting for space	No. of empty spaces in lorry
1	80	153	3	0
2	81	153	3	0
3	76	152	2	0
4	75	152	2	0
5	64	152	2	0
6	43	150	0	0
7	18	148	0	2
8	26	149	0	1
9	10	147	0	3
10	12	147	0	3
11	65	152	2	0
12	68	152	2	0
13	69	152	2	0
14	61	152	2	0
15	57	151	1	0
		Total	21	9

Average number of scooters waiting for space in the lorry = Total No. of scooters waiting for Space / Total number of days = $21/15 = 1.4$

- (ii) Average Number of empty spaces in the lorry = $9/15 = 0.6$.

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5. (a) Project with the following data is to be implemented. Draw the network and find the critical path.

Activity	Predecessor	Duration (days)	Cost (day)(₹)
A	--	2	50
B	--	4	50
C	A	1	40
D	B	2	100
E	A, B	3	100
F	E	2	60

[8]

- (i) What is the minimum duration of the project?
- (ii) Draw a Gantt chart for early start schedule.
- (iii) Determine the peak requirement money and day on which it occurs above schedule.

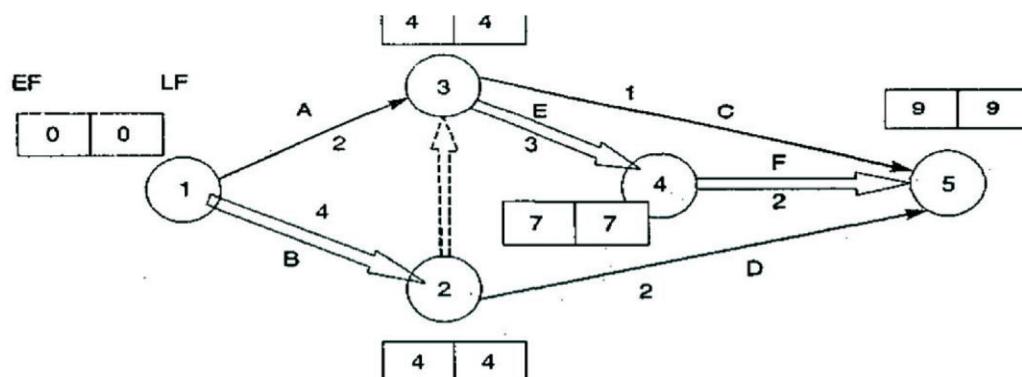
(b) Assume that at a bank teller window the customers arrive in their cars at the average rate of twenty per hour according to a poisson distribution. Assume also that the bank teller spends an average of two minutes per customer to complete a service, and the service time is exponentially distributed. Customers, who arrive from an infinite population, are served on a first-come-first served basis, and there is no limit to possible queue length.

- (i) What is the expected waiting time in the system per customer?
- (ii) What is the mean number of customers waiting in the system?
- (iii) What is the probability of zero customers in the system?
- (iv) What value is the utilization factor?

[8]

Answer:

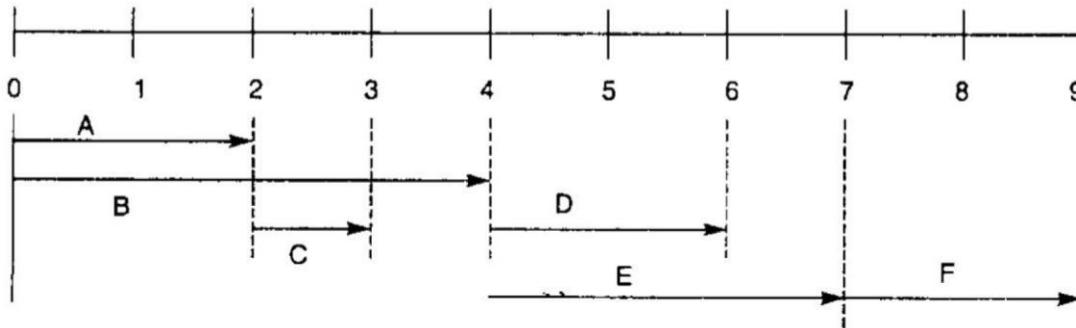
5. (a)



Critical Path
Minimum time

$$1 - 2 - 3 - 4 - 5 \\ = 9$$

Activity	t	$EX(EF - t)$	EF	LS (LF - t)	LF	Event Slack (LS - ES) (LF - EF)	On Critical Path
A	2	0	2	2	4	2	No
B	4	0	4	0	4	0	Yes
C	1	4	5	8	9	4	No
D	2	4	6	7	9	3	No
E	3	4	7	4	7	0	Yes
F	2	7	9	7	9	0	Yes

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(b) Here, arrival rate $\lambda = 20$ customers/hour,
 Service rate $\mu = 30$ Customers / hour
 Thus, $p = \lambda / \mu = 20/30 = 2/3$

- (i) Expected waiting time in the system per customer,
 $W_s = 1/(\lambda - \mu) = 1/(30 - 20) = 1/10$ hour or 6 minutes
- (ii) Mean number of customers waiting in the system,
 $L_q = p^2/(1 - p) = (2/3)^2/(1 - 2/3) = 4/3$
- (iii) Probability of zero customers in the system.
 $P(0) = 1 - p = 1 - 2/3 = 1/3$
- (iv) Utilization factor, $p = 2/3$.

Section – II: (Strategic Management)**6. Choose the correct answer from the given alternatives:****[1×6=6]**

- (i) Successful 'differential strategy' allows a company to
 - (A) Gain buyer loyalty to its brands
 - (B) Charge too high a price premium
 - (C) Have product quality that exceeds buyers' needs
 - (D) Depend only on intrinsic product attributes.
- (ii) For an actor in Bollywood, his outstanding performance would be a /an
 - (A) Asset
 - (B) Strategic Asset
 - (C) Core competency
 - (D) Capability.
- (iii) A Strategic Business Unit (SBU) is defined as a division of an organization:
 - (A) That help in the marketing operations
 - (B) That enable managers to have better control over the resources
 - (C) The help in the choice of technology
 - (D) That help in the allocation of scarce resources
 - (E) That help in identifying talents and potentials of people
- (iv) Intensity of competition is _____ in low return industries
 - (A) low.
 - (B) non-existent.
 - (C) high.
 - (D) not important dependent on industry nature.

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- (v) The strategy of the TATA group in India could be viewed as a good example of
 (A) Conglomerate diversification
 (B) Market development
 (C) Cost Leadership
 (D) Concentric diversification
- (vi) Blue Ocean Strategy is concerned with
 (A) moving into new market with new products
 (B) creating a new market places where there is no competition
 (C) developments of products and markets in order to ensure survival
 (D) making the product unique in terms of attributes

Answer:

6. (i) (A)
 (ii) (C)
 (iii) (B)
 (iv) (C)
 (v) (A)
 (vi) (B)

Answer any one question from the following:

7. (a) Discuss about "Product Development Strategy".

(b) Enlist the advantage of strategic Management.

[6+6]

Answer:

7. (a) Product Development Strategy:

This involves extending the product range available to the firm's existing markets. These products may be obtained by:

- (i) investment in the research and development of additional products;
- (ii) acquisition of rights to produce someone else's product;
- (iii) buying-in the product and 'badging' it;
- (iv) joint development with owners of another product who need access to the firm's distribution channels or brands.

The critical factor to the success of this strategy is the profitability of the customer group for which the products are being developed. Also the firm's present competitive advantages in serving the market must confer on to the new good. These can include:

- (i) customer information that allows accurate targeting;
- (ii) established distribution channels;
- (iii) a brand which can be credibly applied to the new product.

(b) The Advantages of Strategic Management

- Discharges Board Responsibility The first reason that most organizations state for having a strategic management process is that it discharges the responsibility of the Board of Directors.

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- Forces an Objective Assessment
Strategic management provides a discipline that enables the board and senior management to actually take a step back from the day-to-day business to think about the future of the organization. Without this discipline, the organization can become solely consumed with working through the next issue or problem without consideration of the larger picture.
- Provides a Framework for Decision-Making
Strategy provides a framework within which all staff can make day-to-day operational decisions and understand that those decisions are all moving the organization in a single direction.
- Supports Understanding & Buy-In
Allowing the board and staff participation in the strategic discussion enables them to better understand the direction, why that direction was chosen, and the associated benefits. For some people simply knowing is enough; for many people, to gain their full support requires them to understand.
- Enables Measurement of Progress
A strategic management process forces an organization to set objectives and measures of success. The setting of measures of success requires that the organization first determine what is critical to its ongoing success and then forces the establishment of objectives and keeps these critical measures in front of the board and senior management.

8. (a) What are the areas to keep in mind while framing strategy to motivate employees?**(b) Discuss about “Types of Strategic Control System”.****[6+6]****Answer:**

8. (a) While designing strategy to motivate employees, the management must bear in mind the following cardinal principles:
- (a) All reasonably healthy adults have a considerable reservoir of potential energy. Differences in the total amount of potential energy are important determinants of motivation.
 - (b) All adults have a number of basic motives which can be thought of as values or outlet that channel and regulate the flow of potential energy from this reservoir.
 - (c) Most adults within a given socio-cultural system may have the same set of motives or energy outlets that channel and regulate the flow of potential energy from this reservoir.
 - (d) Actualisation of motive depends on specific situation in which a person finds himself.
 - (e) Certain characteristics of a situation arouse or trigger different motives, opening different values or outlets. Each motive or energy outlet is responsive to a different set of situational characteristics.
 - (f) Each motive leads to a different pattern of behaviour.
 - (g) By changing the nature of the situational characteristics or stimuli, different motives are aroused or actualised resulting in the emerging of distinct different patterns of behaviour.

MTP_Intermediate_Syllabus-2016_December2018_Set -2**(b) Types of Strategic Control Systems:**

- **Personal Control**

It is the desire to shape and influence the behaviour of a person in a face to face interaction in order to achieve the organisation's goals. Direct supervision is the most common form of personal control as it helps in identifying the problems faced by subordinates and better man management. Personal control may also come from group of peers when people work in teams. Here personal control is all about possibility of learning to occur and competencies to develop.

- **Output control**

This system involves the estimation and forecasting of appropriate performance goals for each unit/division, department and employees and then measure the actual performance relative to these goals. It is often observed that the organisation's reward system is linked to performance on these goals. It can therefore be concluded that the output control system also provides an incentive structure for motivating employees at all levels of the organisation.

- **Behaviour control**

The establishment of a comprehensive system of rules and procedures to direct the actions or behaviour of divisions, functions and individuals is called behaviour control. The main purpose of having behaviour control is not to specify goals but to standardise the way of reaching them. It is felt that if rules are standardised then outcomes are predictable. It is of utmost importance that the management reviews behaviour controls over time. The rules that have been established tend to increase over time leading to inflexibility to react to the changing environment thereby adversely affecting the organisation's competitive advantage.

9. Write short notes on any three of the following four questions:**[4×3=12]****(a) Strategic Management Framework;****(b) Mc Kinsey's 7 -s Frame work;****(c) Marketing Mix;****(d) Theory X and Theory Y.****Answer:****9. (a) Strategic Management Framework:**

The basic framework of strategic management involves five stages:

Stage 1: In this stage, organisation analyse about their present situation in terms of their Strengths, Weaknesses, Opportunities and Threats.

Stage 2: In this stage, organisations setup their missions, goals and objectives by analysing where they want to go in future.

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Stage 3: In this stage organisation analyses various strategic alternatives to achieve their goals and objectives. The alternatives are analysed in terms of what business portfolio/ product mix to adopt, expansion, merger, acquisition and divestment options etc are analysed to achieve the goals.

Stage 4: In this organisations select the best suitable alternatives in line with their SWOT analysis.

Stage 5: This is implementation stage in which organisation implement and execute the selected alternatives to achieve their strategic goals and objectives.

Stage 1: Where are we now? Analysis of present situation

Stage 2: Where we want to go? Setting goals and objectives for future

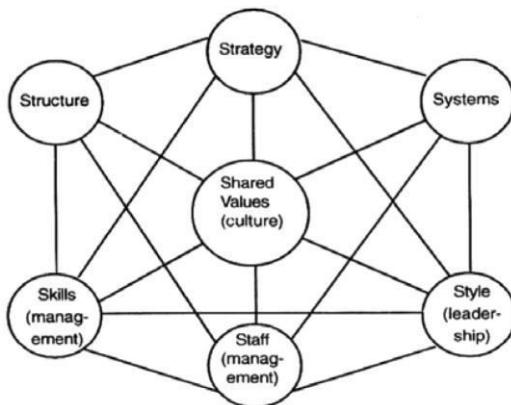
Stage 3: Analyses of various alternatives to achieve the goals and objectives

Stage 4: Selecting best alternatives in line with strengths of organisation

Stage 5: Implementing and executing the selected alternatives and monitoring of the same overtimes

(b) Mc Kinsey's 7 –S Frame work;

Strategy is dependent on many variables – Internal as well as external. All factors are interrelated.



The McKinsey Company, a well known management consultancy firm in the United States, towards the end of 1970s was asked to find a solution to this knotty issue. The researchers Peters and Waterman found after examining America's best run companies that the problem in strategy lay in its implementation and structure was only one lever in the hands of management. The other levers were systems, staff, style, skills and super ordinate goals. A strategy is usually successful when the other S's in the 7-S framework fit into or support the strategy.

Strategy: A set of decisions and actions aimed at gaining a sustainable competitive advantage

- Structure: The organisation chart and associated information that shows who reports to whom and how tasks are both divided and integrated.
- Systems: The flow of activities involved in the daily operation of a business, including its core processes and its support systems.
- Style: How managers collectively spend their time and attention and how they use symbolic behaviour. How management acts is more important than what management says.
- Staff: How companies develop employees and shape basic values.

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- (c)** Marketing mix is the pack of four sets of variables namely, product variables, price variables, promotion variables and place variable.

Marketing Mix refers to the appointment of effort, the combination, designing and integration of the elements of marketing into a programme or mix which, on the basis of an appraisal of the market forces will best achieve the objectives of an enterprise at a given time.

Kotler defines the marketing mix as the set of controllable variables and their levels that the firm uses to influence the target market. Such variables are:

- (i) Product
- (ii) Place
- (iii) Price and
- (iv) Promotion In addition, for service-there are three more P's

They are:

- (i) People
- (ii) Processes and
- (iii) Physical evidence.

- (d) Theory X and Theory Y:** Another motivation strategy involves manager's assumptions about the nature of people. Douglas McGregor identified two sets of assumptions. According to him, Theory X involves negative assumptions that managers often use as the basis for dealing with people. Theory Y represents positive assumptions which managers strive to use. The basic rationale for using Theory Y rather than Theory X in most situations is that managerial activities reflect Theory X assumptions. As such, the activities based on Theory Y assumptions generally are more successful in motivating organisation people than those based on Theory X assumptions.

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Paper - 9 : OPERATIONS MANAGEMENT & STRATEGIC MANAGEMENT

MTP_Paper 9_Syllabus 2016_June 2018_Set 1**Paper – 9 : Operation Management and Strategic Management****Full Marks : 100****Time allowed: 3 hours****The figures in the margin on the right side indicate full marks.****This question paper has two sections.****Both the sections are to be answered subject to instructions given against each.****Section I : (Operation Management)**

1. (a) Choose the most correct alternative: [1*10]
- (i) The desire objective of Production and Operation Management is
- (A) Use of cheap machinery to produce,
 - (B) To train unskilled workers to manufacture goods perfectly,
 - (C) Optimal utilization of available resources,
 - (D) To earn good profits.
- (ii) Most suitable layout for job Production is
- (A) Line layout,
 - (B) Matrix layout,
 - (C) Process layout,
 - (D) Product layout.
- (iii) To activity of specifying when to start the job and when to end the job is known as:
- (A) Planning,
 - (B) Scheduling,
 - (C) Timing,
 - (D) Follow-up.
- (iv) Routine and Scheduling becomes relatively complicated in
- (A) Job production,
 - (B) Batch production,
 - (C) Flow production,
 - (D) Mass production.
- (v) The lead-time is the time:
- (A) To place holders for materials,
 - (B) Time of receiving materials,
 - (C) Time between receipt of material and using materials,
 - (D) Time between placing the order and receiving the material

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(vi) The first stage in production planning is:

- (A) Process planning,
- (B) Factory planning,
- (C) Operating planning,
- (D) Layout planning.

(vii) The time horizon selected for forecasting depends on

- (A) The salability of the product,
- (B) The selling capacity of salesman,
- (C) Purpose for which forecast is made,
- (D) Time required for production cycle.

(viii) In transportation models, points of demand is classified as

- (A) Ordination,
- (B) Transportation,
- (C) Destinations,
- (D) Origins.

(ix) Jigs are used in machine tool for holding:

- (A) Tools,
- (B) Work piece,
- (C) Head stock,
- (D) Tail stock

(x) Addition of value to raw materials through application of technology is:

- (A) Product,
- (B) Production,
- (C) Advancement,
- (D) Transformation.

(b) Match the terms in Column I with the relevant terms in Column II.

[1*6]

Column I	Column II
(A) Furniture	(i) Assembly line
(B) Hydro-electricity	(ii) Refinery
(C) Television set	(iii) Carpentry
(D) Cement	(iv) Turbo-alternator
(E) Aviation Fuel	(v) Rotary kiln
(F) Tools	(vi) Machine shop

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(c) State whether the following statements are True or False: [1×6]

- (i) In carrying out Job Evaluation studies, point system is the best method ()
- (ii) Increase in productivity leads to retrenchment of work force ()
- (iii) Project costs increase as the duration of the project increases ()
- (iv) Job Evaluation is a systematic approach to ascertain the labour worth of a job ()
- (v) There is a limit beyond which labour productivity cannot be improved ()
- (vi) Breakdown maintenance doesn't require use of standby machines ()

Answer: 1 (a)

- (i) C
- (ii) C
- (iii) B
- (iv) B
- (v) D
- (vi) B
- (vii) C
- (viii) C
- (ix) A
- (x) B

Answer: 1 (b)

Column I	Column II
(A) Furniture	(iii) Carpentry
(B) Hydro-electricity	(iv) Turbo-alternator
(C) Television set	(i) Assembly line
(D) Cement	(v) Rotary kiln
(E) Aviation Fuel	(ii) Refinery
(F) Tools	(vi) Machine shop

Answer: 1 (c)

- (i) True
- (ii) True
- (iii) True
- (iv) True
- (v) True
- (vi) False

2. (a) Define forecasting. Why sales forecasting is the most important activity in the business? [6]

Demand in (000 MT) for sugar of S Ltd is given below:

Year	2010	2011	2012	2013	2014	2015	2016

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Demand	77	88	94	85	91	98	90
--------	----	----	----	----	----	----	----

(b)**(i) Fit a straight line trend by method of least square;****(ii) Obtain the forecast of demand for the year 2017****[10]****Answer: 2 (a)**

Forecasting means peeping into the future. As future is unknown and is anybody's guess but the business leaders in the past have evolved certain systematic and scientific methods to know the future by scientific analysis based on facts and possible consequences. Thus, this systematic method of probing the future is called forecasting.

All business and industrial activities revolve around the sale and its future planning. To know what a business will do we must know its future sales. All other activities depend upon the sales of the concern. Sales forecasting as a guiding factor for a firm because it enables the firm to concentrate its efforts to produce the required quantities, at the right time at reasonable price and of the right quality. Sales forecasting is the basis of planning the various activities i.e.; production activities, pricing policies, programme policies and strategies, personnel policies as to recruitment, transfer, promotion, training, wages etc.

Answer: 2 (b) (i)

The trend line is represented as $Y_t = a + bX$

Where Y_t = the trend value (which is to be predicated);

a = the Y axis intercept;

b = slope of the trend line;

x = the independent variable, the time;

a and b are computed as

$$b = \frac{\sum XY - n\bar{X}\bar{Y}}{\sum X^2 - n\bar{X}^2}, \quad a = \bar{Y} - b\bar{X}$$

The computations are in the following table

Year	X	Demand, (Y)	XY	X^2	Trend Values Y_t
2010	0	77	0	0	83
2011	1	88	88	1	85
2012	2	94	188	4	87
2013	3	85	255	9	89
2014	4	91	364	16	91
2015	5	98	490	25	93
2016	6	90	540	36	95
Total	21	623	1925	91	125

$$\bar{X} = \frac{21}{7} = 3 \text{ & } \bar{Y} = \frac{623}{7} = 89 \text{ So } b = \frac{(1925 - 7 \times 3 \times 89)}{(91 - 7 \times 3 \times 3)} = 2 \text{ and } a = 89 - 2 \times 3 = 83$$

(ii) Forecast value for 2017 = $83 + 2 \times 7 = 97$

3. (a) What does Product Design do? Discuss – Process design and selection.

[6]

(b) Machine A costs of ₹ 80,000. Annual operating costs are ₹2,000 for the first year, and they increase by ₹15,000 every year (for example, in the fourth year the operating costs are

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₹47,000). Determine the least age at which to replace the machine. If the optimal replacement policy is followed; what will be the average yearly cost of operating and owning the machine? (Assume that the resale value of the machine is zero when replaced, and that future costs are not discounted).

- (i) Another machine B costs ₹1,00,000. Annual operating cost for the first year is ₹4,000 and they increase by ₹7,000 every year. The firm has a machine of type A which is one year old. Should the firm replace it with B and if so, when?
 - (ii) Suppose the firm is just ready to replace the machine A with another machine of the same type, just then the firm gets an information that the machine B will become available in a year. What should the firm do?
- [10]

Answer: 3 (a)

The activities and responsibilities of product design include the following:

- (i) Translating customer needs and wants into product and service requirements (marketing).
- (ii) Refining existing products (marketing).
- (iii) Developing new products (marketing, product design and production).
- (iv) Formulating quality goals (quality assurance, production).
- (v) Formulating cost targets (accounting).
- (vi) Constructing and testing prototype (marketing, production).
- (vii) Documenting specifications (product design).

Process Design is concerned with the overall sequences of operations required to achieve the product specifications. It specifies the type of work stations to be used, the machines and equipments necessary to carry out the operations. The sequence of operations are determined by (a) the nature of the product, (b) the materials used, (c) the quantities to be produced and (d) the existing physical layout of the plant.

The process design is concerned with the following:

- (i) Characteristics of the product or service offered to the customers.
- (ii) Expected volume of output.
- (iii) Kinds of equipments and machines available in the firm.
- (iv) Whether equipments and machines should be of special purpose or general purpose.
- (v) Cost of equipments and machines needed.
- (vi) Kind of labour skills available, amount of labour available and their wage rates.
- (vii) Expenditure to be incurred for manufacturing processes.
- (viii) Whether the process should be capital-intensive or labour-intensive.
- (ix) Make or buy decision.
- (x) Method of handling materials economically.

Answer: 3 (b)

The operating cost of machine A in successive years are as follows:

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Year	1	2	3	4	5
Operating cost (₹)	2,000	17,000	32,000	47,000	62,000

CALCULATIONS FOR AVERAGE COST OF MACHINE A

Replacement at the end of year	Cumulative operating cost (in ₹)	Depreciation cost (in ₹)	Total cost (in ₹)	Average cost per year (in ₹)
1	2,000	80,000	82,000	82,000
2	19,000	80,000	99,000	49,500
3	51,000	80,000	1,31,000	43,666
4	98,000	80,000	1,78,000	44,500
5	1,60,000	80,000	2,40,000	48,000

It is clear from the table that machine A should be replaced at the end of third year. The average yearly, cost of owning & operating machine A in this situation will be ₹43,666.

(i) The operating cost of machine B are as follows:

Year	1	2	3	4	5	6
Operating cost (₹)	4,000	11,000	18,000	25,000	32,000	39,000

CALCULATIONS FOR AVERAGE COST OF MACHINE B

Replacement at the end of year	Cumulative operating cost (in ₹)	Depreciation cost (in ₹)	Total cost (in ₹)	Average cost per year (in ₹)
1	4,000	1,00,000	1,40,000	1,04,000
2	15,000	1,00,000	1,15,000	57,500
3	33,000	1,00,000	1,33,000	44,333
4	88,000	1,00,000	158,000	39,500
5	90,000	1,00,000	1,90,000	38,000
6	1,29,000	1,00,000	2,29,000	38,166

It is clear from the above Table that if machine B is replaced after 5 years then its average cost per year is ₹ 38,000. Since the lowest average cost for machine B (₹ 38,000) is less than the lowest average cost for machine A (₹43,666), the machine A should be replaced by machine B. Now to find the time of replacement of Machine A by Machine B, we proceed as follows :

The machine A is replaced by machine B at the time (age), when its running cost of the next year exceed the lowest average yearly cost ₹38,000 of machine B. Further, the total cost of the machine A in the successive years are computed as follows :

Year	1	2	3	4	5
Total cost in the year (in ₹)	82,000	99,000 – 82,000 = 17,000	1,31,000 – 99,000 = 32,000	1,78,000 – 1,31,000 = 47,000	2,40,000 – 1,31,000 = 1,78,000 = 62,000

The running cost of fourth year of machine A is ₹ 47,000 which is more than the lowest average yearly cost ₹ 38,000 of machine B. Therefore, the machine A should be replaced by machine B, when its age is 1 year. Since the machine A is one year old now, it should be replaced just now.

(ii) Install new machine now and replace it with machine B during the *third* year.

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4. (a) Priyanshu enterprise has three factories at locations A, B and C which supply three warehouses located at D, E and F. Monthly factory capacities are 10, 80 and 15 units respectively. Monthly warehouse requirements are 75, 20 and 50 units respectively. Unit shipping costs (in ₹) are given in the following table:

	To	D	E	F
	A	5	1	7
From	B	6	4	6
	C	3	2	5

The penalty costs for satisfying demand at the warehouses E, E and F are ₹5, ₹3 and ₹ 2 per unit respectively. Determine the optimum distribution for Priyanshu, using any of the known algorithms. [10]

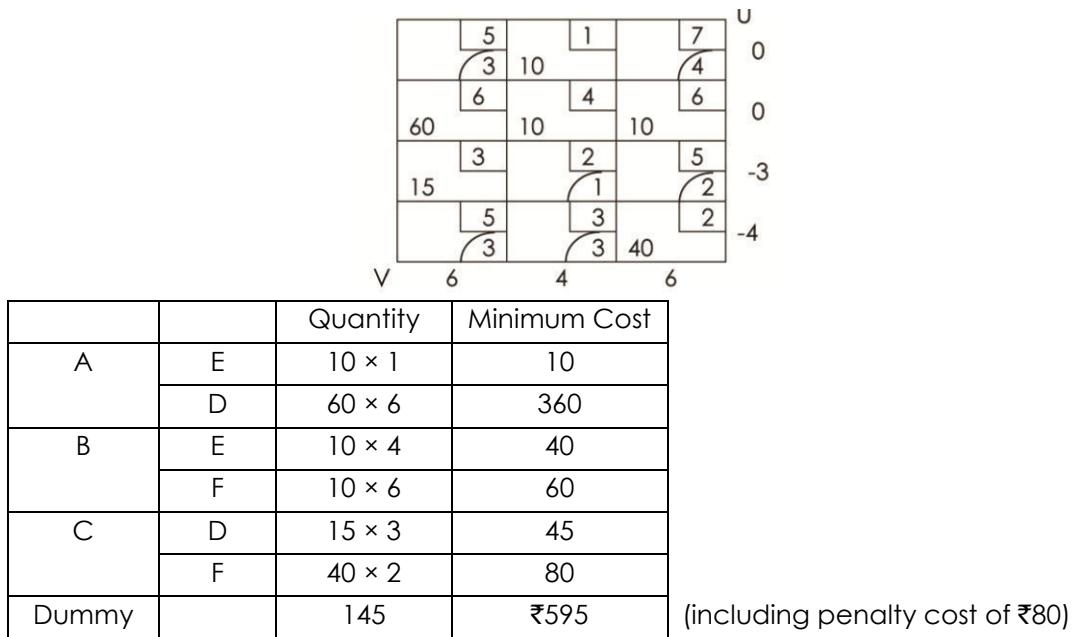
- (b) Enumerate four differences between PERT and CPM. [6]

Answer: 4 (a)

	D	E	F		
A	5 10 200	1 10 200	7	10/0	4*
B	6 10 10	4 10 10	6	80/0	2/2/2
C	3 15	2	5	15/0	1/1/1
Dummy	5 40	3 40	2	40/0	1/1
	75 60 0 2 2 3*	20 10 0 1 1 2	50 10 0 3 3* 1		

Since there are $m + n - 1$ allocations optimality test can be performed.

Since $\Delta_{ij} \geq 0$, the solution is optimum.

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Four differences between PERT and CPM are enumerated in the following table:

PERT	CPM
It is applicable when time estimate are uncertain as regards duration of activities and measured by pessimistic time.	It is good when time estimates are possible with certainty.
It is concerned with events which are the beginning or ending points of operation.	It is concerned with activities.
It is relevant for non-repetitive projects.	It is designed for repetitive process.
It is not concerned with the relationship between time and cost	It establishes a relationship between time and cost, and cost is proportionate to time.
It can be analyzed statistically.	It is not so in case of CPM

5. (a) The following table gives data on normal time & cost and crash time & cost for a project.

Activity	Normal		Crash	
	Time (days)	Cost (₹)	Time (days)	Cost (₹)
1 – 2	6	600	4	1,000
1 – 3	4	600	2	2,000
2 – 4	5	500	3	1,500
2 – 5	3	450	1	650
3 – 4	6	900	4	2,000
4 – 6	8	800	4	3,000
5 – 6	4	400	2	1,000
6 – 7	3	450	2	800

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The indirect cost per day is ₹100.

1. Draw the network and identify the critical path.
2. What are the normal project duration and associated cost?

[10]

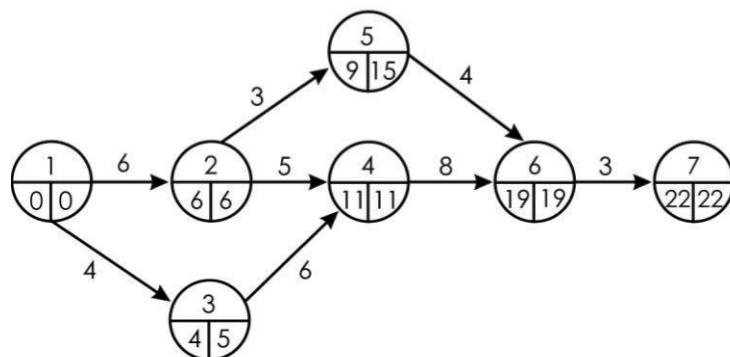
- (b) A fleet owner finds from his past records that the costs per year of running a vehicle whose purchase price is ₹1,00,000 are as under:

Year	1	2	3	4	5
Running costs (₹)	10,000	12,000	13,500	15,000	18,000
Resale value (₹)	80,000	65,000	55,000	25,000	6,000

Thereafter, running cost increases by ₹3,000, But resale value remains constant at ₹6,000.
At what age is a replacement due? [6]

Answer: 5 (a)

The network for normal activity times indicates a project time of 22 weeks with the critical path 1-2-4-6-7.



Normal project duration is 22 weeks and the associated cost is as follows:
Total cost = Direct normal cost + Indirect cost for 22 weeks.
= 4,700 + 100 × 22 = ₹ 6,900.

Answer: 5 (b)

Chart showing Optimal Replacement Period

Year	Net Capital Cost (C-S) (₹)	Running Cost (₹)	Cumulative operation Cost (₹)	Total Cost (₹) (2) + (4)	Average Annual Cost (₹) (5) / (1)
(1)	(2)	(3)	(4)	(5)	(6)
1	20,000	10,000	10,000	30,000	30,000
2	35,000	12,000	22,000	57,000	28,500
3	45,000	13,500	35,500	80,500	26,833
4	75,000	15,000	50,500	1,25,500	31,375
5	94,000	18,000	68,500	1,62,500	32,500

Optimal replacement is the end of 3rd year.

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Section – B

6. Choose the correct answer: [1*6]

- (i) Behaviour modification includes
 - A. Involving employees in decision making
 - B. Positive reinforcement
 - C. Job enlargement
 - D. Job enrichment and Flexi time.
- (ii) Successful differentiation strategy allows the company to:
 - A. gain buyer loyalty to its brands
 - B. charge too high a price premium
 - C. depend only on intrinsic product attributes
 - D. have product quality that exceeds buyers needs
 - E. segment a market in to distinct group of buyer
- (iii) Matrix structure
 - A. structural grouping is geographic
 - B. simultaneous combination of similar activities on the basis of function
 - C. adopts parts of both functional and divisional structures at the same level of management
 - D. creates a dual chain of command
- (iv) The conditional of Low share, Negative growth, and negative cash flow indicates –
 - A. Dogs
 - B. Dodos
 - C. Donkey
 - D. Dinosaurs
- (v) Benchmarking is :
 - A. The analytical tool to identifying high cost activities based on the 'Pareto Analysis'
 - B. The search for industries best practices that lead to superior performance
 - C. The simulation of cost reduction schemes that help to build commitment and improvement of actions
 - D. The process of marketing and redesigning the way a typical company works
 - E. The framework that earmarks a linkage with suppliers and customers
- (vi) A product line is a group of product that
 - A. are closely related
 - B. are marketed through the same channel
 - C. performance a similar function for being sold to the same customers
 - D. all of the above

Answer: 6

- (i) B
- (ii) A
- (iii) D

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- (iv) B
- (v) B
- (vi) D

Answer any one question from the following:

- 7. (a) State the approaches of Strategic Planning.**
(b) Discuss Contingency Planning & its seven steps.

[6+6]

Answer: 7(a)

Approaches in Strategic Planning

It is important to operate a planning process which will not only produce realistic and potentially rewarding plans but will also secure the support of all those involved in implementing them. There are three approaches that can be adopted to strategic planning:

- (i) A top-down process, in which managers are given targets to achieve which they pass on down the line.
- (ii) A bottom-up process, in which functional and line managers in conjunction with their staff submit plans, targets and budgets for approval by higher authority.
- (iii) An iterative process, which involves both the top-down and bottom-up setting of targets. There is a to and- from movement between different levels until agreement is reached.

However, this agreement will have to be consistent with the overall mission, objectives and priorities and will have to be made within the context of the financial resources available to the organization. The iterative approach, which involves the maximum number of people, is the one most likely to deliver worthwhile and acceptable strategic plans.

Answer: 7(b)

Contingency plans can be defined as alternative plans that can be put into effect if certain key events do not occur as expected. Only high-priority areas require the insurance of contingency plans. Strategists cannot and should not try to cover all bases by planning for all possible contingencies. But in any case, contingency plans should be as simple as possible.

Steps in Contingency Planning

Robert Linnemann and Rajan Chandran have suggested that a seven step process as follows:

Step 1 - Identify the beneficial and unfavourable events that could possibly derail the strategy or strategies.

Step 2 - Specify trigger points. Calculate about when contingent events are likely to occur.

Step 3 - Assess the impact of each contingent event. Estimate the potential benefit or harm of each contingent event.

Step 4 - Develop contingency plans. Be sure that contingency plans are compatible with current strategy and are economically feasible.

Step 5 - Assess the counter impact of each contingency plan. That is, estimate how much each contingency plan will capitalize on or cancel out its associated contingent event. Doing this will quantify the potential value of each contingency plan.

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Step 6 - Determine early warning signals for key contingency event. Monitor the early warning signals.

Step 7 - For contingent event with reliable early warning signals, develop advance action plans to take advantage of the available lead time.

8. (a) Discuss various stages in strategic planning.

(b) Define SBU. What are its merits & demerits?

[6+6]

Answer: 8(a) The stages in strategic planning are given below:

Stage I - Strategic Option Generations

At this stage, a variety of alternatives are considered, relating to the firm's product and markets, its competitors and so forth. Examples of strategies might be:

- (a) increase market share
- (b) penetration into international market
- (c) concentration on core competencies
- (d) acquisition or expansion etc.

Stage II - Strategic Options Evaluation

Each option is then examined on its merits.

- (a) does it increase existing strengths ?
- (b) does it alleviate existing weaknesses ?
- (c) is it suitable for the firm's existing position ?
- (d) is it acceptable to stakeholders ?

Stage III - Strategic Selection

It involves choosing between the alternative strategies. This process is strongly influenced by the values of the managers in selecting the strategies.

Answer: 8(b)

SBU groups similar divisions into "Strategic Business Units" and then delegates authority and responsibility of each unit to a senior executive who is normally identified as CEO or MD of that SBU. It is an extension of Divisional structure.

SBU Structure

Big organisation like Unilever, etc have many SBUs for their different categories of products like Cosmetics, Food products and Beverages, etc, and each is managed through separate unit head.

Advantages:

- (i) Promotes accountability since units' heads are responsible for individual SBU profitability
- (ii) Career development opportunities are further higher in this structure
- (iii) Allow better control of categories of products manufacturing, marketing and distributions
- (iv) Helps to expand in different related and unrelated businesses

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Disadvantages:

- (i) May provide inconsistent approach to tackle customers, etc, because each unit may work in its own way to handle situations
- (ii) High cost approach

9. Write short notes on any three of the following four questions:

[4*3]

- (a) **PEST Framework;**
- (b) **Limitation of B.C.G Model;**
- (c) **SWOT Analysis;**
- (d) **Market Penetration Strategy.**

Answer: 9

- (a) PEST analysis refers to Political, Economical, Social, and Technological factors which manipulate the business environment. SWOT analysis refers to Strengths, Weaknesses, Opportunity and Threats. These factors are prime determinants of strategic planning. Without SWOT and PEST analysis companies might fail to achieve desired goals.
- PEST Analysis looks at external factors and is primarily used for market research. It is used as an alternative to SWOT analysis:
- (i) **Political** – These are the external factors that influence the business environment. Government decisions and policies affect a firm's position and structure, Tax laws, monetary and fiscal policies as well as reforms of labor and workforce, all influence companies in future. These factors are important and need to be managed in order to overcome uncertainty.
 - (ii) **Economical** – Economical factors are the most important since it impacts business in the long run. Inflation, interest rates, economic growth and demand/supply trends are to be considered and analyzed effectively before planning and implementing. Economic factors affect both consumers and enterprises.
 - (iii) **Social** – Social factors involve the trends of population, domestic markets, cultural trends and demographics. These factors help businesses assess the market and improve their products/service accordingly.
 - (iv) **Technological** – This analyses the technology trends and advancements in business environment, innovations and advancements lowers barriers to entry plus decreased production levels as it results in unemployment. This includes research and development activity, automation and incentives.
 - (i) It presents a business' standing and position, i.e. whether it is weak or strong
 - (ii) It informs about both internal and external factors that affect a firm's success and/or failure
 - (iii) It helps firms assess the report and take counter measures for improvement and analyzing threats
 - (iv) It forecasts the future and sheds light on the current situation
 - (v) Evaluates business environment and allows firms to make strategic decisions
 - (vi) Prevents future failure and creates a system of continuous success
 - (vii) Provides companies with a reality check on their performance and shortcoming
 - (viii) Enables firms to understand the economy and market and expand
 - (ix) Provides a mechanism to identify threats and opportunities
 - (x) Enables companies to learn about markets and enter new markets nationally or globally.

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(b) Limitations of the BCG Model:

The BCG model analyses products in the light of two variables: the growth in the market as a whole, and the growth of the product's share of the market in relation to other products. It suggests that there is a relationship between these variables and the product's propensity to generate cash or consume it. It rests on the assumption that the firm with the highest market share can be the lowest cost producer. The model suggests that cash cows should be used to fund stars. There are a number of limitations to the model.

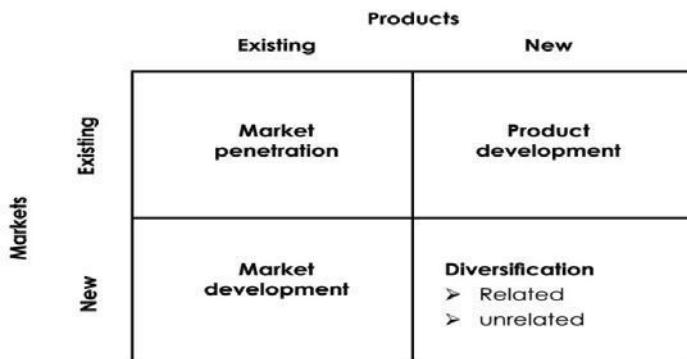
- (i) How do you define your market? Segmentation strategies can provide a niche. A niche is inevitably a low or restricted share of the market, yet it is the heart of a focus strategy. Firms can profit servicing small low-growth niches.
- (ii) Market growth and market share are assumed to be reliable pointers for cash flow. This is often not true. High market share does not necessarily mean high profits, especially if a firm has high costs, or has bought market share by low pricing.
- (iii) Relative market share amongst competitors is not necessarily an indication of their competitive strengths at any particular time. After all, market leaders are vulnerable.
- (iv) The BCG model might become a self-fulfilling prophecy: Dogs which could be made profitable might simply be left to the rather than be resuscitated.
- (v) It does not suggest any response to declining markets other than withdrawal: many firms can make money in 'sunset industries'.
- (vi) It ignores the extent to which a firm which serves a number of markets can exploit production synergies.
- (vii) It ignores the threat of substitute products.

(c) SWOT Analysis:

Gathering data about the general, operating, and internal environments provides the raw material from which to develop a picture of the organisational environment.

SWOT analysis refines this body of information by applying a general framework for understanding and managing the environment in which an organisation operates. (The acronym SWOT stands for Strengths, Weaknesses, Opportunities, and Threats.) In many respects, the sophisticated analytical techniques discussed throughout the text are further refinements of basic SWOT analysis. In addition, students have repeatedly told us that SWOT is an excellent way to begin a case analysis. SWOT analysis attempts to assess the internal strengths and weaknesses of an organisation and the opportunities and threats that its external environment presents. SWOT seeks to isolate the major issues facing an organisation through careful analysis of each of these four elements. Managers can then formulate strategies to address key issues.

(d) MARKET PENETRATION Strategy:



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Firm increases its sales in its present line of business. This can be accomplished by:

- (i) price reductions;
- (ii) increases in promotional and distribution support;
- (iii) acquisition of a rival in the same market;
- (iv) modest product refinements.

These strategies involve increasing the firm's investment in a product/market and so are generally only used in markets which are growing, and hence the investment may be recouped. In this respect the strategy is similar to invest to build and holding strategy as described by the Boston Consulting Group.

Paper - 9 : OPERATIONS MANAGEMENT & STRATEGIC MANAGEMENT

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Paper – 9 : Operation Management and Strategic Management

Full Marks: 100

Time allowed: 3 hours

The figures in the margin on the right side indicate full marks.

This question paper has two sections.

Both the sections are to be answered subject to instructions given against each.

Section I : (Operation Management)

1. (a) Choose the most correct alternative: [1×10]

- (i) Which one is NOT an index of Productivity?
 - (A) Man-hour output
 - (B) Productivity ratio
 - (C) TQM
 - (D) Use of Financial Ratios
- (ii) Which of the following stages of Product Life Cycle does attribute beginning of substantial increase in Sales and Profits?
 - (A) Introduction
 - (B) Growth
 - (C) Maturity
 - (D) Decline
- (iii) The activity of specifying when to start the job and when to end the job is known as
 - (A) Planning
 - (B) Scheduling
 - (C) Timing
 - (D) Follow-up
- (iv) In an organization, the Production Planning and Control department comes under
 - (A) Planning department
 - (B) Manufacturing department
 - (C) Personnel department
 - (D) R & D department
- (v) Preventive maintenance is useful in reducing
 - (A) Inspection Cost
 - (B) Cost of premature replacement
 - (C) Shutdown Cost
 - (D) Set-up Cost of machine
- (vi) Reliability and per unit cost of which of the following spares are less?
 - (A) Regular spares
 - (B) Insurance spares
 - (C) Capital spares
 - (D) Rotable spares

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(vii) Long range forecasting is useful in:

- (A) Plan for research and development
- (B) To schedule jobs in job production
- (C) In purchasing the material to meet the present production demand
- (D) To access man power required in the coming month

(viii) The act of releasing the production documents to production department is known as:

- (A) Routine
- (B) Scheduling
- (C) Expediting
- (D) Dispatching

(ix) The method used in scheduling a project is:

- (A) A schedule of break-down of orders
- (B) Outline master programme
- (C) PERT & CPM
- (D) Schedule for large and integrated work.

(x) Most suitable layout for continuous production is:

- (A) Line layout
- (B) Process layout
- (C) Group technology
- (D) Matrix layout

(b) Match the terms in Column I with the relevant terms in Column II-(ANY Six)

[1×6]

Column I	Column II
(A) Electricity	(i) Blast Furnace
(B) Petrol	(ii) Generator
(C) Iron	(iii) Refinery
(D) Cloth	(iv) Assembly Line
(E) Car	(v) Smithy
(F) Cotton Yarn	(vi) Spinning Mill
(G) Forgings	(vii) Power Loom

(c) State whether the following statements are True or False:

[1×6]

- (i) A Productivity Index is a device of expressing the ratio between outputs and the inputs of the resources numerically.
- (ii) It is desirable to conduct work measurement after method study.
- (iii) Increase in productivity leads to retrenchment of work force.
- (iv) The term "aesthetics" which appeals to the human sense does not add value to the product.
- (v) In general short term forecasting will be more useful in production planning.
- (vi) Production planning and control is essentially concerned with the control of finished goods.

MTP_Paper 9_Syllabus 2016_June 2018_Set 2**Answer: 1 (a)**

- (i) (C)
- (ii) (B)
- (iii) (B)
- (iv) (B)
- (v) (C)
- (vi) (A)
- (vii) (A)
- (viii) (D)
- (ix) (C)
- (x) (A)

Answer: 1 (b)

Column I	Column II
(A) Electricity	(ii) Generator
(B) Petrol	(iii) Refinery
(C) Iron	(i) Blast Furnace
(D) Cloth	(vii) Power Loom
(E) Car	(iv) Assembly Line
(F) Cotton Yarn	(vi) Spinning Mill
(G) Forgings	(v) Smithy

Answer: 1 (c)

- (i) True
- (ii) True
- (iii) False
- (iv) False
- (v) True
- (vi) False

2. (a) What are the characteristics of modern operation function?**[8]****(b) With the help of following data project the trend of sales for the next five years:**

Year	2002	2003	2004	2005	2006	2007
Sales (in lakhs)	100	110	115	120	135	140

[8]**Answer: 2 (a)****Characteristics of Modern Operation Function:**

The production management of today presents certain characteristics which make it look totally different from what it was during the past. Specifically, today's production system is characterised by at least four features.

1. Manufacturing as Competitive Advantage

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In the past production was considered to be like any other function in the organisation. Where demand was high and production capacities were inadequate, the concern was to somehow muster all inputs and use them to produce goods which would be grabbed by market. But today's scenario is contrasting. Plants have excess capacities, competition is mounting and firms look and gain competitive advantage to survive and succeed. Interestingly, production system offers vast scope to gain competitive edge and firms intend to exploit the potential. Total Quality Management (TQM), Time-Based Competition, Business Process Re-engineering (BPRE), Just-in-Time (JIT), Focused Factory, Flexible Manufacturing Systems (FMS), Computer Integrated Manufacturing (CIM), and The Virtual Corporation are but only some techniques which the companies are employing to gain competitive advantage.

2. Services Orientation

As was stated earlier, service sector is gaining greater relevance these days. The production system, therefore, needs to be organised keeping in mind the peculiar requirements of the service component. The entire manufacturing needs to be geared to serve (i) intangible and perishable nature of the services, (ii) constant interaction with clients or customers, (iii) small volumes of production to serve local markets, and (iv) need to locate facilities to serve local markets. There is increased presence of professionals on the production, instead of technicians and engineers.

3. Disappearance of Smokestacks

Protective labour legislation, environmental movement and gradual emergence of knowledge based organisations have brought total transformation in the production system. Today's factories are aesthetically designed and built, environment friendly - in fact, they are homes away from homes. Going to factory everyday is no more excruciating experience, it is like holidaying at a scenic spot. A visit to ABB, L & T or Smith Kline and Beecham should convince the reader about the transformation that has taken place in the wealth creation system.

4. Small has Become Beautiful

It was E.F. Schumacher who, in his famous book *Small is Beautiful*, opposed giant organisations and increased specialisation. He advocated, instead, intermediate technology based on smaller working units, community ownership, and regional workplaces utilising local labour and resources. For him, small was beautiful. Businessmen, all over the world, did not believe in Schumacher's philosophy. Inspired by economies of scale, industrialists went in for huge organisations and mass production systems.

2. (b) Computation of trend values of Sales

Year	Time deviations from the middle of 2004 and 2005 assuring 5 years = 1	Sales (in lakh `)	Squares of time deviation	Product of time deviation and sales
	X	Y	X^2	XY
2002	-5	100	25	-500
2003	-3	110	9	-330
2004	-1	115	1	-115
2005	+1	120	1	+120
2006	+3	135	9	+405
2007	+5	140	25	+700
$n = 6$	$\sum X = 0$	$\sum Y = 720$	$\sum X^2 = 720$	$\sum XY = 280$

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Regression equation of Y on X:

$$Y = A + BX$$

To find the values of a and b

$$a = \frac{\sum Y}{n} = \frac{720}{6} = 120$$

$$b = \frac{\sum XY}{\sum X^2} = \frac{280}{70} = 4$$

Sales forecast for the next years, i.e., 2008 to 2012

$$Y_{2008} = 120 + 4 (+7) = 120 + 28 = ₹ 148 \text{ lakhs}$$

$$Y_{2009} = 120 + 4 (+9) = 120 + 36 = ₹ 156 \text{ lakhs}$$

$$Y_{2010} = 120 + 4 (+11) = 120 + 44 = ₹ 164 \text{ lakhs.}$$

$$Y_{2011} = 120 + 4 (+13) = 120 + 52 = ₹ 172 \text{ lakhs.}$$

$$Y_{2012} = 120 + 4 (+15) = 120 + 60 = ₹ 180 \text{ lakhs.}$$

3. (a) Linear Programming tools can be used in Management Application – Explain. [4]

(b) A pension fund manager is considering investing in two shares A and B. It is estimated that:

- (i) Share A will earn a dividend of 12% per annum and share B 4% per annum.
- (ii) Growth in the market value in one year of share A will be 10 paise per ₹1 invested and in B 40 paise per ₹1 invested.

He required investing the minimum total sum which will give:

Dividend income of at least ₹600 per annum and growth in one year of at least ₹1,000 on the initial investment.

Your are required to:

- (i) State the mathematical formulation of the problem
- (ii) Compute the minimum sum to be invested to meet the manager's objective. [8]
- (c) What are the limitations of Linear Programming? [4]

Answer: 3(a) Management Application of Linear Programming Tools

- (a) Portfolio Selection.
- (b) Financial Mix Strategy.
- (c) Profit Planning.
- (d) Media Selection.
- (e) Travelling Salesmen Problem.
- (f) Determination of equitable salaries.
- (g) Staffing problem.

Answer: 3(b)

Share	Dividend	Growth in Rs.
A	12%	10/100 = 0.1
B	4%	40/100 = 0.4
Min-income	600	1000

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Let x_1 be the amount invested on share A

Let x_2 be the amount invested on share B

Objective function: Min. $Z = x_1 + x_2$

Subject to Constraints:

$$0.12 x_1 + 0.04 x_2 \geq 600$$

$$0.1 x_1 + 0.4 x_2 \geq 1000$$

And $x_1, x_2 \geq 0$.

Answer: 3(c)

Although linear programming is a very useful technique for solving optimization problems, there are certain important limitations in the application of linear programming. Some of these are discussed below:

1. Firstly, the linear programming models can be applied only in those situations where the constraints and the objective function can be stated in terms of linear expressions.
2. In linear programming problems, coefficients in the objective function and the constraint equations must be completely known and they should not change during the period of study.
3. Yet another important limitation of linear programming is that it may give fractional valued answers.
4. Linear programming will fail to give a solution if management have conflicting multiple goals.
5. Linear programming problem requires that the total measure of effectiveness and total resource usage resulting from the joint performance of the activities must equal the respective sums of these quantities resulting from each activity being performed individually.
6. Many real-world problems are so complex, in terms of the number of variables and relationships constrained in them, that they tax the capacity of even the largest computer.
7. Other limitations of LP includes:- - Does not take into consideration the effect of time and uncertainty. - Parameters appearing in the model are assumed to be constants but in real-life situations they are frequently neither known nor constants.

4. (a) The following jobs have to be shipped a week from now (week has 5 working days)

Job	A	B	C	D	E	F
Number of day's work remaining	2	4	7	6	5	3

Sequence the jobs according to priority established by (a) least slack rule (b) critical ratio rule. [8]

(b) A bakery keeps stock of a popular brand of cake. Previous experience shows the daily demand pattern for the item with associated probabilities, as given below:

Daily demand (number)	0	10	20	30	40	50
Probability	0.01	0.20	0.15	0.50	0.12	0.02

Use the following sequence of random numbers to simulate the demand for next 10 years.

MTP_Paper 9_Syllabus 2016_June 2018_Set 2**Random numbers: 48, 78, 19, 51, 56, 77, 15, 14, 68, 9.****Also estimate the daily average demand for the cakes on the basis of simulated data. [8]****Answer: 4 (a)****(a) Calculation of slack:**

Number of days unit clue date is 5 days for all jobs

Job	Slack	(days)
A	5 - 2	= 3
B	5 - 4	= 1
C	5 - 7	= (-2)
D	5 - 6	= (-1)
E	5 - 5	= 0
F	5 - 3	= 2

Sequence:

C	D	E	B	F	A
-2	-1	0	1	2	3

$$\text{Critical ratio} = \frac{\text{Due Date} - \text{Date Now}}{\text{Lead Time Remaining}} = \frac{\text{DD} - \text{DN}}{\text{LTR}} = \frac{\text{Available Time}}{\text{Operation Time}}$$

Critical ratio for job A = 5/2 = 2.5

Critical ratio for job B = 5/4 = 1.25

Critical ratio for job C = 5/7 = 0.71

Critical ratio for job D = 5/6 = 0.83

Critical ratio for job E = 5/5 = 1.0

Critical ratio for job A = 5/3 = 1.67

Job having least critical ratio is given the first priority and so on.

Sequence:	C	D	E	B	F	A
Critical Ratio:	0.71	0.83	1.0	1.25	1.67	2.5

Answer: 4 (b)

According to the given distribution of demand, the random number coding for various demand levels is shown in below

Demand	Probability	Cumulative probability	Random number interval
0	0.01	0.01	00
10	0.20	0.01 + 0.20 = 0.21	01 - 20
20	0.15	0.21 + 0.15 = 0.36	21 - 35
30	0.50	0.36 + 0.50 = 0.86	36 - 85
40	0.12	0.86 + 0.12 = 0.98	86 - 97
50	0.02	0.98 + 0.02 = 1.00	98 - 99

The simulation experiment is now conducted for demand by taking a sample of 10 random numbers from a table of random numbers.

The simulated demand for the cakes for a period of 10 days is given in adjoining table
SIMULATION EXPERIMENT WORKSHEET

Day	Random number	Demand
1	48	30

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2	78	30
3	19	10
4	51	30
5	56	30
6	77	30
7	15	10
8	14	10
9	68	30
10	09	10
Total	-	220

Expected demand, on the basis of simulated data. = $220/10 = 22$ cakes/day.

5. (a) Project with the following data is to be implemented. Draw the network and find the critical path.

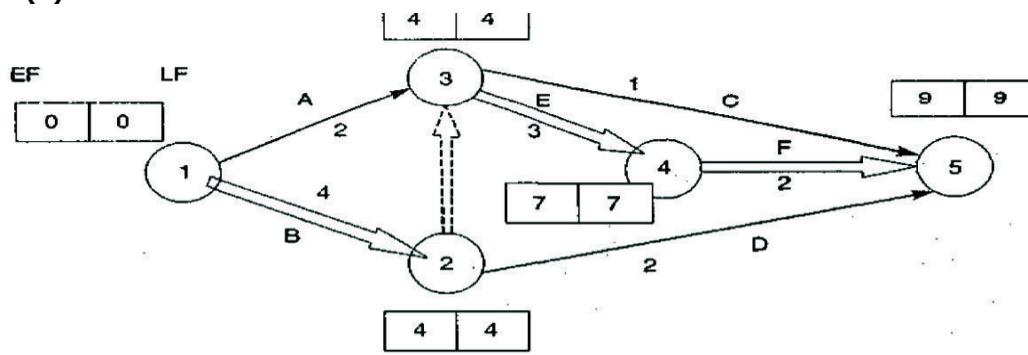
Activity	Predecessor	Duration (days)	Cost (₹ day)
A	-	2	50
B	-	4	50
C	A	1	40
D	B	2	100
E	A, B	3	100
F	E	2	60

1. What is the minimum duration of the project?
2. Draw a Gantt chart for early start schedule.
3. Determine the peak requirement money and day on which it occurs above schedule.

[6]

- (b) Indian Electronics, manufactures TV sets and carries out the picture tube testing for 2000 hours. A sample of 100 tubes was put through this quality test during which two tubes failed. If the average usage of TV by the customer is 4 hours/day and if 10,000 TV sets were sold, then in one year how many tubes were expected to fail and what is the mean time between failures for these tubes? [10]

Answer: 5(a)

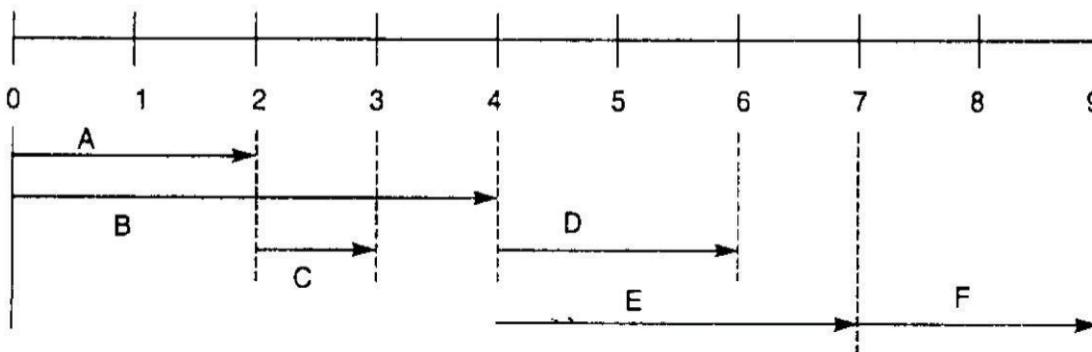


Critical Path
Minimum time

$$1 - 2 - 3 - 4 - 5 \\ = 9$$

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Activity	t	ES(EF - t)	EF	LS (LF - t)	LF	Event Slack (LS - ES) (LF - EF)	On Critical Path
A	2	0	2	2	4	2	No
B	4	0	4	0	4	0	Yes
C	1	4	5	8	9	4	No
D	2	4	6	7	9	3	No
E	3	4	7	4	7	0	Yes
F	2	7	9	7	9	0	Yes

**Answer: 5(b)**

The total test time = (100 tubes) \times 2,000 hours = 200,000 tube- hours.

There are two tubes which have failed and hence the total time is to be adjusted for the number of hours lost due to the failures during the testing.

The lost hours are computed as $2 \times \frac{2,000}{2} = 2,000$ hours.

The assumption is made here is that each of the failed tubes have lasted average of half of the test period.

Therefore, the test shows that there are two failures during $(2,00,000 - 2,000) = 1,98,000$ tube hours of testing.

During 365 days a year (four hours a day) for 10,000 tubes the number of expected failures

$\frac{2}{1,98,000} \times 10,000 \times 365 \times 4 = 147.47$ tubes approximately.

Mean time between failures = $\frac{1,98,000 \text{ tubes hrs. of testing}}{2 \text{ failure}} = 99,000 \text{ tubes hours per failure}$

failure = $99,000/4 \times 365 = 67.8$ tubes year per failure.

Section – B**6. Choose the correct answer:**

[1*6]

(i) McKinsey's 7-s Framework does not include

- A. Skills
- B. Structure
- C. SBU

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D. Shared Values.

- (ii) Typical profits are highest in which stage of the industry life-cycle?
- Introduction
 - Growth
 - Maturity
 - Decline
- (iii) A strategic business unit (SBU) is defined as a division of an organization:
- That help in the marketing operations
 - That enable managers to have better control over the resources
 - The help in the choice of technology
 - That help in the allocation of scarce resources
 - That help in identifying talents and potentials of people
- (iv) Intensity of competition is _____ in low return industries
- low
 - non - existent
 - high
 - not important dependent on industry nature
- (v) Successful differentiation strategy allows the company to:
- gain buyer loyalty to its brands
 - charge too high a price premium
 - depend only on intrinsic product attributes
 - have product quality that exceeds buyers needs
 - segment a market in to distinct group of buyer
- (vi) What are enduring statements of purpose that distinguish one business from other similar firms?
- Policies
 - Mission statements
 - Objectives
 - Rules
 - Nature of ownership

Answer: 6

- (i) C
- (ii) C
- (iii) B
- (iv) C
- (v) A
- (vi) B

Answer any one question from the following:

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7. (a) Discuss the different types of organizational structures. [6]
 (b) Enlist the advantage of Strategic Management. [6]

Answer: 7 (a)

The different types of **Organisational Structure** are stated below.

- **Functional Structure**

The **Functional Structure** is characterized by the simultaneous combination of similar activities and the separation of dissimilar activities on the basis of function. The functional organization form is one of the most common organizational structures found in firms pursuing strategy of concentration or very high relatedness. A **Functional Structure** is most appropriate when the organization is small to medium in terms of size and relatively stable.

- **Geographic Structure**

Another basic form structural grouping is **Geographic Structure** in which activities and personnel are grouped in terms of specific geographic locations. Each geographic unit includes all functions required to produce and market products in that region.

- **Organization Structure**,

According to geographic areas or territories, is rather a common structural form for the large-scale enterprises whose strategies need to be tailored keeping in mind the particular needs and features of different geographic locations.

- **Matrix Structure**

Another way to achieve focus on multiple outcomes is to go for the **Matrix Structure**. The **Matrix Structure** creates a dual chain of command; two lines of budget authority and two sources of performance and reward. The key feature of the **Matrix Structure** is that the product (or the business) and functional lines of authority are overlaid to form a Matrix or grid between the product manager and the functional manager.

- **Hybrid Organization**

A single type of structural design is not always sufficient to meet the requirements of the strategy. When this occurs, one option is to mix and blend the basic organizations forms, matching structure to strategy, requirement by requirement and unit by unit.

Hybrid Structure is a form of departmentalization that adopts parts of both functional structure and divisional structure at the same level of management.

The potential advantage of the **Hybrid Structure** is that the combination may allow the firm to gain the advantages offered by the primary structures while, at least, diminishing the impact of the disadvantages.

Answer: 7 (b)

The Advantages of Strategic Management

- **Discharges Board Responsibility**

The first reason that most organizations state for having a strategic management process is that it discharges the responsibility of the Board of Directors.

- **Forces an Objective Assessment**

Strategic management provides a discipline that enables the board and senior management to actually take a step back from the day-to-day business to think about the future of the organization. Without this discipline, the organization can become solely consumed with working through the next issue or problem without consideration of the larger picture.

- **Provides a Framework for Decision-Making**

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Strategy provides a framework within which all staff can make day-to-day operational decisions and understand that those decisions are all moving the organization in a single direction.

- **Supports Understanding & Buy-In**

Allowing the board and staff participation in the strategic discussion enables them to better understand the direction, why that direction was chosen, and the associated benefits. For some people simply knowing is enough; for many people, to gain their full support requires them to understand.

- **Enables Measurement of Progress**

A strategic management process forces an organization to set objectives and measures of success. The setting of measures of success requires that the organization first determine what is critical to its ongoing success and then forces the establishment of objectives and keeps these critical measures in front of the board and senior management.

8. (a) Distinguish between Strategic Planning and Strategic Management. [6]

(b) Discuss about 'Marketing Mix'. [6]

Answer: 8 (a)

Strategic Management and Strategic Planning : Distinction

The basic difference between Strategic management and Strategic planning are as follows:

Strategic Management	Strategic Planning
1. It is focused on producing strategic results; new markets; new products; new technologies etc.	1. It is focused on making optimal strategic decisions.
2. It is management by results.	2. It is management by plans.
3. It is an organizational action process.	3. It is an analytical process.
4. It broadens focus to include psychological, sociological and political variables.	4. It is focused on business, economic and technological variables.
5. It is about choosing things to do and also about the people who will do them.	5. It is about choosing things to do.

Answer: 8 (b)

Marketing mix is the pack of four sets of variables namely, product variables, price variables, promotion variables and place variable.

—Marketing Mix refers to the appointment of effort, the combination, designing and integration of the elements of marketing into a programme or mix which, on the basis of an appraisal of the market forces will best achieve the objectives of an enterprise at a given time.

Kotler defines the marketing mix as the set of controllable variables and their levels that the firm uses to influence the target market. Such variables are:

- (i) Product
- (ii) Place
- (iii) Price and
- (iv) Promotion

In addition, for service—there are three more P's

They are:

- (i) People

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- (ii) Processes and
- (iii) Physical evidence.

9. Write a short note of the following three questions:

[4*3]

- (a) **Strategic Management Framework;**
- (b) **Mc Kinsey's 7-s Frame work;**
- (c) **Business Process Re-engineering;**
- (d) **Matrix Organization Structure.**

Answer: 9

(a) Strategic Management Framework:

The basic framework of strategic management involves five stages:

Stage 1: In this stage, organisation analyse about their present situation in terms of their Strengths, Weaknesses, Opportunities and Threats.

Stage 2: In this stage, organisations setup their missions, goals and objectives by analysing where they want to go in future.

Stage 3: In this stage organisation analyses various strategic alternatives to achieve their goals and objectives. The alternatives are analysed in terms of what business portfolio/product mix to adopt, expansion, merger, acquisition and divestment options etc are analysed to achieve the goals.

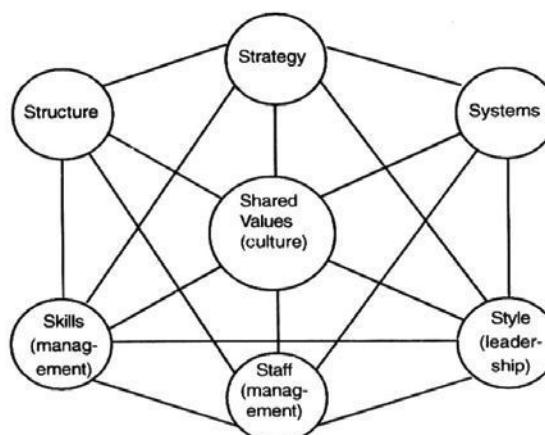
Stage 4: In this organisations select the best suitable alternatives in line with their SWOT analysis .

Stage 5: This is implementation stage in which organisation implement and execute the selected alternatives to achieve their strategic goals and objectives.

Stage 1: Where are we now? Analysis of present situation
Stage 2: Where we want to go? Setting goals and objectives for future
Stage 3: Analyses of various alternatives to achieve the goals and objectives
Stage 4: Selecting best alternatives in line with strengths of organisation
Stage 5: Implementing and executing the selected alternatives and monitoring of the same overtimes

(b) Mc Kinsey's 7-s Frame work:

Strategy is dependent on many variables – Internal as well as external. All factors are interrelated.



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The McKinsey Company, a well known management consultancy firm in the United States, towards the end of 1970s was asked to find a solution to this knotty issue. The researchers Peters and Waterman found after examining America's best run companies that the problem in strategy lay in its implementation and structure was only one lever in the hands of management. The other levers were systems, staff, style, skills and superordinate goals. A strategy is usually successful when the other S's in the 7-S framework fit into or support the strategy.

Strategy: A set of decisions and actions aimed at gaining a sustainable competitive advantage.

- **Structure:** The organisation chart and associated information that shows who reports to whom and how tasks are both divided and integrated.
- **Systems:** The flow of activities involved in the daily operation of a business, including its core processes and its support systems.
- **Style:** How managers collectively spend their time and attention and how they use symbolic behaviour. How management acts is more important than what management says.
- **Staff:** How companies develop employees and shape basic values.

(c) Business Process re- engineering:

It is a business management strategy, originally pioneered in the early 1990s, focusing on the analysis and design of workflows and processes within an organisation. **Business Process Reengineering (BPR)** aims to help organisations fundamentally rethink how they do their work in order to dramatically improve customer service, cut operational costs, and become world-class competitors. **BPR** seeks to help companies radically restructure their organisations by focusing on the ground-up design of their business processes. It involves the redrawing of organisational boundaries, the reconsideration of jobs, tasks, and skills. This occurs with the creation and the use of models. Whether those are physical models or mathematical/ computer/ structural models, the engineers build and analyse models to predict the performance of designs or to understand the behaviour of devices. More specifically, **BPR** is defined as the use of scientific methods, models and tools to bring about the radical restructuring of an enterprise. That results in significant improvements in performance. Redesign, retooling and reorchestrating form the key components of **BPR** that are essential for an organisation to focus on the outcome that it needs to achieve.

(d) Matrix Organization Structure

To achieve focus on multiple outcomes is with the matrix structure. The matrix structure creates a dual chain of command; two lines of budget authority and two sources of performance and reward. The key feature of the matrix is that product (or business) and functional lines of authority are overlaid to form a matrix or grid, between the product manager and functional manager.

Paper 9 – OPERATIONS MANAGEMENT

&

STRATEGIC MANAGEMENT

Paper 9- OPERATIONS MANAGEMENT & STRATEGIC MANAGEMENT

Full Marks: 100

Time allowed: 3 hours

The figures in the margin on the right side indicate full marks.

This question paper has two sections.

Both the sections are to be answered subject to instructions given against each.

Section – A

1. (a) Choose the correct answer: [1x10=10]

- (i) The lead-time is the time :
 - (a) To place holders for materials
 - (b) Time of receiving materials
 - (c) Time between receipt of material and using materials,
 - (d) Time between placing the order and receiving the materials
- (ii) Variety reduction is generally known as :
 - (a) Less varieties
 - (b) Simplification
 - (c) Reduced varieties
 - (d) None of the above
- (iii) To activity of specifying when to start the job and when to end the job is known as :
 - (a) Planning
 - (b) Scheduling
 - (c) Timing
 - (d) Follow-up
- (iv) Routine and Scheduling becomes relatively complicated in
 - (a) Job production
 - (b) Batch production
 - (c) Flow production
 - (d) Mass production
- (v) The scope of production planning and control is :
 - (a) Limited to production of products only
 - (b) Limited to production of services only
 - (c) Limited to production of services and products only
 - (d) Unlimited, can be applied to any type of activity
- (vi) The first stage in production planning is :
 - (a) Process Planning
 - (b) Factory planning
 - (c) Operating planning
 - (d) Layout planning
- (vii) One of the product examples for Line Layout is :
 - (a) Repair Workshop
 - (b) Welding Shop
 - (c) Engineering College
 - (d) Cement

(viii) Cost reduction can be achieved through :

- (a) Work sampling
- (b) Value analysis
- (c) Quality assurance
- (d) Supply chain management

(ix) Which of the following stages of Product Life Cycle does attribute beginning of substantial increase in Sales and Profits?

- (a) Introduction
- (b) Growth
- (c) Maturity
- (d) Decline

(x) Reliability and per unit cost of which of the following spares are less?

- (a) Regular spares
- (b) Insurance spares
- (c) Capital spares
- (d) Rotable spares

(b) Match the products in column-I with production centers in column -II:

[1x6=6]

I	II
(A) Furniture	(a) Assembly line
(B) Hydro-electricity	(b) Refinery
(C) Television set	(c) Carpentry
(D) Cement	(d) Turbo-Alternator
(E) Aviation Fuel	(e) Rotary Kiln
(F) Tools	(f) Machine shop

(c) State whether the following statements are True or False:

[1x6=6]

- (i) A good materials handling system always consists of conveyors ()
- (ii) Increase in productivity leads to retrenchment of work force ()
- (iii) Project costs increase as the duration of the project increases ()
- (iv) Break-even analysis a management tool ()
- (v) There is a limit beyond which labour productivity cannot be improved ()
- (vi) Breakdown maintenance doesn't require use of standby machines ()

Answer:

1. (a) (i) (d)
- (ii) (b)
- (iii) (b)
- (iv) (b)
- (v) (d)
- (vi) (b)
- (vii) (d)
- (viii) (b)
- (ix) (b)
- (x) (a)

(b)

I	II
(A) Furniture	(c) Carpentry
(B) Hydro-electricity	(d) Turbo-Alternator
(C) Television set	(a) Assembly line
(D) Cement	(e) Rotary Kiln
(E) Aviation Fuel	(b) Refinery
(F) Tools	(f) Machine shop

- | | |
|---------|-----|
| (c) (i) | (F) |
| (ii) | (T) |
| (iii) | (T) |
| (iv) | (T) |
| (v) | (T) |
| (vi) | (F) |

Answer any three questions from the following:**[3x16=48]****2. (a) What is forecasting? What are its advantages? [8]**

(b) M/s Kobo Bearings Ltd., is committed to supply 24,000 bearings per annum to M/s. Deluxe Fans on a steady daily basis. It is estimated that it costs 10 paisa as inventory holding cost per bearing per month and that the setup cost per run of bearing manufacture is ₹ 324.

- (i) What is the optimum run size for bearing manufacture?**
- (ii) What should be the interval between the consecutive Optimum runs?**
- (iii) Find out the minimum inventory holding cost.**

[8]**Answer:**

2. (a) Forecasting is the process of making statements about events whose actual outcomes (typically) have not yet been observed.

A Forecast is a prediction of future events and their quantification for planning purposes. Forecasting involves the estimation of the trend in future variables sales, tastes or profit using both quantitative and judgment techniques whereas extrapolation is a purely statistical exercise. Forecasting includes the assessment of environmental changes and in this respect, forecasting assist in obtaining strategic fit.

The strategic environment of the firm consists of economic, political, legal, social and technological factors, which influence the ability of the organization to survive and make profits, examples of environmental variables with which a fit must be achieved include the following:

- (a) The changing tastes of the customers
- (b) Developments in the market demand for a product
- (c) The likely trend of interest and exchange rates.

Forecasting can be more than just a numerical exercise on estimated trends. Whilst trends in price, interest rates, market growth rates and margins will involve numbers, other forecast does not;

- (i) Value profiles are long range forecasts of consumers and social attitudes.
- (ii) Geopolitical forecasts consider changes in national economic power and can alert the firm to new markets or potential competitive threats.

After all, the forecast that 'the political situation is unstable' is not quantitative but it would be relevant.

The important role which Forecasting plays in strategic planning is therefore to forewarn managers of possible changes in environmental factors. The long-term nature of strategic change means that effective forecasting is necessary to give the organization time to adopt and obtain a good fit with its environment.

(b) (a) Optimum run size or Economic Batch Quantity (EBQ)

$$= \sqrt{\frac{2 \times \text{Annual Output} \times \text{Setup Cost}}{\text{Annual Cost of Carrying one unit}}} = \sqrt{\frac{2 \times 24000 \times 324}{0.10 \times 12}} = 3600 \text{ units}$$

$$\begin{aligned}
 \text{(b) Interval between two consecutive optimum runs} &= \frac{\text{EBQ}}{\text{Monthly Output}} \times 3 \\
 &= \frac{3600}{24000 \div 12} \times 30 = 54 \text{ Calendar days}
 \end{aligned}$$

$$\begin{aligned}
 \text{(c) Minimum inventory holding cost} &= \text{Average inventory} \times \text{Annual carrying cost of} \\
 &\quad \text{one unit of inventory} \\
 &= (3600 \div 2) \times 0.10 \times 12 = ₹ 2,160.
 \end{aligned}$$

3. (a) What does Product Design do? Discuss – Process design and selection. [6]

(b) A department works on 8 hours shift, 288 days a year and has the usage data of a machine, as given below:

Product	Annual Demand (units)	Processing time (standard time in hours)
A	325	5.0
B	450	4.0
C	550	6.0

Calculate:

- (a) Processing time needed in hours to produce product A, B and C,
- (b) Annual production capacity of one machine in standard hours, and
- (c) Number of machines required.

[10]

Answer:

3. (a) The activities and responsibilities of product design include the following:

- (i) Translating customer needs and wants into product and service requirements (marketing).
- (ii) Refining existing products (marketing).
- (iii) Developing new products (marketing, product design and production).
- (iv) Formulating quality goals (quality assurance, production).
- (v) Formulating cost targets (accounting).
- (vi) Constructing and testing prototype (marketing, production).
- (vii) Documenting specifications (product design).

Process Design is concerned with the overall sequences of operations required to achieve the product specifications. It specifies the type of work stations to be used, the machines and equipments necessary to carry out the operations. The sequence of operations are determined by (a) the nature of the product, (b) the materials used, (c) the quantities to be produced and (d) the existing physical layout of the plant.

The process design is concerned with the following:

- (i) Characteristics of the product or service offered to the customers.
- (ii) Expected volume of output.
- (iii) Kinds of equipments and machines available in the firm.
- (iv) Whether equipments and machines should be of special purpose or general purpose.
- (v) Cost of equipments and machines needed.
- (vi) Kind of labour skills available, amount of labour available and their wage rates.
- (vii) Expenditure to be incurred for manufacturing processes.
- (viii) Whether the process should be capital-intensive or labour-intensive.
- (ix) Make or buy decision.
- (x) Method of handling materials economically.

- (b) Step 1:** Calculate the processing time needed in hours to produce product x, y and z in the quantities demanded using the standard time data.

Product	Annual demand (units)	Standard processing per unit (Hrs.)	Processing needed (Hrs.)
X	300	4.0	$300 \times 4 = 1200$ Hrs.
Y	400	6.0	$400 \times 6 = 2400$ Hrs.
Z	500	3.0	$500 \times 3 = 1500$ Hrs.
			Total = 5100 Hrs

Step 2 : Annual production capacity of one machine in standard hours = $8 \times 250 = 2000$ hours per year

Step 3 : Number of machines required = $\frac{\text{Work load per year}}{\text{Production capacity per machine}} = \frac{5100}{2000} = 2.55$ machines = 3 machines.

4. (a) Priyanshu enterprise has three factories at locations A, B and C which supply three warehouses located at E, E and F. Monthly factory capacities are 10, 80 and 15 units respectively. Monthly warehouse requirements are 75, 20 and 50 units respectively. Unit shipping costs (in ₹) are given in the following table :

	To	D	E	F
	A	5	1	7
From	B	6	4	6
	C	3	2	5

The penalty costs for satisfying demand at the warehouses D, E and F are ₹ 5, ₹ 3 and ₹ 2 per unit respectively. Determine the optimum distribution for Priyanshu, using any of the known algorithms. [10]

- (b) A small retailer has studied the weekly receipts and payments over the past 200 weeks and has developed the following set of information: [6]

Weekly Receipts (₹)	Probability	Weekly Payments (₹)	Probability
3,000	0.20	4,000	0.30
5,000	0.30	6,000	0.40
7,000	0.40	8,000	0.20
12,000	0.10	10,000	0.10

Using the following set of random numbers, simulate the weekly pattern of receipts and payments for the 12 weeks of the next quarter, assuming further that the beginning bank balance is ₹ 8,000. what is the estimated balance at the end of the 12 weekly period? What is the highest weekly balance during the quarter? What is the average weekly balance for the quarter?

Answer:

4. (a)

	D	E	F		
A	5	1	7	10/0	4*
B	6	4	6	80/0	2/2/2
C	3	2	5	15/0	1/1/1
Dummy	5	3	2	40/0	1/1
	75	20	50		
	60	10	10		
	0	0	0		
	2	1	3		
	2	1	3*		
	3*	2	1		

$$\begin{array}{r}
 \hline
 75 & 20 & 50 \\
 \hline
 60 & 10 & 10 \\
 \hline
 0 & 0 & 0 \\
 \hline
 2 & 1 & 3 \\
 \hline
 2 & 1 & 3* \\
 \hline
 3* & 2 & 1
 \end{array}$$

Since there are $m+n-1$ allocations optimality test can be performed.
Since $\Delta_{ij} \geq 0$, the solution is optimum.

			U
	5	1	0
	3	10	0
	6	4	0
60	10	10	-3
	3	2	-3
15	1	5	-4
	5	3	
	3	3	
V	6	4	
	4	6	

		Quantity	Minimum Cost
A	E	10 x 1	10
	D	60 x 6	360
B	E	10 x 4	40
	F	10 x 6	60
C	D	15 x 3	45
Dummy	F	40 x 2	80
		145	₹ 595 (including Penalty cost of ₹ 80)

(b)

Range of random numbers							
Receipt (₹)	Probability	Cumulative probability	Range	Payments (₹)	Probability	Cumulative probability	Range
3000	0.20	0.20	0-19	4000	0.30	0.30	0-29
5000	0.30	0.50	20-49	6000	0.40	0.70	30-69
7000	0.40	0.90	50-89	8000	0.20	0.90	70-89
12000	0.10	1.00	90-99	10000	0.10	1.00	90-99

Simulation of Data for a period of 12 weeks					
Week	Random No. for receipt	Expected Receipt (₹)	Random No. for payment	Expected Payment (₹)	Week end Balance (₹)
Opening Balance					8000
1	03	3000	61	6000	5000 (8000 + 3000 - 6000)
2	91	12000	96	10000	7000
3	38	5000	30	6000	6000
4	55	7000	32	6000	7000
5	17	3000	03	4000	6000
6	46	5000	88	8000	3000
7	32	5000	48	6000	2000
8	43	5000	28	4000	3000
9	69	7000	88	8000	2000
10	72	7000	18	4000	5000
11	24	5000	71	8000	2000
12	22	5000	99	10000	(3000)

Estimated balance at the end of 12th week = ₹ (3,000)

Highest balance = ₹ 7,000

Average balance during the quarter = 45,000/12 = ₹ 3,750

5. (a) The following table gives data on normal time & cost and crash time & cost for a project.

Activity	Normal		Crash	
	Time (days)	Cost (₹)	Time (days)	Cost (₹)
1 – 2	6	600	4	1,000
1 – 3	4	600	2	2,000
2 – 4	5	500	3	1,500
2 – 5	3	450	1	650
3 – 4	6	900	4	2,000
4 – 6	8	800	4	3,000
5 – 6	4	400	2	1,000
6 – 7	3	450	2	800

The indirect cost per day is ₹100.

1. Draw the network and identify the critical path.
2. What are the normal project duration and associated cost?

[8]

- (b) A firm is using a machine whose purchase price is ₹15,000. The installation charges amount to ₹ 3,500 and the machine has a scrap value of only ₹1,500 because the firm has a monopoly of this type of work. The maintenance cost in various years is given in the following table:

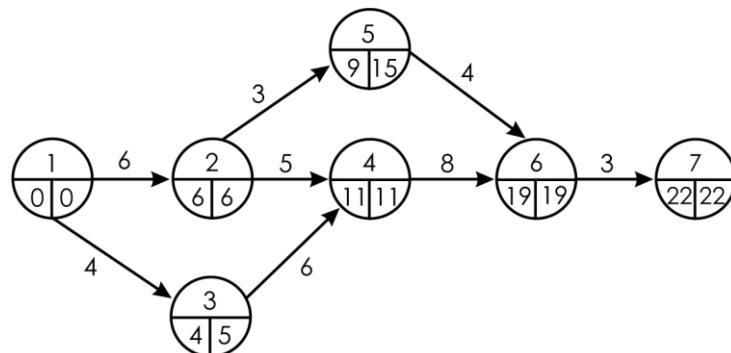
[8]

Year	1	2	3	4	5	6	7	8	9
Maintenance Cost (₹)	260	760	1100	1600	2200	3000	4100	4900	6100

The firm wants to determine after how many years should the machine be replaced on economic considerations, assuming that the machine replacement can be done only at the year end.

Answer:

5. (a) (i) The network for normal activity times indicates a project time of 22 weeks with the critical path 1-2-4-6-7.



- (ii) Normal project duration is 22 weeks and the associated cost is as follows:

$$\begin{aligned}\text{Total cost} &= \text{Direct normal cost} + \text{Indirect cost for 22 weeks.} \\ &= 4,700 + 100 \times 22 = ₹ 6,900.\end{aligned}$$

- (b) Cost of machine, $C = ₹ 15,000 + ₹ 3,500 = ₹ 18,500$
Scrap value, $S = ₹ 1,500$.

Year	Maintenance Cost, M_1 (₹)	Cumulative Maintenance Cost, ΣM_1 (₹)	$C - S$ (₹)	Total Cost $T_{(n)}$ (₹)	Annual Cost $A_{(n)}$ (₹)
(i)	(ii)	(iii)	(iv)	(v) = (iii) + (iv)	(vi) = (v)/n
1	260	260	17,000	17,260	17,260
2	760	1,020	17,000	18,020	9,010
3	1,100	2,120	17,000	19,120	6,373
4	1,600	3,720	17,000	20,720	5,180
5	2,200	5,920	17,000	22,920	4,584
6	3,000	8,920	17,000	25,920	4,320
7	4,100	13,020	17,000	30,020	4,288*
8	4,900	17,920	17,000	34,920	4,365
9	6,100	24,020	17,000	41,020	4,557

Lowest average cost is ₹4,288 approx., which corresponds to $n = 7$ in above table.
Thus machine needs to be replaced every 7th year.

Section – B

6. Choose the correct answer:

[6x1=6]

- (i) Benchmarking is :
- The analytical tool to identifying high cost activities based on the 'Pareto Analysis'
 - The search for industries best practices that lead to superior performance
 - The simulation of cost reduction schemes that help to build commitment and improvement of actions
 - The process of marketing and redesigning the way a typical company works
 - The framework that earmarks a linkage with suppliers and customers

- (ii) Question mark in BCG Matrix is an investment, which :
 (a) Yields low current income but has bright growth prospects
 (b) Yields high current income and has bright growth prospects
 (c) Yields high current income and has bleak growth prospects
 (d) Yields low current income and has bleak growth prospects
- (iii) Directional policy matrix is the same as :
 (a) the BCG model
 (b) the 9 – cell GE matrix
 (c) the life cycle portfolio analysis
 (d) the PIMS matrix
 (e) the 3x3 competitive positioning matrix
- (iv) For an entrepreneur :
 (a) Vision is before the mission
 (b) Mission is before the vision
 (c) Both are developed simultaneously
 (d) Division or mission are un-important issue
 (e) Profitability is most crucial
- (v) Indian Airlines decreasing the airfare on the Delhi – Mumbai sector following the introduction of the no frills airlines would be an example of
 (a) Cost leadership
 (b) Price leadership
 (c) Product differentiate
 (d) Focus
 (e) Market retention
- (vi) A product line is a group of product that
 (a) are closely related
 (b) are marketed through the same channel
 (c) perform a similar function for being sold to the same customers
 (d) All of the above

Answer:

6. (a) (i) (b)
 (ii) (a)
 (iii) (b)
 (iv) (a)
 (v) (b)
 (vi) (d)

Answer any one question from the following:**[1x12=12]****7. (a) What do you mean by strategy? Discuss its features.****[5]****(b) Discuss Contingency Planning & its seven steps?****[7]****Answer:****7. (a) STRATEGY:**

Strategy is all about integrating organizational activities and utilizing and allocating the scarce resources within the organizational environment so as to meet the present objectives. While planning a strategy it is essential to consider that decisions are not taken in a vacuum and that any act taken by a firm is likely to be met by a reaction from those affected, competitors, customers, employees or suppliers.

Strategy can also be defined as knowledge of the goals, the uncertainty of events and the need to take into consideration the likely or actual behavior of others. Strategy is the outline of decisions in an organization that shows its objectives and goals, reduces the key policies, and plans for achieving these goals, and defines the business the company is to carry on, the type of economic and human organization it wants to be, and the contribution it plans to make to its shareholders, customers and society at large.

Features of Strategy:

- (i) Strategy is important to foresight, the uncertain events of firms/industries .
- (ii) Strategy deals with long term developments rather than routine operations. For example innovations or new products, new methods of productions, or new markets to be developed in future.
- (iii) Strategy is created to deal behavior of customers and competitors.
- (iv) Strategy is a well defined roadmap of an organization. It defines the overall mission, vision and direction of an organization. The objective of a strategy is to maximize an organization's strengths and to minimize the strengths of the competitors.

(b) Contingency plans can be defined as alternative plans that can be put into effect if certain key events do not occur as expected. Only high-priority areas require the insurance of contingency plans. Strategists cannot and should not try to cover all bases by planning for all possible contingencies. But in any case, contingency plans should be as simple as possible.

Steps in Contingency Planning

Robert Linnemann and Rajan Chandran have suggested that a seven step process as follows:

Step 1 - Identify the beneficial and unfavourable events that could possibly derail the strategy or strategies.

Step 2 - Specify trigger points. Calculate about when contingent events are likely to occur.

Step 3 - Assess the impact of each contingent event. Estimate the potential benefit or harm of each contingent event.

Step 4 - Develop contingency plans. Be sure that contingency plans are compatible with current strategy and are economically feasible.

Step 5 - Assess the counter impact of each contingency plan. That is, estimate how much each contingency plan will capitalize on or cancel out its associated contingent event. Doing this will quantify the potential value of each contingency plan.

Step 6 - Determine early warning signals for key contingency event. Monitor the early warning signals.

Step 7 - For contingent event with reliable early warning signals, develop advance action plans to take advantage of the available lead time.

8. (a) Discuss various stages in strategic planning.

[6]

(b) Define SBU. What are its merits & demerits?

[6]

Answer:

(8) (a) The stages in strategic planning are given below:

Stage I - Strategic Option Generations

At this stage, a variety of alternatives are considered, relating to the firm's product and markets, its competitors and so forth. Examples of strategies might be:

- (a) increase market share
- (b) penetration into international market

- (c) concentration on core competencies
- (d) acquisition or expansion etc.

Stage II - Strategic Options Evaluation

Each option is then examined on its merits.

- (a) does it increase existing strengths ?
- (b) does it alleviate existing weaknesses ?
- (c) is it suitable for the firm's existing position ?
- (d) is it acceptable to stakeholders ?

Stage III - Strategic Selection

It involves choosing between the alternative strategies. This process is strongly influenced by the values of the managers in selecting the strategies.

- (b) SBU groups similar divisions into "Strategic Business Units" and then delegate's authority and responsibility of each unit to a senior executive who is normally identified as CEO or MD of that SBU. It is an extension of Divisional structure.

SBU Structure

Big organisation like Unilever, etc have many SBUs for their different categories of products like Cosmetics, Food products and Beverages, etc, and each is managed through separate unit head.

Advantages:

- (i) Promotes accountability since units' heads are responsible for individual SBU profitability
- (ii) Career development opportunities are further higher in this structure
- (iii) Allow better control of categories of products manufacturing, marketing and distributions
- (iv) Helps to expand in different related and unrelated businesses

Disadvantages:

- (i) May provide inconsistent approach to tackle customers, etc, because each unit may work in its own way to handle situations
- (ii) High cost approach

9. Write a short note on any of the following three questions:

[3x4=12]

- (a) SWOT Analysis;
- (b) BCG Matrix;
- (c) Strategic Planning;
- (d) Market Penetration Strategy.

Answer:

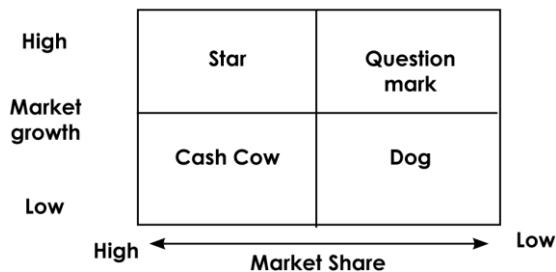
9. (a) Swot Analysis:

Gathering data about the general, operating, and internal environments provides the raw material from which to develop a picture of the organisational environment.

SWOT analysis refines this body of information by applying a general framework for understanding and managing the environment in which an organisation operates. (The acronym SWOT stands for Strengths, Weaknesses, Opportunities, and Threats.) In many respects, the sophisticated analytical techniques discussed throughout the text are further refinements of basic SWOT analysis. In addition, students have repeatedly told us that SWOT is an excellent way to begin a case analysis. SWOT analysis attempts to assess the internal strengths and weaknesses of an organisation and the opportunities and threats that its external environment presents. SWOT seeks to isolate the major issues facing an organisation through careful analysis of each of these four elements. Managers can then formulate strategies to address key issues.

(b) Boston Matrix:

The Boston Consulting Group (BCG)'s matrix analyses 'products and businesses by market share and market growth.'



This growth/share matrix for the classification of products into cash cows, dogs, rising stars and question marks is known as the Boston classification for product-market strategy.

- (i) Stars are products with a high share of a high growth market. In the short term, these require capital expenditure, in excess of the cash they generate, in order to maintain their market position, but promise high returns in the future.
- (ii) In due course, however, stars will become cash cows, with a high share of a low-growth market. Cash cows need very little capital expenditure and generate high levels of cash income. The important strategic feature of cash cows is that they are already generating high cash returns, which can be used to finance the stars.
- (iii) Question marks are products in a high-growth market, but where they have a low market share. A decision needs to be taken about whether the products justify considerable capital expenditure in the hope of increasing their market share, or whether they should be allowed to 'die' quietly as they are squeezed out of the expanding market by rival products. Because considerable expenditure would be needed to turn a question mark into a star by building up market share, question marks will usually be poor cash generators and show a negative cash flow.
- (iv) Dogs are products with a low share of a low growth market. They may be ex-cash cows that have now fallen on hard times. Dogs should be allowed to die, or should be killed off. Although they will show only a modest net cash outflow, or even a modest net cash inflow, they are 'cash traps' which tie up funds and provide a poor return, on investment, and not enough to achieve the organisation's target rate of return.

(c) Strategic Planning

It is important to operate a planning process which will not only produce realistic and potentially rewarding plans but will also secure the support of all those involved in implementing them. There are three approaches that can be adopted to strategic planning:

- (i) A top-down process, in which managers are given targets to achieve which they pass on down the line.
- (ii) A bottom-up process, in which functional and line managers in conjunction with their staff submit plans, targets and budgets for approval by higher authority.
- (iii) An iterative process, which involves both the top-down and bottom-up setting of targets. There is a to-and-from movement between different levels until agreement is reached. However, this agreement will have to be consistent with the overall mission, objectives and priorities and will have to be made within the context of the financial resources available to the organization. The iterative approach, which involves the maximum number of people, is the one most likely to deliver worthwhile and acceptable strategic plans.

(d) Market Penetration Strategy:

		Products	
		Existing	New
Markets	Existing	Market penetration	Product development
	New	Market development	Diversification ➤ Related ➤ unrelated

Firm increases its sales in its present line of business. This can be accomplished by:

- (i) price reductions;
- (ii) increases in promotional and distribution support;
- (iii) acquisition of a rival in the same market;
- (iv) modest product refinements.

These strategies involve increasing the firm's investment in a product/market and so are generally only used in markets which are growing, and hence the investment may be recouped. In this respect the strategy is similar to invest to build and holding strategy as described by the Boston Consulting Group.

**Paper 9 – OPERATIONS MANAGEMENT
&
STRATEGIC MANAGEMENT**

Paper 9- OPERATIONS MANAGEMENT & STRATEGIC MANAGEMENT**Full Marks: 100****Time allowed: 3 hours****The figures in the margin on the right side indicate full marks.****This question paper has two sections.****Both the sections are to be answered subject to instructions given against each.****Section – A****1. (a) Choose the correct answer: [1x10=10]**

- (i) The method used in scheduling a project is :
 - (a) A schedule of break-down of orders
 - (b) Outline master programme
 - (c) PERT & CPM
 - (d) Schedule for large and integrated work.

- (ii) MRP stands for :
 - (a) Material requirement planning
 - (b) Material reordering planning
 - (c) Material requisition procedure
 - (d) Material recording procedure

- (iii) Conversion of inputs into outputs is known as :
 - (a) Application of technology
 - (b) Operations management
 - (c) Manufacturing products
 - (d) Product

- (iv) Long range forecasting is useful in :
 - (a) plan for research and development
 - (b) to schedule jobs in job production
 - (c) in purchasing the material to meet the present production demand
 - (d) to access man power required in the coming month

- (v) JIT stands for :
 - (a) Just in time purchase
 - (b) Just in time production
 - (c) Just in time use of materials
 - (d) Just in time order the material

- (vi) The act of releasing the production documents to production department is known as :
 - (a) Routine
 - (b) Scheduling
 - (c) Expediting
 - (d) Dispatching

- (vii) Addition of value to raw materials through application of technology is :
 - (a) Product
 - (b) Production
 - (c) Advancement
 - (d) Transformation

- (viii) Arrangement of machines depending on sequence of operations happens in :
 - (a) Process Layout
 - (b) Product Layout
 - (c) Hybrid Layout
 - (d) Group Technology Layout

- (ix) The aims at finding the best and most efficient way of using the available resources-men, materials, money and machinery :
- Time Study
 - Work Study
 - Method Study
 - Job Evaluation
- (x) Most suitable layout for continuous production is :
- Line layout
 - Process layout
 - Group technology
 - Matrix layout

(b) Match the products in column-I with production centers in column -II

[1x6=6]

I	II
1. Electricity	(a) Blast Furnace
2. Petrol	(b) Generator
3. Iron	(c) Refinery
4. Cloth	(d) assembly Line
5. Car	(e) Smithy
6. Cotton Yarn	(f) Spinning Mill
7. Forgings	(g) Power Loom

(c) State whether the following statements are True or False:

[1x6=6]

- General purpose machine are less prone to obsolescence ()
- It is desirable to conduct work measurement after method study ()
- Increase in productivity leads to retrenchment of work force ()
- Increased productivity leads to cost reduction ()
- Activity sampling is not a technique of Job Evaluation ()
- Production planning and control is essentially concerned with the control of Finished goods ()

Answer

1. (a) (i) (c)
(ii) (a)
(iii) (c)
(iv) (a)
(v) (b)
(vi) (d)
(vii) (b)
(viii) (b)
(xi) (b)
(x) (a)

(b)

I	II
1. Electricity	(b) Generator
2. Petrol	(c) Refinery
3. Iron	(a) Blast Furnace
4. Cloth	(g) Power Loom
5. Car	(d) assembly Line
6. Cotton Yarn	(f) Spinning Mill
7. Forgings	(e) Smithy

- (c) (i) (T)
 (ii) (T)
 (iii) (F)
 (iv) (T)
 (v) (T)
 (vi) (F)

Answer any three questions from the following:

[3x16=48]

2. (a) What are the characteristics of modern operation function?

[8]

(b) With the help of following data project the trend of sales for the next five years:

Years	2002	2003	2004	2005	2006	2007
Sales (in lakhs)	100	110	115	120	135	140

[8]

Answer:

2. (a) Characteristics of Modern Operation Function:

The production management of today presents certain characteristics which make it look totally different from what it was during the past. Specifically, today's production system is characterised by at least four features.

1. Manufacturing as Competitive Advantage

In the past production was considered to be like any other function in the organisation. Where demand was high and production capacities were inadequate, the concern was to somehow muster all inputs and use them to produce goods which would be grabbed by market. But today's scenario is contrasting. Plants have excess capacities, competition is mounting and firms look and gain competitive advantage to survive and succeed. Interestingly, production system offers vast scope to gain competitive edge and firms intend to exploit the potential. Total Quality Management (TQM), Time-Based Competition, Business Process Re-engineering (BPRE), Just-in-Time (JIT), Focused Factory, Flexible Manufacturing Systems (FMS), Computer Integrated Manufacturing (CIM), and The Virtual Corporation are but only some techniques which the companies are employing to gain competitive advantage.

2. Services Orientation

As was stated earlier, service sector is gaining greater relevance these days. The production system, therefore, needs to be organised keeping in mind the peculiar requirements of the service component. The entire manufacturing needs to be geared to serve (i) intangible and perishable nature of the services, (ii) constant interaction with clients or customers, (iii) small volumes of production to serve local markets, and (iv) need to locate facilities to serve local markets. There is increased presence of professionals on the production, instead of technicians and engineers.

3. Disappearance of Smokestacks

Protective labour legislation, environmental movement and gradual emergence of knowledge based organisations have brought total transformation in the production system. Today's factories are aesthetically designed and built, environment friendly - in fact, they are homes away from homes. Going to factory everyday is no more excruciating experience, it is like holidaying at a scenic spot. A visit to ABB, L & T or Smith Kline and Beecham should convince the reader about the transformation that has taken place in the wealth creation system.

4. Small has Become Beautiful

It was E.F. Schumacher who, in his famous book *Small is Beautiful*, opposed giant organisations and increased specialisation. He advocated, instead, intermediate technology based on smaller working units, community ownership, and regional workplaces utilising local labour and resources. For him, small was beautiful. Businessmen, all over the world, did not believe in Schumacher's philosophy. Inspired by economies of scale, industrialists went in for huge organisations and mass production systems.

(b) Computation of trend values of sales

Year	Time deviations from the middle of 2004 and 2005 assuring 5 years = 1	Sales (in lakh ₹)	Squares of time deviation	Product of time deviation and sales
	X	Y	X ²	XY
2002	-5	100	25	-500
2003	-3	110	9	-330
2004	-1	115	1	-115
2005	+1	120	1	+120
2006	+3	135	9	+405
2007	+5	140	25	+700
n = 6	$\Sigma X = 0$	$\Sigma Y = 720$	$\Sigma X^2 = 70$	$\Sigma XY = 280$

Regression equation of Y on X:

$$Y = a + bX$$

To find the values of a and b

$$a = \frac{\sum Y}{n} = \frac{720}{6} = 120$$

$$b = \frac{\sum XY}{\sum X^2} = \frac{280}{70} = 4$$

Sales forecast for the next years, i.e., 2008 to 2012

$$Y_{2008} = 120 + 4(+7) = 120 + 28 = ₹ 148 \text{ lakhs}$$

$$Y_{2009} = 120 + 4(+9) = 120 + 36 = ₹ 156 \text{ lakhs}$$

$$Y_{2010} = 120 + 4(+11) = 120 + 44 = ₹ 164 \text{ lakhs.}$$

$$Y_{2011} = 120 + 4(+13) = 120 + 52 = ₹ 172 \text{ lakhs.}$$

$$Y_{2012} = 120 + 4(+15) = 120 + 60 = ₹ 180 \text{ lakhs.}$$

3. (a) Mention any six characteristics of a good Product Design.

[3+7=10]

(b) The following data is available for a manufacturing unit:

No. of operators	15
Daily working hours	8
No. of days per months	25
Std. production per month	300 units
Std. labour hours per unit	8

The following information was obtained for November 2015:

Man days lost due to absenteeism	30
Unit produced	240
Idle Time	276 man hours

Find the following:-

- Percent absenteeism
- Efficiency of utilization of labour
- Productive efficiency of labour
- Overall productivity of labour in terms of units produced per man per month. [6]

Answer:

3. (a) A good product design must ensure the following:

- (i) **Function or performance:** The function or performance is what the customer expects the product to do to solve his/her problem or offer certain benefits leading to satisfaction. For example, a customer for a motor bike expects the bike to start with a few kicks on the kick peddle and also expects some other functional aspects such as pick-up, maximum speed, engine power and fuel consumption etc.
- (ii) **Appearance or aesthetics:** This includes the style, colour, look, feel, etc. which appeals to the human sense and adds value to the product.
- (iii) **Reliability:** This refers to the length of time a product can be used before it fails. In other words, reliability is the probability that a product will function for a specific time period without failure.
- (iv) **Maintainability:** Refers to the restoration of a product once it has failed. High degree of maintainability is desired so that the product can be restored (repaired) to be used within a short time after it breaks down. This is also known as serviceability.
- (v) **Availability:** This refers to the continuity of service to the customer. A product is available for use when it is in an operational state. Availability is a combination of reliability and maintainability. High reliability and maintainability ensures high availability.
- (vi) **Productibility:** This refers to the ease of manufacture with minimum cost (economic production). This is ensured in product design by proper specification of tolerances, use of materials that can be easily processed and also use of economical processes and equipments to produce the product quickly and at a cheaper cost.
- (vii) **Simplification:** This refers to the elimination of the complex features so that the intended function is performed with reduced costs, higher quality or more customer satisfaction. A simplified design has fewer parts which can be manufactured and assembled with less time and cost. “
- (viii) **Standardisation:** Refers to the design activity that reduces variety among a group of products or parts. For example, group technology items have standardised design which calls for similar manufacturing process steps to be followed. Standard designs lead to variety reduction and results in economies of scale due to high volume of production of standard products. However, standardised designs may lead to reduced choices for customers.
- (ix) **Specification:** A specification is a detailed description of a material, part or product, including physical measures such as dimensions, volume, weight, surface finish etc. These specifications indicate tolerances on physical measures which provide production department with precise information about the characteristics of products to be produced and the processes and production equipments to be used to achieve the specified tolerances (acceptable variations).

Interchangeability of parts in products produced in large volumes (mass production and flow-line production) is provided by appropriate specification of tolerances to facilitate the desired fit between parts which are assembled together.

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(x) **Safety:** The product must be safe to the user and should not cause any accident while using or should not cause any health hazard to the user. Safety in storage, handling and usage must be ensured by the designer and a proper package has to be provided to avoid damage during transportation and storage of the product. For example, a pharmaceutical product while used by the patient, should not cause some other side effect threatening the user.

(Mention any six characteristics)

(b) No. of days per month	=	25
Daily working hrs	=	8
No. of operators	=	15
No. of Man days	=	$15 \times 25 = 375$ Man days.
Total working hrs.	=	$375 \times 8 = 3,000$
Hours lost in absenteeism	=	$30 \times 8 = 240$
(i) Percent absenteeism	=	$\frac{240 \text{ hrs.} \times 100}{3000 \text{ hrs.}} = 8\%$
(ii) Efficiency of utilisation of labour	=	$\frac{\text{Standard labour hour to produce 240 units}}{\text{Total labour hour}}$
	=	$\frac{240 \times 8}{3000} = 64\%$
(iii) Standard time required to produce 240 units	=	$240 \times 8 = 1920$ labour-hours.

In November, man hours lost	=	$30 \times 8 = 240$
„ „ „ idle time	=	<u>276</u>
Total loss of time	=	516 hours.
Productive hours available in November	=	3000
Less, Total loss of time	=	<u>516</u>
Actual labour-hours	=	2484 hours
Efficiency of labour	=	$\frac{\text{Std. Labour hrs.}}{\text{Actual Labour hrs.}} = \frac{1920 \times 100}{2484} = 77.3\%$

- (iv) 15 men produces 300 units,
 Std. labour productivity = $300/15 = 20$ units.
 In November, overall productivity = $240/15 = 16$ units. (Ans.)
 i.e., productivity falls by 25%.

4. (a) The following jobs have to be shipped a week from now (week has 5 working days)

Job	A	B	C	D	E	F
Number of day's work remaining	2	4	7	6	5	3

Sequence the jobs according to priority established by (a) least slack rule (b) critical ratio rule. [10]

(b) A book store wishes to carry 'Ramayana' in stock. Demand is probabilistic and replenishment of stock takes 2 days (i.e. if an order is placed on March 1, it will be delivered at the end of day on March 3). The probabilities of demand are given below:

Demand (daily)	0	1	2	3	4
Probability	0.005	0.10	0.30	0.45	0.10

Each time on order is placed, the store incurs an ordering cost of ₹10 per order. The store also incurs a carrying cost of ₹ 0.50 per book per day. The inventory carrying cost is calculated on the basis of stock at the end of each day.

The manager of the bookstore wishes to compare two options for his inventory decision.

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- A. Order 5 books when the inventory at the beginning of the day plus order outstanding is less than 8 books.
- B. Order 8 books when the inventory at the beginning of the day plus order outstanding is less than 8.

Currently (beginning 1st day) the store has a stock of 8 books plus 6 books ordered two days ago and expected to arrive next day.

Using Monte-Carlo Simulation for 10 cycles, recommend, which option the manager, should choose

The two digit random numbers are given below:

89	34	70	63	61	81	39	16	13	73
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[6]

Answer:

4. (a) (a) Calculation of slack :

Number of days until due date is 5 days for all jobs

Job	Slack	(days)
A	5 - 2	= 3
B	5 - 4	= 1
C	5 - 7	= (-2)
D	5 - 6	= (-1)
E	5 - 5	= 0
F	5 - 3	= 2

Sequence :

C	D	E	B	F	A
-2	-1	0	1	2	3

- (b) Calculation of Critical ratio:

$$\text{Critical ratio} = \frac{\text{Due Date} - \text{Date Now}}{\text{Lead Time Remaining}} = \frac{\text{DD} - \text{DN}}{\text{LTR}} = \frac{\text{Available Time}}{\text{Operation Time}}$$

$$\text{Critical ratio for job A} = 5/2 = 2.5$$

$$\text{Critical ratio for job B} = 5/4 = 1.25$$

$$\text{Critical ratio for Job C} = 5/7 = 0.71$$

$$\text{Critical ratio for job D} = 5/6 = 0.83$$

$$\text{Critical ratio for job E} = 5/5 = 1.0$$

$$\text{Critical ratio for job F} = 5/3 = 1.67$$

Job having least critical ratio is given the first priority and so on.

Sequence :	C	D	E	B	F	A
Critical Ratio :	0.71	0.83	1.0	1.25	1.67	2.5

(b)

Demand	Probability	Cumulative Probability	Range
0	0.05	0.05	0-4
1	0.10	0.15	5-14
2	0.30	0.45	15-44
3	0.45	0.90	45-89
4	0.10	1.00	90-99

MTP_ Intermediate _Syllabus 2016_Dec 2017_Set 2**Option - A**

Day	R No.	Demand	Option	Stock order	Closing Stock	Order Placed
1	89	3	8	-	5	-
2	34	2	5	6	9	-
3	70	3	9	-	6	0
4	63	3	6	-	3	5
5	61	3	3	0	0	-
6	81	3	0	5	2	5
7	39	2	2	-	0	5
8	16	2	0	5	3	-
9	13	1	3	5	7	-
10	73	3	7	-	4	5
					39+5 = 44	

Ordering cost 4×10	₹ 40
Ordering cost 0.5×44	₹ 22
Total Cost	₹ 62

Option B

Day	R No.	Demand	Option	Orders received	Closing Stock	No. of Orders
1	89	3	8	-	5	-
2	34	2	5	6	9	-
3	70	3	9	-	6	-
4	63	3	6	-	3	8
5	61	3	3	-	0	-
6	81	3	0	8	5	-
7	39	2	5	-	3	8
8	16	2	3	-	1	-
9	13	1	1	8	8	-
10	73	3	8	-	5	-
					45	

Ordering cost 2×10	₹ 20.0
Ordering cost 0.5×45	₹ 22.5
Total Cost	₹ 42.5

Option 'B' is better because it has low Inventory costs.

5. (a) Project with the following data is to be implemented,. Draw the network and find the critical path.

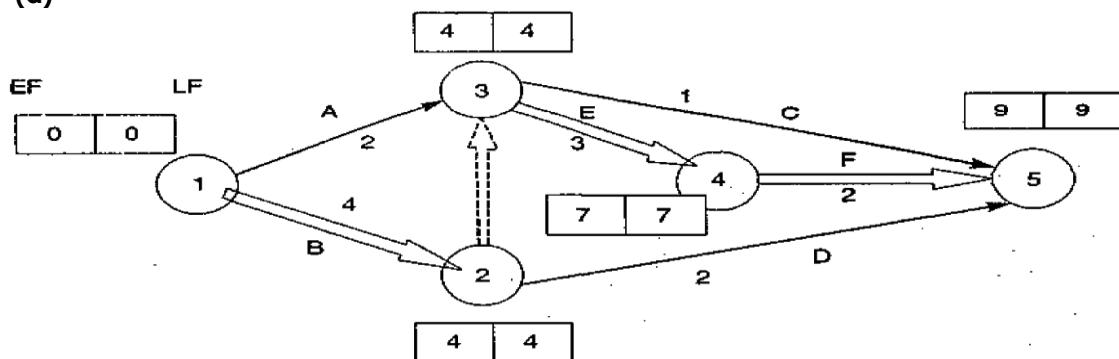
Activity	Predecessor	Duration (days)	Cost (₹ Day)
A	-	2	50
B	-	4	50
C	A	1	40
D	B	2	100
E	A, B	3	100
F	E	2	60

1. What is the minimum duration of the project?
 2. Draw a Gantt chart for early start schedule.
 3. Determine the peak requirement money and day on which it occurs above schedule.
- [6]

- (b) Indian Electronics, manufactures TV sets and carries out the picture tube testing for 2000 hours. A sample of 100 tubes was put through this quality test during which two tubes failed. If the average usage of TV by the customer is 4hours/day and if 10,000 TV sets were sold, then in one year how many tubes were expected to fail and what is the mean time between failures for these tubes? [10]

Answer:

5. (a)

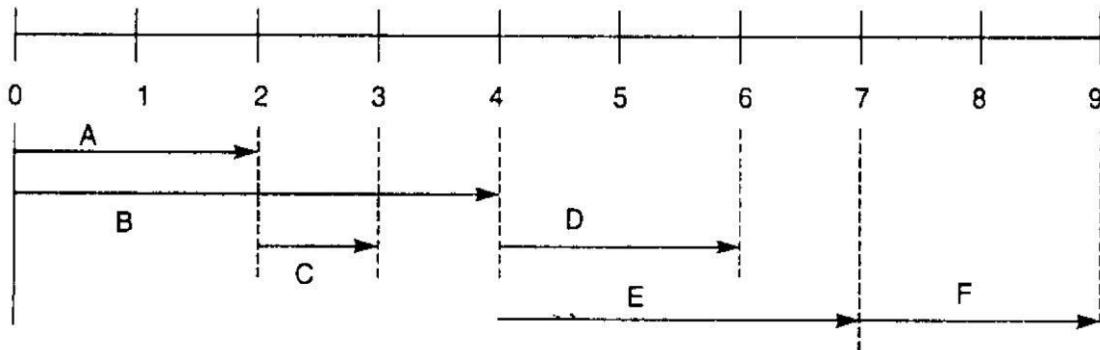


Critical Path
Minimum time

$$1 - 2 - 3 - 4 - 5 \\ = 9$$

Table : Activity Relationship

Activity	t	ES (EF- t)	EF	LS (LF- t)	LF	Event Slack (LS-ES) (LF-EF)	On Critical Path
A	2	0	2	2	4	2	No
B	4	0	4	0	4	0	Yes
C	1	4	5	8	9	4	No
D	2	4	6	7	9	3	No
E	3	4	7	4	7	0	Yes
F	2	7	9	7	9	0	Yes



(b) The total test time = (100 tubes) \times 2000 hours = 200,000 tube-hours.

There are two tubes which have failed and hence the total time is to be adjusted for the number of hours lost due to the failures during the testing.

The lost hours are computed as $= 2 \times \frac{2000}{2} = 2000$ hours.

The assumption is made here is that each of the failed tubes have lasted an average of half of the test period.

Therefore, the test shows that there are two failures during $(2,00,000 - 2000) = 1,98,000$ tube hours of testing.

During 365 days a year (four hours a day) for 10,000 tubes the number of expected failures $\frac{2}{1,98,000} \times 10,000 \times 365 \times 4 = 147.47 = 148$ tubes approximately.

Mean time between failures = $\frac{1,98,000 \text{ tubes hrs. of testing}}{2 \text{ failure}}$

= 99,000 tubes hours per failure = $\frac{99,000}{4 \times 365} = 67.8$ tubes year per failure.

SECTION – B

6. (a) Choose the correct Answer: [1x6=6]

- (i) A strategic business unit (SBU) is defined as a division of an organization :
 - (a) That help in the marketing operations;
 - (b) That enable managers to have better control over the resources;
 - (c) The help in the choice of technology;
 - (d) That help in the allocation of scarce resources;
 - (e) That help in identifying talents and potentials of people
- (ii) Indian Airlines decreasing the airfare on the Delhi – Mumbai sector following the introduction of the no frills airlines would be an example of :
 - (a) Cost leadership
 - (b) Price leadership
 - (c) Product differentiate
 - (d) Focus.
 - (e) Market retention
- (iii) Typically profits are highest in which stage of the industry life-cycle?
 - (a) Introduction
 - (b) Growth
 - (c) Maturity
 - (d) Decline
- (iv) Successful differentiation strategy allows the company to:
 - (a) gain buyer loyalty to its brands
 - (b) charge too high a price premium
 - (c) depend only on intrinsic product attributes
 - (d) have product quality that exceeds buyers needs
 - (e) segment a market in to distinct group of buyer
- (v) The managerial task of implementing strategy primarily falls upon the shoulders of :
 - (a) The Chief Executive Officer (CEO);
 - (b) First line supervisors, who have day-to-day responsibility for seeing that key activities are done properly;
 - (c) All managers, each attending to what needs to be done in their respective areas of authority and responsibility;
 - (d) All of the above.
- (vi) What are enduring statements of purpose that distinguish one business from other similar Firms?
 - (a) Policies
 - (b) Mission statements
 - (c) Objectives
 - (d) Rules
 - (e) Nature of ownership

Answer:

6. (a) (i) (b)
(ii) (b)
(iii) (b)
(iv) (a)
(v) (c)
(vi) (b)

Answer any one question from the following:**[1x12=12]****7. (a) What do you mean by strategy? State its features.****[6]****(b) Enlist the advantage of Strategic Management.****[6]****Answer:****7. (a) STRATEGY:**

Strategy is all about integrating organizational activities and utilizing and allocating the scarce resources within the organizational environment so as to meet the present objectives. While planning a strategy it is essential to consider that decisions are not taken in a vacuum and that any act taken by a firm is likely to be met by a reaction from those affected, competitors, customers, employees or suppliers.

Strategy can also be defined as knowledge of the goals, the uncertainty of events and the need to take into consideration the likely or actual behavior of others. Strategy is the outline of decisions in an organization that shows its objectives and goals, reduces the key policies, and plans for achieving these goals, and defines the business the company is to carry on, the type of economic and human organization it wants to be, and the contribution it plans to make to its shareholders, customers and society at large.

Features of Strategy:

- (i) Strategy is important to foresight, the uncertain events of firms/industries .
- (ii) Strategy deals with long term developments rather than routine operations. For example innovations or new products, new methods of productions, or new markets to be developed in future.
- (iii) Strategy is created to deal behavior of customers and competitors.
- (iv) Strategy is a well defined roadmap of an organization. It defines the overall mission, vision and direction of an organization. The objective of a strategy is to maximize an organization's strengths and to minimize the strengths of the competitors.

(b) The Advantages of Strategic Management**• Discharges Board Responsibility**

The first reason that most organizations state for having a strategic management process is that it discharges the responsibility of the Board of Directors.

• Forces an Objective Assessment

Strategic management provides a discipline that enables the board and senior management to actually take a step back from the day-to-day business to think about the future of the organization. Without this discipline, the organization can become solely consumed with working through the next issue or problem without consideration of the larger picture.

• Provides a Framework for Decision-Making

Strategy provides a framework within which all staff can make day-to-day operational decisions and understand that those decisions are all moving the organization in a single direction.

• Supports Understanding & Buy-In

Allowing the board and staff participation in the strategic discussion enables them to better understand the direction, why that direction was chosen, and the associated benefits. For some people simply knowing is enough; for many people, to gain their full support requires them to understand.

• Enables Measurement of Progress

A strategic management process forces an organization to set objectives and measures of success. The setting of measures of success requires that the organization first determine what is critical to its ongoing success and then forces the establishment of objectives and keeps these critical measures in front of the board and senior management.

- **Provides an Organizational Perspective**

Addressing operational issues rarely looks at the whole organization and the interrelatedness of its varying components. Strategic management takes an organizational perspective and looks at all the components and the interrelationship between those components in order to develop a strategy that is optimal for the whole organization and not a single component.

8. (a) Distinguish between Strategic Planning and Strategic Management [6]

(b) Discuss Mc Kinsey's 7-s frame work. [6]

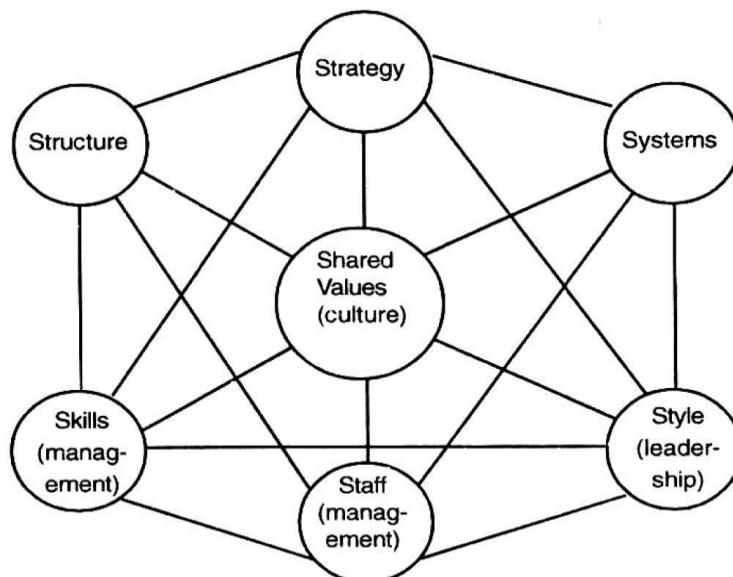
Answer:

8. (a) Strategic Management and Strategic Planning : Distinction

The basic difference between Strategic management and Strategic planning are as follows:

Strategic Management	Strategic Planning
1. It is focused on producing strategic results; new markets; new products; new technologies etc.	1. It is focused on making optimal strategic decisions.
2. It is management by results.	2. It is management by plans.
3. It is an organizational action process.	3. It is an analytical process.
4. It broadens focus to include psychological, sociological and political variables.	4. It is focused on business, economic and technological variables.
5. It is about choosing things to do and also about the people who will do them.	5. It is about choosing things to do.

(b) Strategy is dependent on many variables – Internal as well as external. All factors are interrelated.



McKinsey's 7-S Framework

The McKinsey Company, a well known management consultancy firm in the United States, towards the end of 1970s was asked to find a solution to this knotty issue. The researchers Peters and Waterman found after examining America's best run companies that the problem in strategy lay in its implementation and structure was only one lever in the hands of management. The other levers were systems, staff, style, skills and superordinate goals. A strategy is usually successful when the other S's in the 7-S framework fit into or support the strategy.

- **Strategy:** A set of decisions and actions aimed at gaining a sustainable competitive advantage.
- **Structure:** The organisation chart and associated information that shows who reports to whom and how tasks are both divided and integrated.
- **Systems:** The flow of activities involved in the daily operation of a business, including its core processes and its support systems.
- **Style:** How managers collectively spend their time and attention and how they use symbolic behaviour. How management acts is more important than what management says.
- **Staff:** How companies develop employees and shape basic values.
- **Shared Values:** Commonly held beliefs, mindsets and assumptions that shape how an organisation behaves—its corporate culture.
- **Skills:** An organisation's dominant capabilities and competencies.

9. Write a short note on any of the following three questions:

[4×4=16]

(a) **Strategic Management Framework;**

(b) **Marketing Mix;**

(c) **Functional Organizational Structure;**

(d) **Matrix Organization Structure.**

Answer:

9. (a) **Strategic Management Framework:**

The basic framework of strategic management involves five stages:

Stage 1: In this stage, organisation analyse about their present situation in terms of their Strengths, Weaknesses, Opportunities and Threats.

Stage 2: In this stage, organisations setup their missions, goals and objectives by analysing where they want to go in future.

Stage 3: In this stage organisation analyses various strategic alternatives to achieve their goals and objectives. The alternatives are analysed in terms of what business portfolio/product mix to adopt, expansion, merger, acquisition and divestment options etc are analysed to achieve the goals.

Stage 4: In this organisations select the best suitable alternatives in line with their SWOT analysis

Stage 5: This is implementation stage in which organisation implement and execute the selected alternatives to achieve their strategic goals and objectives.

Stage 1: Where are we now? Analysis of present situation

Stage 2: Where we want to go? Setting goals and objectives for future

Stage 3: Analyses of various alternatives to achieve the goals and objectives

Stage 4: Selecting best alternatives in line with strengths of organisation

Stage 5: Implementing and executing the selected alternatives and monitoring of the same overtimes

Strategic Management Framework

(b) Marketing mix

Marketing mix is the pack of four sets of variables namely, product variables, price variables, promotion variables and place variable.

"Marketing Mix" refers to the appointment of effort, the combination, designing and integration of the elements of marketing into a programme or mix which, on the basis of an appraisal of the market forces will best achieve the objectives of an enterprise at a given time.

Kotler defines the marketing mix as the set of controllable variables and their levels that the firm uses to influence the target market. Such variables are:

- (i) Product
- (ii) Place
- (iii) Price and
- (iv) Promotion

In addition, for service-there are three more P's

They are:

- (i) People
- (ii) Processes and
- (iii) Physical evidence.

(c) Functional structure:

The functional structure is characterized by the simultaneous combination of similar activities and the separation of dissimilar activities on the basis of function. All Cost Accountants are located in the Cost Accounting Department, and the HOD of Cost Accounting is responsible for all cost related activities. The same is true in marketing, research and development, and manufacturing.

The functional organization form is one of the most common organizational structures found in firms pursuing strategy of concentration or very high relatedness. A functional structure is most appropriate when the organization is small to medium size and relatively stable.

(d) Matrix structure:

Another way to achieve focus on multiple outcomes is with the matrix structure. The matrix structure creates a dual chain of command; two lines of budget authority and two sources of performance and reward. The key feature of the matrix is that product (or business) and functional lines of authority are overlaid to form a matrix or grid, between the product manager and functional manager.

Paper 9 – OPERATIONS MANAGEMENT & STRATEGIC MANAGEMENT

Paper 9- OPERATIONS MANAGEMENT & STRATEGIC MANAGEMENT**Full Marks: 100****Time allowed: 3 hours**

The figures in the margin on the right side indicate full marks.

This question paper has two sections.

Both the sections are to be answered subject to instructions given against each.

Section – A

1. (a) Choose the correct answer: [1x10=10]

- (i) Generally the size of the order for production in Job production is :
 - (a) Small
 - (b) Large
 - (c) Medium
 - (d) Very large
- (ii) The activity of specifying when to start the job and when to end the job is known as:
 - (a) Planning
 - (b) Scheduling
 - (c) Timing
 - (d) Follow-up
- (iii) In job production system, we need:
 - (a) More unskilled labours
 - (b) Skilled labours
 - (c) Semi-skilled labours
 - (d) Old people
- (iv) The lead-time is the time:
 - (a) To place holders for materials
 - (b) Time of receiving materials
 - (c) Time between receipt of material and using materials,
 - (d) Time between placing the order and receiving the materials
- (v) The method used in scheduling a project is:
 - (a) A schedule of break-down of orders
 - (b) Outline master programme
 - (c) PERT & CPM
 - (d) Schedule for large and integrated work
- (vi) The act of going round the production shop to note down the progress of work and feedback the information is known as:
 - (a) Follow up
 - (b) Dispatching
 - (c) Routing
 - (d) Trip card
- (vii) MRP stands for:
 - (a) Material requirement planning
 - (b) Material reordering planning
 - (c) Material requisition procedure
 - (d) Material recording procedure

(viii) One of the important charts used in programme control is:

- (a) Material chart
- (b) Gantt chart
- (c) Route chart
- (d) Inspection chart

(ix) Variety reduction is generally known as:

- (a) Less varieties
- (b) Simplification
- (c) Reduced varieties
- (d) None of the above

(x) Conversion of inputs into outputs is known as:

- (a) Application of technology
- (b) operations management
- (c) Manufacturing products
- (d) product

(b) Match the products in column-I with production centers in column -II:

[1x6=6]

I	II
(A) Electricity	(a) Blast Furnace
(B) Petrol	(b) generator
(C) Iron	(c) Refinery
(D) Cloth	(d) Assembly line
(E) Car	(f) spinning Mill
(F) Cotton yarn	(g) power Loom

(c) State whether the following statements are True or False:

[1x6=6]

- (i) Method study should precede work measurement ()
- (ii) Increased productivity leads to cost reduction ()
- (iii) A good materials handling system always consists of conveyors ()
- (iv) Project costs increase as the duration of the project increases ()
- (v) It is desirable to conduct work measurement after method study()
- (vi) No handling is the best handling ().

Answer:

- (1) (a) (i) (a) Small
 (ii) (b) Scheduling
 (iii) (b) Skilled labours
 (iv) (d) Time between placing the order and receiving the materials
 (v) (c) PERT & CPM
 (vi) (a) Follow up
 (vii) (a) Material requirement planning
 (viii) (b) Gantt chart
 (ix) (b) Simplification
 (x) (c) Manufacturing products

(b)

I	II
(A) Electricity	(b) generator
(B) Petrol	(c) Refinery
(C) Iron	(a) Blast Furnace
(D) Cloth	(f) Power Loom
(E) Car	(d) Assembly line
(F) Cotton yarn	(e) Spinning Mill

- (c) (i) Method study should precede work measurement (T)
 (ii) Increased productivity leads to cost reduction (T)
 (iii) A good materials handling system always consists of conveyors (F)
 (iv) Project costs increase as the duration of the project increases (T)
 (v) It is desirable to conduct work measurement after method study(T)
 (vi) No handling is the best handling (T).

Answer any three questions from the following:

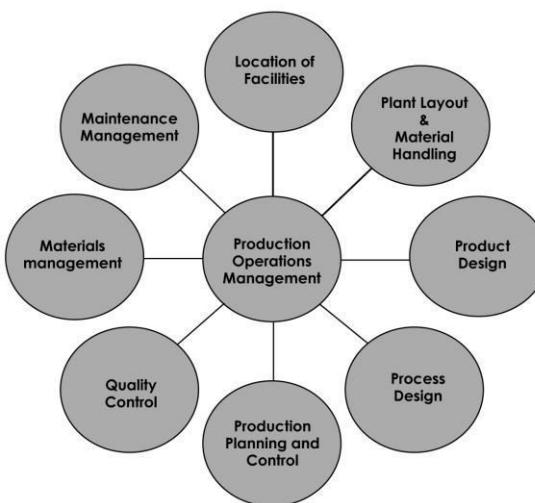
[3x16=48]

- 2. (a) What are the principle functions of an operating system? [8]**
(b) What are the characteristics of a good plant layout? [8]

Answer:

- 2. (a)** Operations Management concern with the conversion of inputs into outputs, using physical resources, so as to provide the desired utilities to the customer while meeting the other organizational objectives of effectiveness, efficiency and adoptability. It distinguishes itself from other functions such as personnel, marketing, finance, etc. by its primary concern for 'conversion by using physical resources'. Following are the activities, which are listed under Production and Operations Management functions:

1. Location of facilities.
2. Plant layouts and Material Handling.
3. Product Design.
4. Process Design.
5. Production and Planning Control.
6. Quality Control.
7. Materials Management.
8. Maintenance Management.



Scope of production and operations management

- (b) Characteristics of good plant layout-**

- Efficient utilisation of labour reduced idle time of labour and equipments,
- Higher flexibility (to change the layout easily),
- Higher utilisation of space, equipment and people (employees),
- Improved employee morale and safe working conditions,
- Improved flow of materials, information and people (employees),
- Improved production capacity,

- Reduced congestion or reduced bottleneck centers,
- Reduced health hazards and accidents,
- To allow ease of maintenance,
- To facilitate better coordination and face-to-face communication where needed,
- To improve productivity,
- To provide ease of supervision,
- To provide product flexibility and volume flexibility,
- To utilise available space efficiently and effectively.

3. (a) Mention any six characteristics of a good Product Design.

[6]

(b) The following data is available for a manufacturing unit:

No. of operators	:	15
Daily working hours	:	8
No. of days per months	:	25
Std. production per month	:	300 units
Std. Labour hours per unit	:	8

The following information was obtained for November 2015:

Man days lost due to absenteeism	:	30
Unit produced	:	240
Idle Time	:	276 man hours

Find the following:-

- (a) Percent absenteeism**
- (b) Efficiency of utilization of labour**
- (c) Productive efficiency of labour**
- (d) Overall productivity of labour in terms of units produced per man per month. [10]**

Answer:

3. (a) A good product design must ensure the following:

- (i) Function or performance:** The function or performance is what the customer expects the product to do to solve his/her problem or offer certain benefits leading to satisfaction. For example, a customer for a motor bike expects the bike to start with a few kicks on the kick peddle and also expects some other functional aspects such as pick-up, maximum speed, engine power and fuel consumption etc.
- (ii) Appearance or aesthetics:** This includes the style, colour, look, feel, etc. which appeals to the human sense and adds value to the product.
- (iii) Reliability:** This refers to the length of time a product can be used before it fails. In other words, reliability is the probability that a product will function for a specific time period without failure.
- (iv) Maintainability:** Refers to the restoration of a product once it has failed. High degree of maintainability is desired so that the product can be restored (repaired) to be used within a short time after it breaks down. This is also known as serviceability.
- (v) Availability:** This refers to the continuity of service to the customer. A product is available for use when it is in an operational state. Availability is a combination of

reliability and maintainability. High reliability and maintainability ensures high availability.

- (vi) **Productibility:** This refers to the ease of manufacture with minimum cost (economic production). This is ensured in product design by proper specification of tolerances, use of materials that can be easily processed and also use of economical processes and equipments to produce the product quickly and at a cheaper cost.
- (vii) **Simplification:** This refers to the elimination of the complex features so that the intended function is performed with reduced costs, higher quality or more customer satisfaction. A simplified design has fewer parts which can be manufactured and assembled with less time and cost. “
- (viii) **Standardisation:** Refers to the design activity that reduces variety among a group of products or parts. For example, group technology items have standardised design which calls for similar manufacturing process steps to be followed. Standard designs lead to variety reduction and results in economies of scale due to high volume of production of standard products. However, standardised designs may lead to reduced choices for customers.
- (ix) **Specification:** A specification is a detailed description of a material, part or product, including physical measures such as dimensions, volume, weight, surface finish etc. These specifications indicate tolerances on physical measures which provide production department with precise information about the characteristics of products to be produced and the processes and production equipments to be used to achieve the specified tolerances (acceptable variations).
- Interchangeability of parts in products produced in large volumes (mass production and flow-line production) is provided by appropriate specification of tolerances to facilitate the desired fit between parts which are assembled together.
- (x) **Safety:** The product must be safe to the user and should not cause any accident while using or should not cause any health hazard to the user. Safety in storage, handling and usage must be ensured by the designer and a proper package has to be provided to avoid damage during transportation and storage of the product. For example, a pharmaceutical product while used by the patient, should not cause some other side effect threatening the user.

(Mention any six characteristics)

- (b) No. of days per month = 25
 Daily working hrs = 8
 No. of operators = 15
 No. of Man days = $15 \times 25 = 375$ Man days.
 Total working hrs. = $375 \times 8 = 3,000$
 Hours lost in absenteeism = $30 \times 8 = 240$
 (i) Percent absentees = $\frac{240 \text{ hrs.} \times 100}{3000 \text{ hrs.}} = 8\%$
 (ii) Efficiency of utilisation of labour = $\frac{\text{Standard labour hour to produce 240 units}}{\text{Total labour hour}}$

$$= \frac{240 \times 8}{3000} = 64\%$$

(iii) Standard time required to produce 240 units = $240 \times 8 = 1920$ labour-hours.

In November, man hours lost	=	$30 \times 8 = 240$
" " idle time	=	<u>276</u>
Total loss of time	=	516 hours.
Productive hours available in November	=	3000
Less, Total loss of time	=	<u>516</u>
Actual labour-hours	=	2484 hours
Efficiency of labour	=	$\frac{\text{Std. Labour hrs.}}{\text{Actual Labour hrs.}} = \frac{1920 \times 100}{2484} = 77.3\%$

(v) 15 men produces 300 units,
 Std. labour productivity = $300/15 = 20$ units.
 In November, overall productivity = $240/15 = 16$ units. (Ans.)
 i.e., productivity falls by 25%.

4. (a) A captain of a cricket team has to allot five middle batting positions to five batsmen. The average runs scored by each batsman at these positions are as follows:

	Batting Position					
		III	IV	V	VI	VII
A	40	40	35	25	50	
B	42	30	16	25	25	27
C	50	48	40	60	60	50
D	20	19	20	18	18	25
E	58	60	59	55	55	53

Make the assignment so that the expected total average runs scored by these batsmen are maximum. [10]

- (b) Table shows the time remaining (number of days until due date) and the work remaining (number of day's work) for 5 jobs which were assigned the letters A to E as they arrived to the shop. Sequence these jobs by priority rules viz., (a) FCFS, (b) EDD, (c) LS(d) SPT and (e) LPT. [6]

Job	Number days until due date	Number of days work remaining
A	8	7
B	3	4
C	7	5
D	9	2
E	6	6

Answer:

4. (a)

Loss Matrix

	III	IV	V	VI	VII						
A	40	40	35	25	50		20	20	25	35	10
B	42	30	16	25	27		18	30	44	35	33
C	50	48	40	60	50		10	12	20	0	10
D	20	19	20	18	25		40	41	40	42	35
E	58	60	59	55	53		2	0	1	5	7

Raw Operation

M ₃					
10	10	14	25	25	0
0	12	25	17	17	15
10	12	19	0	0	10
5	6	4	7	7	0
2	0	0	5	5	7

Column Operation

10	10	15	25	0
0	12	26	17	15
10	12	20	17	10
5	6	5	7	0
2	0	1	5	7

Improved Matrix

10	6	10	25	0
0	21	17	15	
10	15	0	10	
5	2	7	0	
0	0	0	11	

Maximum Average Runs

A	→	VII	-	50
B	→	III	-	42
C	→	VI	-	60
D	→	V	-	20

(b)

(a) **FCFS (First come first served):** Since the jobs are assigned letters A to E as they arrived to the shop, the sequence according to FCFS priority rule is A B C D E

(b) **EDD (Early due date job first) rule:** Taking into account the number of days until due date, the sequence of jobs as per EDD rules is B E C A D

(3) (6) (7) (8) (9)

(c) L.S. (Least slack) rule also called as Minimum slack rule.

Calculation of slack :

Slack = (Number of days until due date) - (Number of days work remaining)

Job	Slack	(Days)
A	8-7	= 1
B	3-4	= (-1)
C	7-5	= 2
D	9-2	= 7
E	6-6	= 0

Sequence:

B	E	A	C	D
-1	0	1	2	7

(d) SPT (Shortest Processing Time job first) also referred as SOT (Shortest Operation time job First) rule or MINPRT (Minimum Processing time job first) rule.

Sequence:

D	B	C	E	A
2	4	5	6	7

(e) LPT (Longest Processing time job first) also referred to as LOT (Longest operation time job first) rule.

Sequence:

A	E	C	B	D
7	6	5	4	2

5. (a) project with the following data is to be implemented.. Draw the network and find the critical path.

Activity	Predecessor	Duration(days)	Cost (₹ day)
A	-	2	50
B	-	4	50
C	A	1	40
D	B	2	100
E	A,B	3	100
F	E	2	60

1. What is the minimum duration of the project?
 2. Draw a Gantt chart for early start schedule.
 3. Determine the peak requirement money and day on which it occurs above schedule.
- [8]

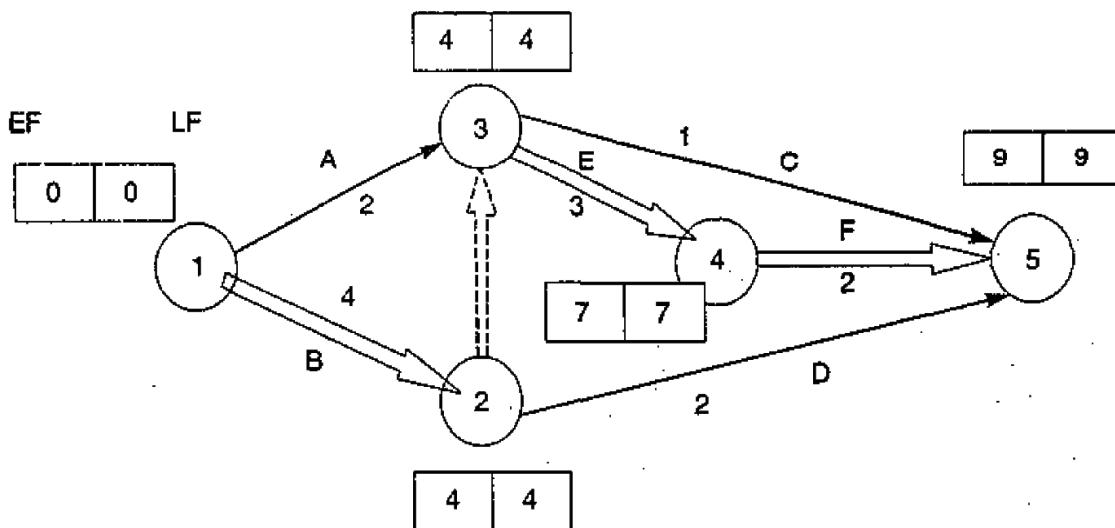
- (b) A public transport system is experiencing the following number of breakdowns for months over the past 2 years in their new fleet of vehicles:
- [8]

Number of breakdowns	0	1	2	3	4
Number of months this occurred	2	8	10	3	1

Each break down costs the firm an average of ₹ 2,800. For a cost of ₹ 1,500 per month, preventive maintenance can be carried out to limit the breakdowns to an average of one per month. Which policy is suitable for the firm?

Answer:

5. (a)

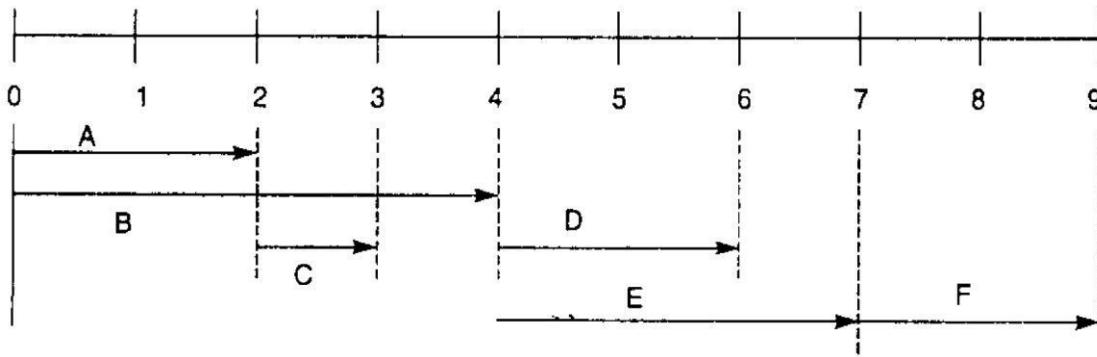


Critical Path
Minimum time

$$1 - 2 - 3 - 4 - 5 \\ = 9$$

Table : Activity Relationship

Activity	t	ES (EF- t)	EF	LS (LF- t)	LF	Event Slack (LS-ES) (LF-EF)	On Critical Path
A	2	0	2	2	4	2	No
B	4	0	4	0	4	0	Yes
C	1	4	5	8	9	4	No
D	2	4	6	7	9	3	No
E	3	4	7	4	7	0	Yes
F	2	7	9	7	9	0	Yes



- (b) Converting the frequencies to a probability distribution and determining the expected cost/month of breakdowns we get:

No. of breakdowns	Frequency in months	Frequency in per cent	Expected Value
0	2	0.083	0.000
1	8	0.333	0.333
2	10	0.417	0.834
3	3	0.125	0.375
4	1	0.042	0.168
		Total	1.710

Breakdown cost per month; Expected cost = $1.710 \times ₹ 2800 = ₹ 4788$.

Preventive maintenance cost per month: -

Average cost of one breakdown/month = ₹ 2,800

Maintenance contract cost/month = ₹ 1,500

Total = ₹ 4,300.

Thus, preventive maintenance policy is suitable for the firm.

Section – B

6. Choose the correct answer:

[6x1=6]

- (i) A corporate strategy can be defined as:
- (a) A list of actions about operational planning and statement of organization structure and control system;
 - (b) A statement of how to compete, directions of growth and method of assessing environment;
 - (c) Abatement of organization's activities and allocation of resources;
 - (d) A course of action or choice of alternatives, specifying the resources required to achieve certain stated objectives;
 - (e) A statement of where and how the company will prefer to operate.
- (ii) A strategic business unit (SUB) is defined as a division of an organization:
- (a) That help in the marketing operations;
 - (b) That enable managers to have better control over the resources;
 - (c) The help in the choice of technology;
 - (d) that help in the allocation of scarce resources;
 - (e) That help in identifying talents and potentials of people
- (iii) Benchmarking is:
- (a) The analytical tool to identify high cost activities based on the 'Pareto Analysis'.
 - (b) The search for industries best practices that lead to superior performance;
 - (c) The simulation of cost reduction schemes that help to build commitment and improvement of actions;
 - (d) The process of marketing and redesigning the way a typical company works;
 - (e) The framework that earmarks a linkage with suppliers and customers;

- (iv) What are enduring statements of purpose that distinguish one business from other similar firms:
(a) Policies
(b) Mission statements
(c) Objectives
(d) Rules
(e) Nature of ownership
- (v) Indian Airlines decreasing the airfare on the Delhi – Mumbai sector following the introduction of the no frills airlines would be an example of
(a) Cost leadership
(b) Price leadership
(c) Product differentiate
(d) Focus
(e) Market retention
- (vi) Question mark in BCG Matrix is an investment, which
(a) Yields low current income but has bright growth prospects.
(b) Yields high current income and has bright growth prospects.
(c) Yields high current income and has bleak growth prospects.
(d) Yields low current income and has bleak growth prospects.

Answer:

- (6) (a) (i) (d) A course of action or choice of alternatives, specifying the resources required to achieve certain stated objectives;
(ii) (b) That enable managers to have better control over the resources;
(iii) (b) The search for industries best practices that lead to superior performance;
(iv) (b) Mission statements
(v) (b) Price leadership
(vi) (a) Yields low current income but has bright growth prospects.

Answer any one of the following Question

[1x12=12]

7. (a) What are differences between Vision and Mission? [5]
(b) Explain the objective of SWOT analysis and its advantages and criticism? [7]

Answer:

- (7) (a) There is a quote that 'great visionary can foresee the future in advance and take steps accordingly to be at forefront'.
So, we can say that:
(1) Vision provide a road map to company's future
(2) Vision indicates the kind of company management is trying to create for future.
(3) Vision specifies about company intention and capabilities to adapt to new technologies
(4) Vision also specifies management policies towards customers and societies.

The term 'mission' implies the fundamental and enduring objectives of an organization that set it apart from other organizations of similar nature. The mission is a general enduring statement of instruction of an organization.

Mission includes:

- A definition of products and services the organization provides.
- Technology used to provide these products and services.
- Types of markets.
- Customer need or requirement.
- Distinctive competencies.

(b) Objectives of SWOT analysis:

- (1) SWOT analysis involves a systematic analysis of the internal strengths and weaknesses of a firm (financial, technological, managerial) and of the external opportunities and threats in the firm's environment (changes in the markets, laws, technology and the actions of the competitors). This will provide a basis for evaluating the extent to which the firm is likely to achieve its various objectives and for identifying new products and market opportunity. It is an internal appraisal of a firm. The purpose of SWOT analysis will be to expose the strengths and weaknesses of the firm.
- (2) Further a SWOT Analysis will help in defining the strategic approach to be formulated that will fit in admirably with the environment.
- (3) An analysis of Opportunities and Threats is concerned with identifying profit-making opportunities in the business environment and for identifying threats - e.g., falling demand, new competition, government legislation etc., it is thus an external appraisal, strengths and weaknesses analysis.
- (4) Identification of shortcomings in skills or resources could lead to a planned acquisition programme or staff recruitment and training. Thus SWOT analysis helps in highlighting areas within the company, which are strong and which might be exploited more fully and weaknesses, where some defensive planning might be exploited more fully and weaknesses, where some defensive planning might be required to prevent the company from poor results.

Advantages:

The following may be termed as 'Opportunities' which should be timely utilised and availed of by the organisation gainfully:

- (i) Seasonal/climatical demand of products
- (ii) Global markets for the company's products/services (Export opportunities)
- (iii) Rural markets to explore and to penetrate
- (iv) To explore the markets in the undeveloped/under-developed/developing states/places
- (v) To avail of the incentives/concessions declared by Central and State Governments
- (vi) Diversifications opportunities
- (vii) Mergers/acquisition opportunities
- (viii) Good home market available due to boost in the economy
- (ix) Liberalised policies of the Government both at Centre as well as State level for the individual production and industrial developments.

Similar to opportunities, there may be threats too prevailing from time to time, which must be examined and necessary action taken to be free from these or to solve these prudently so that loss to the organisation may be minimum. The probable threats, which may arise or be faced by the organisation, are listed out as under:

Criticisms:

- (i) Globalisation
- (ii) Competition
- (iii) Price cutting war
- (iv) Free imports
- (v) Industrial unrest
- (vi) Political instability
- (vii) Quality thrusts
- (viii) High and adverse debt equity ratio
- (ix) Increase in financing cost
- (x) Economic slowdown due to international recession impact

In the above Para, details of:

- (i) Strengths
- (ii) Weaknesses
- (iii) Opportunities
- (iv) Threats

Each and every factor of the SWOT would be analysed critically to find out a best alternative out of various alternatives available.

- 8. (a) Discuss various stages in strategic planning.** [6]
(b) Define SBU. What are its merits & demerits? [6]

Answer:

- (8) (a) The stages in strategic planning are given below:

Stage I - Strategic Option Generations

At this stage, a variety of alternatives are considered, relating to the firm's product and markets, its competitors and so forth. Examples of strategies might be:

- (a) increase market share
- (b) penetration into international market
- (c) concentration on core competencies
- (d) acquisition or expansion etc.

Stage II - Strategic Options Evaluation

Each option is then examined on its merits.

- (a) does it increase existing strengths ?
- (b) does it alleviate existing weaknesses ?
- (c) is it suitable for the firm's existing position ?
- (d) is it acceptable to stakeholders ?

Stage III - Strategic Selection

It involves choosing between the alternative strategies. This process is strongly influenced by the values of the managers in selecting the strategies.

- (b) SBU groups similar divisions into "Strategic Business Units" and then delegate's authority and responsibility of each unit to a senior executive who is normally identified as CEO or MD of that SBU. It is an extension of Divisional structure.

SBU Structure

Big organisation like Unilever, etc have many SBUs for their different categories of products like Cosmetics, Food products and Beverages, etc, and each is managed through separate unit head.

Advantages:

- (i) Promotes accountability since units' heads are responsible for individual SBU profitability
- (ii) Career development opportunities are further higher in this structure
- (iii) Allow better control of categories of products manufacturing, marketing and distributions
- (iv) Helps to expand in different related and unrelated businesses

Disadvantages:

- (i) May provide inconsistent approach to tackle customers, etc, because each unit may work in its own way to handle situations

(ii) High cost approach

9. Write a short note (any three) of the following:

[3x4=12]

- (a) Strategic planning;
- (b) Environment Analysis;
- (c) BCG Matrix;
- (d) Marketing mix.

Answer:

(9) (a) Strategic Planning

It is important to operate a planning process which will not only produce realistic and potentially rewarding plans but will also secure the support of all those involved in implementing them. There are three approaches that can be adopted to strategic planning:

- (i) A top-down process, in which managers are given targets to achieve which they pass on down the line.
- (ii) A bottom-up process, in which functional and line managers in conjunction with their staff submit plans, targets and budgets for approval by higher authority.
- (iii) An iterative process, which involves both the top-down and bottom-up setting of targets. There is a to-and-from movement between different levels until agreement is reached. However, this agreement will have to be consistent with the overall mission, objectives and priorities and will have to be made within the context of the financial resources available to the organization. The iterative approach, which involves the maximum number of people, is the one most likely to deliver worthwhile and acceptable strategic plans.

(b) Environment Analysis

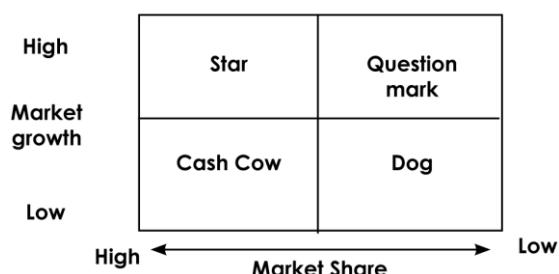
Environmental factors — both internal environment and external environment — are analysed to:

- (i) identify changes in the environment,
- (ii) identify present and future threats and opportunities, and
- (iii) assess critically it's own strengths and weaknesses.

Organisational environment encompasses all factors both inside and outside the organisation that can influence the organisation positively and negatively. Environmental factors may help in building a sustainable competitive advantage.

(c) Boston Matrix:

The Boston Consulting Group (BCG)'s matrix analyses 'products and businesses by market share and market growth.'



This growth/share matrix for the classification of products into cash cows, dogs, rising stars and question marks is known as the Boston classification for product-market strategy.

- (i) Stars are products with a high share of a high growth market. In the short term, these require capital expenditure, in excess of the cash they generate, in order to maintain their market position, but promise high returns in the future.
- (ii) In due course, however, stars will become cash cows, with a high share of a low-growth market. Cash cows need very little capital expenditure and generate high levels of cash income. The important strategic feature of cash cows is that they are already generating high cash returns, which can be used to finance the stars.
- (iii) Question marks are products in a high-growth market, but where they have a low market share. A decision needs to be taken about whether the products justify considerable capital expenditure in the hope of increasing their market share, or whether they should be allowed to 'die' quietly as they are squeezed out of the expanding market by rival products. Because considerable expenditure would be needed to turn a question mark into a star by building up market share, question marks will usually be poor cash generators and show a negative cash flow.
- (iv) Dogs are products with a low share of a low growth market. They may be ex-cash cows that have now fallen on hard times. Dogs should be allowed to die, or should be killed off. Although they will show only a modest net cash outflow, or even a modest net cash inflow, they are 'cash traps' which tie up funds and provide a poor return, on investment, and not enough to achieve the organisation's target rate of return.

(d) Marketing mix

Marketing mix is the pack of four sets of variables namely, product variables, price variables, promotion variables and place variable.

"Marketing Mix" refers to the appointment of effort, the combination, designing and integration of the elements of marketing into a programme or mix which, on the basis of an appraisal of the market forces will best achieve the objectives of an enterprise at a given time.

Kotler defines the marketing mix as the set of controllable variables and their levels that the firm uses to influence the target market. Such variables are:

- (i) Product
- (ii) Place
- (iii) Price and
- (iv) Promotion

In addition, for service-there are three more P's

They are:

- (i) People
- (ii) Processes and
- (iii) Physical evidence.

Paper 9 – OPERATIONS MANAGEMENT & STRATEGIC MANAGEMENT

Paper 9- OPERATIONS MANAGEMENT & STRATEGIC MANAGEMENT

Full Marks: 100

Time allowed: 3 hours

The figures in the margin on the right side indicate full marks.

This question paper has two sections.

Both the sections are to be answered subject to instructions given against each.

Section – A

1. (a) Choose the correct answer: [1x10=10]

- (i) Number of product varieties that can be manufactured in Mass production is:
 - (a) One only
 - (b) Two only
 - (c) Few varieties in large volumes
 - (d) Large varieties in small volumes

- (ii) Routing and Scheduling becomes relatively complicated in
 - (a) Job production
 - (b) Batch production
 - (c) Flow production
 - (d) Mass production

- (iii) Long range forecasting is useful in:
 - (a) Plan for research and development,
 - (b) to schedule jobs in job production
 - (c) in purchasing the material to meet the present production demand
 - (d) to assess man power required in the coming month

- (iv) The scope of production planning and control is:
 - (a) Limited to production of products only
 - (b) Limited to production of services only
 - (c) Limited to production of services and products only
 - (d) Unlimited, can be applied to any type of activity

- (v) Most suitable layout for job production is:
 - (a) Line layout
 - (b) Matrix layout
 - (c) Process layout
 - (d) Product layout

- (vi) JIT stands for
 - (a) Just in time purchase
 - (b) Just in time production
 - (c) Just in time use of materials
 - (d) Just in time order the material

- (vii) The first stage in production planning is:
 - (a) Process planning
 - (b) Factory planning
 - (c) Operation planning
 - (d) Layout planning

(viii) Total station time/cycle time x Number of work stations)x100 is known as:

- (a) Line efficiency
- (b) Line smoothness
- (c) Balance delay of line
- (d) Station efficiency

(ix) Scheduling deals with:

- (a) Number of jobs to be done on a machine
- (b) Number of machine tools used to do a job
- (c) Different materials used in the product
- (d) Fixing up starting and finishing times of each operation in doing a job

(x) The act of releasing the production documents to production department is known as:

- (a) Routing
- (b) Scheduling
- (c) Expediting
- (d) Dispatching

(b) Match the products in column-I with production centers in column -II

[1x6=6]

I	II
1. Ranking Method	(a) Method study
2. Motion economy	(b) job evaluation
3. Work sampling	(c) Inventory Control
4. Crashing	(d) Network Analysis
5. Replacement	(e) work measurement
6. Stock Level	(f) Maintenance

(c) State whether the following statements are True or False:

[1x6=6]

- (i) Training boosts employee morale ()
- (ii) No handling is the best handling ()
- (iii) Increase in productivity leads to retrenchment of work force ()
- (iv) Results available from work sampling study is not 100% accurate ()
- (v) Break-even analysis a management tool ()
- (vi) General purpose machine are less prone to obsolescence ()

Answer any three questions from the following:

[3x16=48]

Answer:

- (1) (a) (i) (c) Few varieties in large volumes
 (ii) (b) Batch Production
 (iii) (a) Plan for research and development
 (iv) (d) Unlimited, can be applied to any type of activity
 (v) (c) Process layout
 (vi) (b) Just in time production
 (vii) (b) Factory planning
 (viii) (a) Line efficiency
 (ix) (d) Fixing up starting and finishing times of each operation in doing a job
 (x) (d) Dispatching

(b)

I	II
1. Ranking Method	(a) job evaluation
2. Motion economy	(b) Method study

Answer to MTP_ Intermediate _Syllabus 2016_Jun 2017_Set 2

3. Work sampling	(c) work measurement
4. Crashing	(d) Network Analysis
5. Replacement	(e) Maintenance
6. Stock Level	(f) Inventory Control

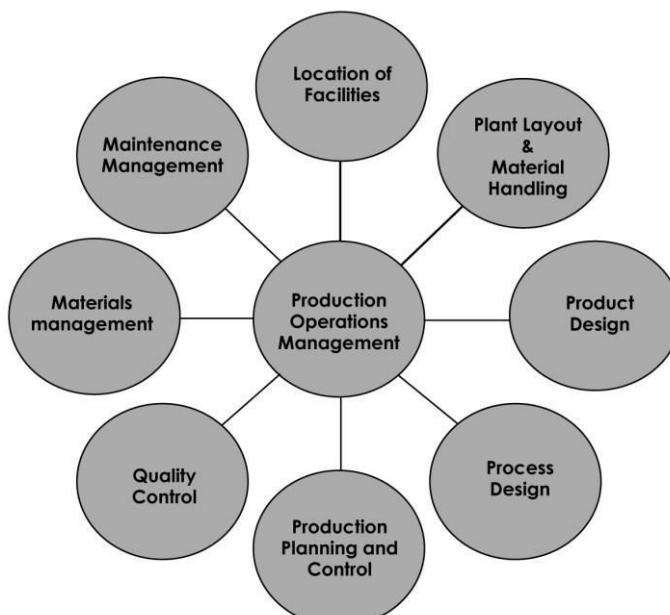
- (c) (i) Method study should precede work measurement (T)
 (ii) Increased productivity leads to cost reduction (T)
 (iii) A good materials handling system always consists of conveyors (F)
 (iv) Project costs increase as the duration of the project increases (T)
 (v) It is desirable to conduct work measurement after method study(T)
 (vi) No handling is the best handling (T).

- 2. (a) List the scope of operations management. [8]**
(b) What is forecasting? What are its advantages? [8]

Answer:

(2) (a) Operations Management concern with the conversion of inputs into outputs, using physical resources, so as to provide the desired utilities to the customer while meeting the other organizational objectives of effectiveness, efficiency and adoptability. It distinguishes itself from other functions such as personnel, marketing, finance, etc. by its primary concern for 'conversion by using physical resources'. Following are the activities, which are listed under Production and Operations Management functions:

1. Location of facilities.
2. Plant layouts and Material Handling.
3. Product Design.
4. Process Design.
5. Production and Planning Control.
6. Quality Control.
7. Materials Management.
8. Maintenance Management.



Scope of operations management

- (b)** Forecasting is the process of making statements about events whose actual outcomes (typically) have not yet been observed.

A Forecast is a prediction of future events and their quantification for planning purposes. Forecasting involves the estimation of the trend in future variables sales, tastes or profit using both quantitative and judgment techniques whereas extrapolation is a purely statistical exercise. Forecasting includes the assessment of environmental changes and in this respect, forecasting assist in obtaining strategic fit.

The strategic environment of the firm consists of economic, political, legal, social and technological factors, which influence the ability of the organization to survive and make profits, examples of environmental variables with which a fit must be achieved include the following:

- (a) The changing tastes of the customers
- (b) Developments in the market demand for a product
- (c) The likely trend of interest and exchange rates.

Forecasting can be more than just a numerical exercise on estimated trends. Whilst trends in price, interest rates, market growth rates and margins will involve numbers, other forecast does not;

- (i) Value profiles are long range forecasts of consumers and social attitudes.
- (ii) Geopolitical forecasts consider changes in national economic power and can alert the firm to new markets or potential competitive threats.

After all, the forecast that 'the political situation is unstable' is not quantitative but it would be relevant.

The important role which Forecasting plays in strategic planning is therefore to forewarn managers of possible changes in environmental factors. The long-term nature of strategic change means that effective forecasting is necessary to give the organization time to adopt and obtain a good fit with its environment.

- 3. (a) What does Product Design do? Discuss — Process design and selection. [3+7=10]**
(b) A department works on 8 hours shift, 288 days a year and has the usage data of a machine, as given below:

Product	Annual Demand (units)	Processing time (standard time in hours)
A	325	5.0
B	450	4.0
C	550	6.0

**Calculate (a) processing time needed in hours to produce products A, B and C,
(b) Annual production capacity of one machine in standard hours, and
(c) Number of machines required.** [6]

Answer:

- (3) (a)** The activities and responsibilities of product design include the following:
- (i) Translating customer needs and wants into product and service requirements (marketing).
 - (ii) Refining existing products (marketing).
 - (iii) Developing new products (marketing, product design and production).
 - (iv) Formulating quality goals (quality assurance, production).
 - (v) Formulating cost targets (accounting).
 - (vi) Constructing and testing prototype (marketing, production).

- (vii) Documenting specifications (product design).

Process Design is concerned with the overall sequences of operations required to achieve the product specifications. It specifies the type of work stations to be used, the machines and equipments necessary to carry out the operations. The sequence of operations are determined by (a) the nature of the product, (b) the materials used, (c) the quantities to be produced and (d) the existing physical layout of the plant.

The process design is concerned with the following:

- (i) Characteristics of the product or service offered to the customers.
- (ii) Expected volume of output.
- (iii) Kinds of equipments and machines available in the firm.
- (iv) Whether equipments and machines should be of special purpose or general purpose.
- (v) Cost of equipments and machines needed.
- (vi) Kind of labour skills available, amount of labour available and their wage rates.
- (vii) Expenditure to be incurred for manufacturing processes.
- (viii) Whether the process should be capital-intensive or labour-intensive.
- (ix) Make or buy decision.
- (x) Method of handling materials economically.

(b) Step 1: Calculate the processing time needed in hours to produce product x, y and z in the quantities demanded using the standard time data.

Product	Annual demand (units)	Standard processing per unit (Hrs.)	Processing needed (Hrs.)
X	300	4.0	$300 \times 4 = 1200$ Hrs.
Y	400	6.0	$400 \times 6 = 2400$ Hrs.
Z	500	3.0	$500 \times 3 = 1500$ Hrs.
			Total = 5100 Hrs

Step 2 : Annual production capacity of one machine in standard hours = $8 \times 250 = 2000$ hours per year

Step 3 : Number of machines required =
$$\frac{\text{Workload per year}}{\text{Production capacity per machine}} = \frac{5100}{2000} = 2.55$$
 machines = 3 machines.

4. (a) The cost conscious company requires for the next month 300, 260 and 180 tonnes of stone chips for its three constructions C₁, C₂ and C₃ respectively. Stone chips are produced by the company at three mineral fields taken on short lease by the company. All the available boulders must be crushed into chips. Any excess chips over the demands are sites C₁, C₂ and C₃ will be sold ex-fields.

The fields are M₁, M₂ and M₃ which will yield 250,320 and 280 tones of stone chips respectively.

Transportation costs from mineral fields to construction sites vary according to distances, which are given below in monetary unit (MU)

	To	C ₁	C ₂	C ₃
Form	M ₁	8	7	6
	M ₂	5	4	9
	M ₃	7	5	5

Answer to MTP_ Intermediate _Syllabus 2016_Jun 2017_Set 2

- (i) Determine the optimal economic transportation plan for the company and the overall transportation cost in MU.
(ii) What are the quantities to be sold from M_1 , M_2 and M_3 respectively? [10]

(b) The following jobs have to be shipped a week from now (weak has 5 working days)

Job	A	B	C	D	E	F
Number of day's work remaining	2	4	7	6	5	3

Sequence the jobs according to priority established by (a) least slack rule (b) critical ratio rule. [6]

Answer:

(4) (a)

Dummy						
	C ₁	C ₂	C ₃			
M ₁	8	7	6	0		
			140	110		
M ₂	5	4	9	0		
	300	20				
M ₃	7	5	5	0		
		240	40			
	300	260	180	110	850	—
	0	240	0			
	2	1	1	0		
	*2	1	1			
		1	1			
		*2	1			

Hence There are $m + n - 1$ allocations. Hence Optimality test is to be performed.

	U_i					
	8	7	6	0		
	1	1	1	0		
	5	4	9	0		
	300	20	5	2		
	7	5	5	0		
	1	240	40	1		
V_i	7	6	6	0		

Since $\Delta_{ij} \geq 0$ Solution is optimum.

	Qty	Minimum Cost
M ₁	C ₃	140 x 6 = 840
	C ₄	110 x 0 = 0
M ₂	C ₁	300 x 5 = 1500

	C ₂	20 x 4 =	80
M ₃	C ₂	240 x 5 =	1200
	C ₃	40 x 5 =	200
		850	₹ 3820

(b) (a) Calculation of slack :

Number of days until due date is 5 days for all jobs

Job	Slack	(days)
A	5 - 2	= 3
B	5 - 4	= 1
C	5 - 7	= (-2)
D	5 - 6	= (-1)
E	5 - 5	= 0
F	5 - 3	= 2

Sequence :

C	D	E	B	F	A
-2	-1	0	1	2	3

(b) Calculation of Critical ratio:

$$\text{Critical ratio} = \frac{\text{Due Date} - \text{Date Now}}{\text{Lead Time Remaining}} = \frac{\text{DD} - \text{DN}}{\text{LTR}} = \frac{\text{Available Time}}{\text{Operation Time}}$$

$$\text{Critical ratio for job A} = 5/2 = 2.5$$

$$\text{Critical ratio for job B} = 5/4 = 1.25$$

$$\text{Critical ratio for Job C} = 5/7 = 0.71$$

$$\text{Critical ratio for job D} = 5/6 = 0.83$$

$$\text{Critical ratio for job E} = 5/5 = 1.0$$

$$\text{Critical ratio for job F} = 5/3 = 1.67$$

Job having least critical ratio is given the first priority and so on.

Sequence :	C	D	E	B	F	A
Critical Ratio :	0.71	0.83	1.0	1.25	1.67	2.5

5. (a) A project consists of five activities. Activities P and Q run simultaneously. The relationship among the various activities is as follows:

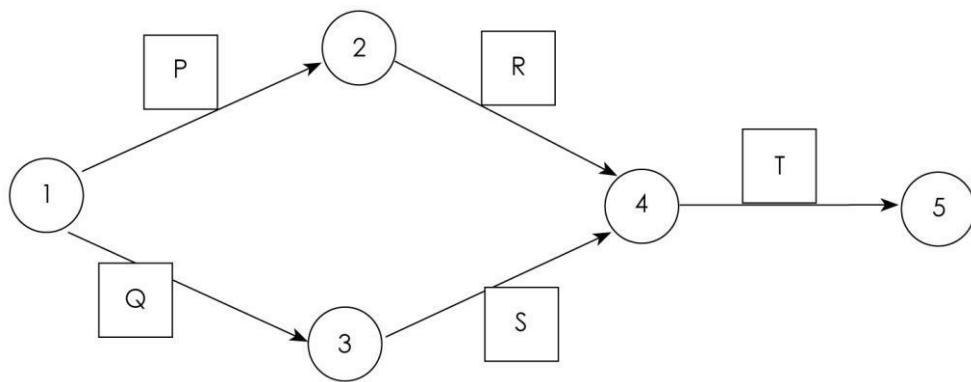
Activity	Immediate successor
P	R
Q	S

Activity T is the last operation of the project and it is also immediate successor to R and S. Draw the network of the project. [6]

(b) Indian electronics, manufactures TV sets and carries out the picture tube testing for 2000 hours. A sample of 100 tubes was put through this quality test during which two tubes failed. If the average usage of TV by the customer is 4hours/day and if 10,000 TV sets were sold, then in one year how many tubes were expected to fail and what is the mean time between failures for these tubes? [10]

Answer:

(5) (a)



(b) The total test time = (100 tubes) \times 2000 hours = 200,000 tube-hours.

There are two tubes which have failed and hence the total time is to be adjusted for the number of hours lost due to the failures during the testing.

The lost hours are computed as = $2 \times \frac{2000}{2} = 2000$ hours.

The assumption is made here is that each of the failed tubes have lasted an average of half of the test period.

Therefore, the test shows that there are two failures during $(2,00,000 - 2000) = 1,98,000$ tube hours of testing.

During 365 days a year (four hours a day) for 10,000 tubes the number of expected failures $\frac{2}{1,98,000} \times 10,000 \times 365 \times 4 = 147.47 = 148$ tubes approximately.

Mean time between failures = $\frac{1,98,000 \text{ tubes hrs. of testing}}{2 \text{ failure}}$

= $99,000 \text{ tubes hours per failure} = \frac{99,000}{4 \times 365} = 67.8 \text{ tubes year per failure.}$

SECTION – B

6. (a) Choose the correct Answer:

[1x6=6]

(i) Strategic analysis is concerned with stating the position of the organization in terms of:

- (a) Mission, choice of market segments, product selection, financial targets, external appraisal;
- (b) Mission, goals, corporate appraisal, position audit and gap analysis.
- (c) Mission goals, identification of key competitors, SWOT and environmental appraisal;
- (d) Mission, targeted ROI, manpower planning, position audit;
- (e) Mission, SWOT, competitive strategies, stakeholders position and institutional goal;

(ii) The essential ingredients of Business Process Re- engineering are:

- (a) Continuous improvements of products, processes and technologies.
- (b) Advanced planning in the areas of technologies, processes and strategic partnerships etc.
- (c) Fundamental rethinking and radical redesign of business process to achieve dramatic results.
- (d) Generation, comparison and evolution of many ideas to find out one worthy of development.
- (e) Identification and selection of layouts most suited for products and processes.

(iii) Successful differentiation strategy allows the company to:

- (a) gain buyer loyalty to its brands

Answer to MTP_ Intermediate _Syllabus 2016_Jun 2017_Set 2

- (b) charge too high a price premium
 - (c) depend only on intrinsic product attributes
 - (d) have product quality that exceeds buyers needs
 - (e) segment a market in to distinct group of buyer
- (iv) Directional policy matrix is the same as
- (a) the BCG model
 - (b) the 9 – cell GE matrix
 - (c) the life cycle portfolio analysis
 - (d) the PIMS matrix
 - (e) the 3x3 competitive positioning matrix
- (v) For an entrepreneur
- (a) Vision is before the mission
 - (b) Mission is before the vision
 - (c) Both are developed simultaneously
 - (d) Vision or mission are un-important issue
 - (e) Profitability is most crucial
- (vi) Typically profits are highest in which stage of the industry life-cycle?
- (a) Introduction
 - (b) Growth
 - (c) Maturity
 - (d) Decline

Answer:

- (6) (a) (i) (b) Mission, goals, corporate appraisal, position audit and gap analysis.
- (ii) (c) Fundamental rethinking and radical redesign of business process to achieve dramatic results.
- (iii) (a) gain buyer loyalty to its brands;
- (iv) (b) the 9 – cell GE matrix
- (v) (a) Vision is before the mission
- (vi) (b) Growth.

Answer any one question from the following:**[1x12=12]**

7. (a) What do you mean by strategy? State its features. [6]
- (b) What do you mean by Portfolio Analysis and do list down its objectives. [6]

Answer:

- (7) (a) Strategy is all about integrating organizational activities and utilizing and allocating the scarce resources within the organizational environment so as to meet the present objectives. While planning a strategy it is essential to consider that decisions are not taken in a vacuum and that any act taken by a firm is likely to be met by a reaction from those affected, competitors, customers, employees or suppliers. Strategy can also be defined as knowledge of the goals, the uncertainty of events and the need to take into consideration the likely or actual behavior of others. Strategy is the outline of decisions in an organization that shows its objectives and goals, reduces the key policies, and plans for achieving these goals, and defines the business the company is to carry on, the type of economic and human organization it wants to be, and the contribution it plans to make to its shareholders, customers and society at large.

Features of Strategy:

- (i) Strategy is important to foresight, the uncertain events of firms/industries .

- (ii) Strategy deals with long term developments rather than routine operations. For example innovations or new products, new methods of productions, or new markets to be developed in future.
- (iii) Strategy is created to deal behavior of customers and competitors.
- (iv) Strategy is a well defined roadmap of an organization. It defines the overall mission, vision and direction of an organization. The objective of a strategy is to maximize an organization's strengths and to minimize the strengths of the competitors.

(b) Portfolio analysis is a term used in describing methods of analyzing a product market portfolio with the following aims:

- (i) To identify the current strengths and weaknesses of an organisation's products in its markets, and the state of growth or decline in each of these markets.
- (ii) To identify what strategy is needed to maintain a strong position or improve a weak one.

Several matrices have been developed over the years to analyse market share, market growth and market position.

8. (a) List down various types of organizational structure.

[6]

(b) Discuss Mc Kinsey's 7-s frame work.

[6]

Answer:

(8) (a) Organizational Structure

The successful implementation of Strategy requires an effective organization structure. Organizational structure means the framework in which the organization defines how tasks are divided, resources are deployed and departments are co-ordinated.

There are several types of organizational structure:

- (1) Functional Structure
- (2) Geographic Structure
- (3) Matrix Structure
- (4) Hybrid Structure

Functional structure:

The functional structure is characterized by the simultaneous combination of similar activities and the separation of dissimilar activities on the basis of function. All Cost Accountants are located in the Cost Accounting Department, and the HOD of Cost Accounting is responsible for all cost related activities. The same is true in marketing, research and development, and manufacturing.

The functional organization form is one of the most common organizational structures found in firms pursuing strategy of concentration or very high relatedness. A functional structure is most appropriate when the organization is small to medium size and relatively stable.

Geographic structure:

Another basic form structural grouping is geographic structure, in which activities and personnel are grouped by specific geographic locations. Each geographic unit includes all functions required to produce and market products in that region.

Organization according to geographic areas or territories is rather common structural form for large-scale enterprise whose strategies need to be tailored to fit the particular needs and features of different.

Matrix structure:

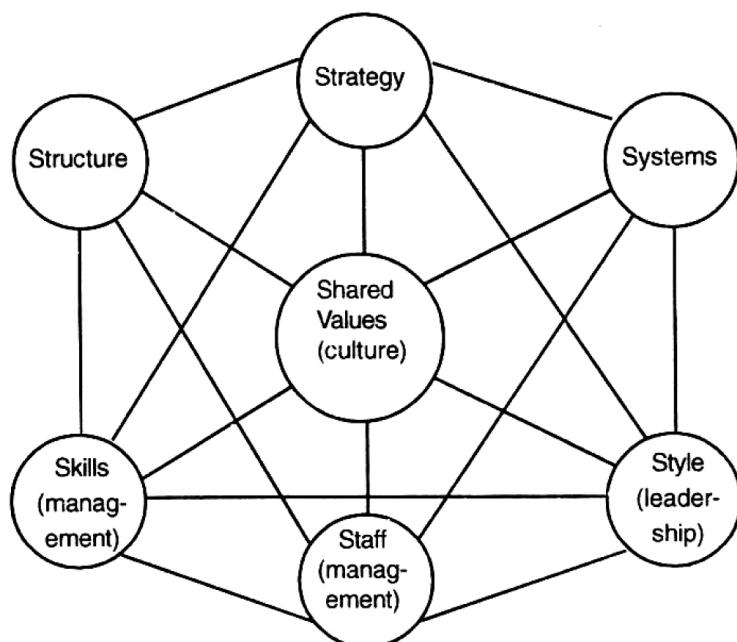
Another way to achieve focus on multiple outcomes is with the matrix structure. The matrix structure creates a dual chain of command; two lines of budget authority and two sources of performance and reward. The key feature of the matrix is that product (or business) and functional lines of authority are overlaid to form a matrix or grid, between the product manager and functional manager.

Hybrid Organization And supplemental Methods:

A single type of structural design is not always sufficient to meet the requirements of strategy. When this occurs, one option is to mix and blend the basic organizations forms, matching structure to strategy, requirement by requirement, and unit by unit, Hybrid structure is a form of departmentalization that adopts parts of both functional and divisional structures at the same level of management.

The major potential advantage of the hybrid structures is that the combination may allow the firm to gain the advantages offered by the primary structure while at least diminishing the impact of the disadvantages.

- (b)** Strategy is dependent on many variables – Internal as well as external. All factors are interrelated.



McKinsey's 7-S Framework

The McKinsey Company, a well known management consultancy firm in the United States, towards the end of 1970s was asked to find a solution to this knotty issue. The researchers Peters and Waterman found after examining America's best run companies that the problem in strategy lay in its implementation and structure was only one lever in the hands of management. The other levers were systems, staff, style, skills and superordinate goals. A strategy is usually successful when the other S's in the 7-S framework fit into or support the strategy.

- **Strategy:** A set of decisions and actions aimed at gaining a sustainable competitive advantage.
- **Structure:** The organisation chart and associated information that shows who reports to whom and how tasks are both divided and integrated.
- **Systems:** The flow of activities involved in the daily operation of a business, including its core processes and its support systems.

Answer to MTP_ Intermediate _Syllabus 2016_Jun 2017_Set 2

- **Style:** How managers collectively spend their time and attention and how they use symbolic behaviour. How management acts is more important than what management says.
- **Staff:** How companies develop employees and shape basic values.
- **Shared Values:** Commonly held beliefs, mindsets and assumptions that shape how an organisation behaves—its corporate culture.
- **Skills:** An organisation's dominant capabilities and competencies.

9. Write a short note on any of the following three questions:

[4×4=16]

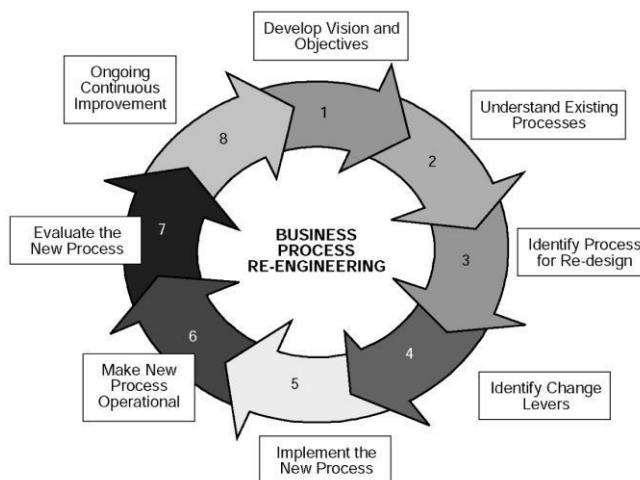
- (a) BPR;
- (b) Marketing Mix;
- (c) Benefits on contingency planning;
- (d) Corporate level management.

Answer:

(9) (a) Business process re-engineering (BPR) is a business management strategy, originally pioneered in the early 1990s, focusing on the analysis and design of workflows and processes within an organization. BPR aimed to help organizations fundamentally rethink how they do their work in order to dramatically improve customer service, cut operational costs, and become world-class competitors. In the mid-1990s, as many as 60% of the Fortune 500 companies claimed to either have initiated reengineering efforts, or to have plans to do so.

BPR seeks to help companies radically restructure their organizations by focusing on the ground-up design of their business processes. According to Davenport (1990) a business process is a set of logically related tasks performed to achieve a defined business outcome. Re-engineering emphasized a holistic focus on business objectives and how processes related to them, encouraging full-scale recreation of processes rather than iterative optimization of sub-processes.

Business process re-engineering is also known as business process redesign, business transformation, or business process change management.



The globalization of the economy and the liberalization of the trade markets have formulated new conditions in the market place which are characterized by instability and intensive competition in the business environment. Competition is continuously increasing with respect to price, quality and selection, service and promptness of delivery. Removal of barriers, international cooperation, technological innovations cause competition to intensify. All these changes impose the need for organizational

transformation, where the entire processes, organization climate and organization structure are changed. Hammer and Champy provide the following definitions:

Re-engineering is the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical contemporary measures of performance such as cost, quality, service and speed.

Process is a structured, measured set of activities designed to produce a specified output for a particular customer or market. It implies a strong emphasis on how work is done within an organization. "(Davenport 1993).

Each process is composed of related steps or activities that use people, information, and other resources to create value for customers as it is illustrated in the following example.

Principle of BPR

BPR is achieving dramatic performance improvements through radical change in organizational processes, re-architecting of business and management processes. Redesign, retooling and re-orchestrating form the key components of BPR that are essential for an organization to focus on the outcome that it needs to achieve.

(b) Marketing mix

Marketing mix is the pack of four sets of variables namely, product variables, price variables, promotion variables and place variable.

"Marketing Mix" refers to the appointment of effort, the combination, designing and integration of the elements of marketing into a programme or mix which, on the basis of an appraisal of the market forces will best achieve the objectives of an enterprise at a given time.

Kotler defines the marketing mix as the set of controllable variables and their levels that the firm uses to influence the target market. Such variables are:

- (i) Product
- (ii) Place
- (iii) Price and
- (iv) Promotion

In addition, for service-there are three more P's

They are:

- (i) People
- (ii) Processes and
- (iii) Physical evidence.

(c) Benefits of Contingency Planning

- (i) It will make the future through their proactive planning and advanced preparation.
- (ii) It will introduce original action by removing present difficulties.
- (iii) It enables to anticipate future problems.
- (iv) It will change the goals to suit internal and external changes.
- (v) It experiments with creative ideas and take initiative.
- (vi) It will attempt to shape the future and create a more desirable environment.
- (vii) It permits quick response to change,
- (viii) It prevents panic in crisis situations.
- (ix) It makes managers more adaptable to unforeseen changes.

(d) Corporate Level Management

The corporate level of management consists of the chief executive officer (CEO), other senior executives, the board of directors, and corporate staff. These individuals occupy the top-committee of decision making within the organisation. The CEO is the principal general manager. In consultation with other senior executives, the role of corporate-level managers is to oversee the development of strategies for the whole organisation. This role includes defining the mission and goals of the organisation, determining what businesses it should be in, allocating resources among the different businesses, formulating and implementing strategies that span individual businesses, and providing leadership for the organisation. For example, strategies formed for Unilever Limited would be at corporate level.

INTERMEDIATE EXAMINATION**GROUP - II****(SYLLABUS 2016)****SUGGESTED ANSWERS TO QUESTIONS****DECEMBER - 2019****Paper - 9 : OPERATIONS MANAGEMENT & STRATEGIC MANAGEMENT****Time Allowed : 3 Hours****Full Marks : 100****The figures in the margin on the right side indicate full marks.****This paper contains two Sections.****Both Sections are compulsory, subject to instructions provided against each.****All workings must form part of your answer.****Assumptions, if any, must be clearly indicated.****Section – A****Operations Management****1. (a) Choose the correct answer: $1 \times 10 = 10$** **(i) Conversion of inputs into outputs is known as**

- (A) Application of technology
- (B) Manufacturing products
- (C) Product
- (D) Operation management

(ii) Which of the following is NOT the Plant Layout Principle?

- (A) Principle of sequence
- (B) Principle of usage
- (C) Principle of maximum travel
- (D) Principle of minimum investment

(iii) Number of product varieties that can be manufactured in Mass production is

- (A) one only.
- (B) few varieties in large volume.
- (C) two only.
- (D) large varieties in small volumes.

Suggested Answers_Sy16_December 2019_Paper 9

- (iv) Scheduling shows.
- (A) which resource should do which job and when.
 - (B) total cost of production.
 - (C) total material cost.
 - (D) the flow line of materials.
- (v) Which one of the following standards is associated with the "Quality Management and Quality System Elements-Guidelines"?
- (A) ISO 9001
 - (B) ISO 9002
 - (C) ISO 9003
 - (D) ISO 9004
- (vi) In a network diagram, the activity that must be completed prior to the start of an activity is called as
- (A) Successor activity
 - (B) Predecessor activity
 - (C) Concurrent activity
 - (D) Dummy activity
- (vii) Identify which one of the following is NOT the objective of the maintenance:
- (A) To keep all production facilities and allied facilities in an optimum working condition.
 - (B) To ensure specified accuracy to products and time schedule of delivery to customers.
 - (C) To keep the down time of the machine at the maximum.
 - (D) To keep the production cycle within the stipulated range.
- (viii) One of the important charts used in Programme control is
- (A) Gantt chart
 - (B) Material chart
 - (C) Distribution chart
 - (D) Maintenance chart
- (ix) The act of going round the production shop to note down the progress of work and feedback the information is known as
- (A) Dispatching
 - (B) Routing
 - (C) Follow up
 - (D) Trip card

Suggested Answers_Sy16_December 2019_Paper 9

- (x) With reference to the characteristics of a good product design, which one of the following is referred to "the ease of manufacture with minimum cost"?
- (A) Reliability
 (B) Productibility
 (C) Specification
 (D) Simplification

(b) Match Column A with Column B:**1x6=6**

Column A	Column B
(A) Use of minimal amounts of resources to produce a high volume of high quality goods with some variety	(i) KAIZEN
(B) Arranging and grouping of machines which are meant to produce goods	(ii) Network
(C) The extent to which a firm will produce goods or provide services in-house or go for outsourcing	(iii) Monte Carlo Method
(D) A given problem is solved by simulating the original data with random number generators	(iv) Lean Production
(E) The principle of continuous improvement	(v) Make or Buy Decisions
(F) A graphical representation of all the activities and events arranged in a logical and sequential order	(vi) Layout

(c) State whether the following statements are 'True' or 'False':**1x6=6**

- (i) The full form of the word MRP in the term "MRP II" is Material Requirements Planning.
- (ii) Strikes and lock-out are controllable factors affecting Capacity Planning.
- (iii) Queue Discipline refers to the order in which customers are processed.
- (iv) ISO Standards are reviewed every four years and revised if needed.
- (v) The CPM has the advantage of decreasing completion times by probably spending more money.
- (vi) The rotatable spares are spare parts which are required regularly and in substantial number.

Answer:**1. (a)**

- (i) (D) Operation management
 (ii) (C) Principle of maximum travel
 (iii) (B) few varieties in large volume.
 (iv) (A) which resource should do which job and when.
 (v) (D) ISO 9004
 (vi) (B) Predecessor activity
 (vii) (C) To keep the down time of the machine at the maximum.

Suggested Answers_Sy16_December 2019_Paper 9

(viii) (A) Gantt chart

(ix) (C) Follow up

(x) (B) Productibility

1. (b)

(A) (iv) Lean Production

(B) (vi) Layout

(C) (v) Make or Buy Decisions

(D) (iii) Monte Carlo Method

(E) (i) KAIZEN

(F) (ii) Network

1. (c)

(i) False

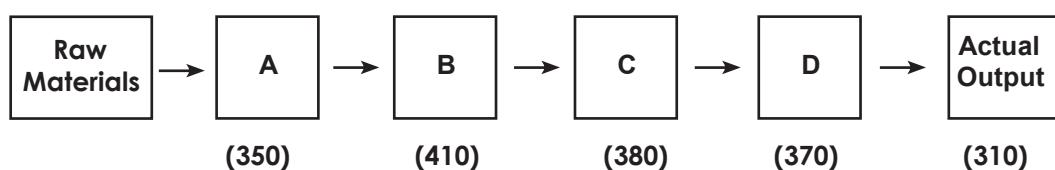
(ii) False

(iii) True

(iv) False

(v) True

(vi) False

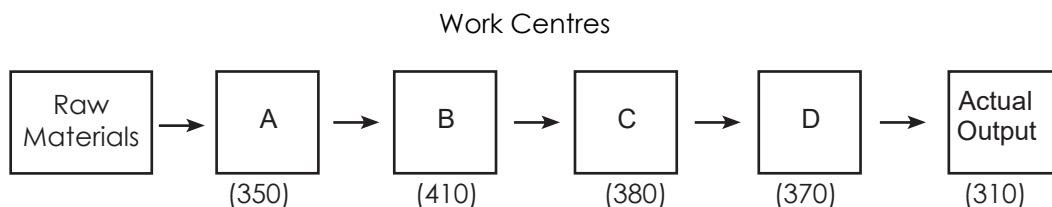
Answer any three questions from the following: **$16 \times 3 = 48$** **2. (a) Enumerate the characteristics of a modern operations function.****7****(b) A firm has four work centres, A, B, C and D, in series with individual capacities in units per day shown in the figure below:** **$3 \times 3 = 9$** **Work Centres****(i) Identify the bottle neck centre.****(ii) Determine the system capacity.****(iii) Determine the system efficiency.**

Suggested Answers_Sy16_December 2019_Paper 9**Answer:**

2. (a) Today's production system is characterised by the following features:

1. **Manufacturing as Competitive Advantage:** Unlike the past, today plants have excess capacities, competition is mounting and firms look for competitive edge and firms intend to exploit the potential. Total Quality Management (TQM), Time-Based Competition, Business Process Re-engineering (BPRE), Just-in-Time (JIT), Focused Factory, Flexible Manufacturing Systems (FMS), Computer Integrated Manufacturing (CIM), and The Virtual Corporation are but only some techniques which the companies are employing to gain competitive advantage.
2. **Services Orientation:** Service sector is gaining greater relevance these days. The production system, therefore, needs to be organised keeping in mind the peculiar requirements of the service component. The entire manufacturing needs to be geared to serve (i) intangible and perishable nature of the services, (ii) constant interaction with clients or customers, (iii) small volumes of production to serve local markets, and (iv) need to locate facilities to serve local markets. There is increased presence of professionals on the production, instead of technicians and engineers.
3. **Disappearance of Smokestacks:** Protective labour legislation, environmental movement and gradual emergence of knowledge based organisations have brought total transformation in the production system. Today's factories are aesthetically designed and built, environment friendly - in fact, they are homes away from homes. Going to factory every day is no more excruciating experience, it is like holidaying at a scenic spot.
4. **Small has Become Beautiful:** E. F. Schumacher, in his famous book Small is Beautiful, opposed giant organisations and increased specialisation. He advocated, instead, intermediate technology based on smaller working units, community ownership, and regional workplaces utilising local labour and resources. Businessmen, all over the world, did not believe in Schumacher's philosophy. Inspired by economies of scale, industrialists went in for huge organisations and mass production systems.

(b) A firm has four work centres.



- (i) the bottleneck centre is the work centre having the minimum capacity. Hence, work centre 'A' is the bottleneck centre.
- (ii) System capacity is the maximum units that are possible to produce in the system as a whole. Hence, system capacity is the capacity of the bottleneck centre i.e., 350 units.
- (iii) System efficiency = Actual output/ System capacity = $(310/350) \times 100$ (i.e. maximum possible output) = 88.57%

Suggested Answers_Sy16_December 2019_Paper 9**3. (a) What do you understand by Process Design and Selection?****3+5=8****(b) The following data is available for a manufacturing unit:**

No. of operators	16
Daily working hours	8
No. of days per month	25
Standard production per month	400 units
Standard labour hours per units	8

The following information was obtained for June 2019:

Man days lost due to absenteeism	36
Units produced	300
Idle time	260 man hours

Find the following:**2×4=8**

- (i) Per cent absenteeism
- (ii) Efficiency of utilization of labour
- (iii) Productive efficiency of labour
- (iv) Overall productivity of labour in terms of units produced per man per month.

Answer:**3. (a)**

Process Design is concerned with the overall sequences of operations required to achieve the product specifications. It specifies the type of work stations to be used, the machines and equipment necessary to carry out the operations. The sequence of operations is determined by (i) the nature of the product, (ii) the materials used, (iii) the quantities to be produced, and (iv) the existing physical layout of the plant.

The process design is concerned with the following:

- (i) Characteristics of the product or service offered to the customers.
- (ii) Expected volume of output.
- (iii) Kinds of equipments and machines available in the firm.
- (iv) Whether equipments and machines should be of special purpose or general purpose.
- (v) Cost of equipments and machines needed.
- (vi) Kind of labour skills available, amount of labour available and their wage rates.
- (vii) Expenditure to be incurred for manufacturing processes.
- (viii) Whether the process should be capital-intensive or labour-intensive.
- (ix) Make or buy decision.
- (x) Method of handling materials economically.

Suggested Answers_Sy16_December 2019_Paper 9**3. (b)**

- (i) Percent absenteeism = [(No. of Hrs. lost in absenteeism in a month)/(Total working hours per month)] x 100 = $(36 \times 8) / (16 \times 25 \times 8) = 0.09 \times 100 = 9\%$
- (ii) Efficiency of utilization of labour = [(Standard labour hour to produce 300 units) / (Total labour hour)] x 100 = $[(300 \times 8) / (16 \times 25 \times 8)] \times 100 = 75\%$
- (iii) Determination of Productive efficiency of labour:-
 Standard time required to produce 300 units = $300 \times 8 = 2400$ labour hours. In June 2019, man hours lost = $36 \times 8 = 288$
 In June 2019, Idle time (in hours) = 260 Total loss of time = 548 hrs.
 Productive hours available in June 2019 = $16 \times 25 \times 8 = 3,200$ hrs. Less, Total loss of time: 548 hrs.
 Actual Labour hours = $3200 - 548 = 2,652$ hrs
 Productive efficiency of labour = $[(\text{Standard Labour hours}) / (\text{Actual labour hours})] \times 100$
 $= (2400/2652) \times 100$
 $= 90.497\%$
 $= 90.50\% \text{ (approx.)}$
- (iv) Overall productivity of labour in terms of units produced per man per month: 16 men produce 400 units, Standard labour productivity = $400/16 = 25$ units In June 2019, overall productivity = $300/16 = 18.75$ units
 i.e. productivity falls by $[(25-18.75)/25] \times 100 = 25\%$

4. (a) Find the Initial Feasible Solution by North-West Corner method.

8

	W1	W2	W3	W4	Supplies
F1	10	12	14	18	210
F2	25	19	21	30	330
F3	18	16	11	23	430
F4	28	34	17	15	290
Demand	270	390	320	280	

W_j = Warehouse**F_i = Factory****Cell entries are unit costs in ₹**

- (b) A retailer is dealing with FMCG items. The table, as given below, presents the past data of demand per week in hundred kgs with frequency.

Demand/Week	0	5	10	15	20	25
Frequency	3	7	5	11	18	6

Suggested Answers_Sy16_December 2019_Paper 9

Using the following sequence of the random numbers, generate the demand for the next 10 weeks. Also find out the average demand per week.
6+2=8

Random Nos.	27	43	50	11	16	36
	58	64	51	38	18	47

Answer:**4. (a) The Initial Feasible Solution**

	W1	W2	W3	W4	Supplies
F1	210			18	210
F2	10	12	14		
F3	60	270			330
F4	25	19	21	30	
	18	120	310		430
	18	16	11	23	
	28	34	17	10	290
Demand	270	390	320	280	

W_j = WarehouseF_i = Factory

Cell entries are unit costs in ₹

(b)

Random No. Range Table for Demand				
Demand per week	Frequency (f)	Probability (p=f/Σf)	Cumulative Probability	Range of Random numbers
0	3	0.06	0.06	0-5
5	7	0.14	0.20	6-19
10	5	0.10	0.30	20-29
15	11	0.22	0.52	30-51
20	18	0.36	0.88	52-87
25	6	0.12	1.00	88-99
	Σf=50	1.00		

Suggested Answers_Syl16_December 2019_Paper 9

Simulated Values for next 10 weeks		
Weeks	Random nos.	Demand
1	27	10
2	43	15
3	50	15
4	11	05
5	16	05
6	36	15
7	58	20
8	64	20
9	51	15
10	38	15
Total:	-	135

Average weekly demand is = $135/10=13.5$

5. (a) Draw the network for the following activities and find the Critical Path and Total duration of the project. 6

Activity	Predecessor	Duration (months)
A	-	2
B	-	3
C	-	5
D	A	4
E	B	1
F	B	5
G	C	8
H	D	1
I	E	2
J	F, G	4
K	H, I	3
L	K, J	2

Suggested Answers_Sy16_December 2019_Paper 9

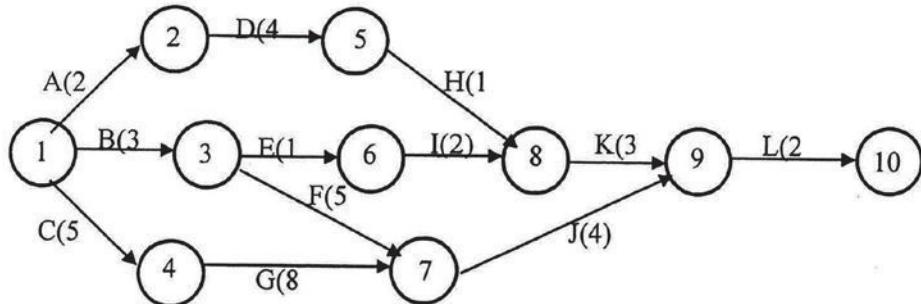
(b) RST Company has kept records of breakdown of its machines for 300 days work year as shown below:

No. of Breakdown	Frequency in days
0	50
1	140
2	60
3	30
4	20
Total	300

The company estimates that each breakdown costs ₹600 and is considering adopting a preventive maintenance program which would cost ₹ 250 per day and limit the number of breakdown to an average of one per day. What is the expected annual savings from preventive maintenance program? 10

Answer:

5. (a)



Calculation of Critical path:

- (i) A-D-H-K-L = $2+4+1+3+2 = 12$
- (ii) B-E-I-K-L = $3+1+2+3+2 = 11$
- (iii) B-F-J-L = $3+5+4+2 = 14$
- (iv) C-G-J-L = $5+8+4+2 = 19$ = Critical Path (Project duration)

(b) Step-1:

No. of Breakdowns (X)	Frequency of breakdowns in days; i.e. f(x)	Probability distribution of breakdowns; i.e. p(x)	Expected value of breakdown X p(x)
0	50	$50/300 = 0.167$	Nil
1	140	$140/300 = 0.466$	0.466
2	60	$60/300 = 0.200$	0.400

Suggested Answers_Sy16_December 2019_Paper 9

3	30	$30/300 = 0.100$	0.300
4	20	$20/300 = 0.067$	0.268
Total:	300	1.000	1.434

Step - 2 :

Total no. of breakdowns per day = 1.434

Cost of breakdown per day = $1.434 \times 600 = 860.4/-$

Cost of preventive maintenance program per day = ₹ 250 + 600 = 850/- Expected annual savings from the preventive maintenance program = $(860.4 - 850) \times 300 = 10.4 \times 300 = ₹ 3,120$

Section - B**Strategic Management****6. Choose the correct answer:****1x6=6**

- (i) Which of the following statements can be closely related with the Mission?
- (A) It includes definition of products & services the organization provides.
 - (B) It specifies management policies towards customers and societies.
 - (C) It provides a roadmap to company's future.
 - (D) It indicates the kind that company management is trying to create for future.
- (ii) Portfolio Analysis is a term used
- (A) to identify what strategy is needed to maintain a strong position or improve a weak one.
 - (B) to find out a best alternative out of various alternatives available.
 - (C) to analyse products and business by market share and market growth.
 - (D) to make managers more adaptable to unforeseen changes.
- (iii) Which one of the following is NOT a role of Marketing?
- (A) It helps in sustaining and improving the existing levels of employment.
 - (B) It helps in the economic growth of a country.
 - (C) It helps in the discovery of entrepreneurial talent.
 - (D) It diminishes potential aggregate demand and thus reduces the size of the market
- (iv) Which one of the following is NOT the benefit of a Vision?
- (A) It helps in the creation of common identity and a shared sense of purpose.
 - (B) It fosters risk taking and experimentation.
 - (C) It fosters short-term thinking.
 - (D) It represents integrity.

Suggested Answers_Sy16_December 2019_Paper 9

- (v) The competitive position of a company's SBU or product line can NOT be classified as one of the following:
- (A) Dominant
 (B) Strong
 (C) Favourable
 (D) Volatile
- (vi) The best test of a successful Strategy Implementation is
- (A) whether the strategies and procedures are observed in the strategy supportive fashion.
 (B) whether the structure is well-matched to strategy.
 (C) whether actual organizational performance matches or exceeds the targets spelt out in the strategic plan.
 (D) whether it is made after the strategy is formulated, so that it is supportive to the strategy.

Answer:

- (i) (A) It includes definition of products & services the organization provides.
- (ii) (A) to identify what strategy is needed to maintain a strong position or improve a weak one.
- (iii) (D) It diminishes potential aggregate demand and thus reduces the size of the market.
- (iv) (C) It fosters short-term thinking.
- (v) (D) Volatile
- (vi) (C) whether actual organizational performance matches or exceeds the targets spelt out in the strategic plan.

Answer any two questions from the following:**12x2=24**

7. (a) Define the term 'strategy' and list the characteristics of a strategic decision. **2+6=8**
- (b) What do you understand by Product Development Strategy? **4**

Answer:**7. (a)**

Strategy may be defined as the direction and scope of a organisation over the long term, which achieves advantage for the organisation through the configuration of resources within a changing environment and to fulfill stakeholder expectations.

The definition of strategy encompasses a comprehensive master approach that states how the corporation will achieve its mission and objectives. It maximizes competitive advantage and minimizes competitive disadvantage.

The characteristics of a strategic decision/strategy:

- (i) Strategy is likely to be concerned with long-term direction of an organisation.

Suggested Answers_Sy16_December 2019_Paper 9

- (ii) Strategic decisions are normally about trying to achieve some advantage for the organisation over competition.
- (iii) Strategy is likely to be concerned with the scope of the organisation's activities.
- (iv) Strategy can be seen as matching the resources and activities to the environment in which it operates.
- (v) Strategy can be seen as stretching an organisation's resources and competences to create new opportunities or to capitalise on them.
- (vi) Strategies may require major resource changes for an organisation.
- (vii) Strategic decisions are likely to affect operational decisions.
- (viii) The strategy of an organisation is affected not only by environmental factors and resource availability but also by the values and expectations of those who have power in and around the organisation.

7. (b)

Product Development Strategy involves extending the product range available to the firm's existing markets. These products may be obtained by:

- (i) investment in the research and development of additional products;
- (ii) acquisition of rights to produce someone else's product;
- (iii) buying-in the product and 'badging' it;
- (iv) joint development with owners of another product who need access to the firm's distribution channels or brands.

The critical factor to the success of this strategy is the profitability of the customer group for which the products are being developed. Also the firm's present competitive advantages in serving the market must confer on to the new good. These can include:

- (i) customer information that allows accurate targeting;
- (ii) established distribution channels;
- (iii) a brand which can be credibly applied to the new product.

8. (a) What do you mean by Contingency Plans? Illustrate some contingency plans commonly established by firms. 1+5=6

(b) What are the three most important characteristics of SBU? List down major reasons of using SBU approach. 3+3=6

Answer:

8. (a) Contingency Plans:

Contingency plans can be defined as alternative plans that can be put into effect if certain key events do not occur as expected.

Some contingency plans commonly established by firms:

1. If a major competitor withdraws from particular markets as intelligence reports indicate, what actions should our firm take?
2. If our sales objectives are not reached, what actions should our firm take to avoid profit losses?
3. If demand for our new product exceeds plans, what actions should our firm take to meet the higher demand?

Suggested Answers_Sy16_December 2019_Paper 9

4. If certain disasters occur—such as loss of computer capabilities; a hostile takeover attempt; loss of patent protection; or destruction of manufacturing facilities because of earthquakes, tornadoes, or hurricanes — what actions should our firm take?
5. If a new technological advancement makes our new product obsolete sooner than expected, what actions should our firm take?

(b) Three most important characteristics of SBU:

- It is a single business or a collection of related businesses which offer scope for independent planning and which might feasibly stand-alone from the rest of the organisation.
- Has its own set of competitors.
- Has a manager who has responsibility for strategic planning and profit performance, and who has control of profit-influencing factors.

Major reasons of using SBU approach :

- A scientific method of grouping the businesses of a multi-business corporation which helps the firm in strategic planning.
- An improvement over the geographical grouping of businesses and strategic planning based on locational units.
- An SBU is a grouping of related businesses that can be taken up for strategic planning distinct from the rest of the businesses.
- Grouping the businesses on SBU lines helps the firm in strategic planning by removing the ambiguity and confusion generally seen in grouping businesses,
- Each SBU is a separate business from the strategic planning standpoint. In the basic factors, viz., mission, objectives, competition and strategy-one SBU will be distinct from another.
- Each SBU will have its own distinct set of competitors and its own distinct strategy.
- Each SBU will have a CEO. He will be responsible for strategic planning for the SBU and its profit performance; he will also have control over most of the factors affecting the profit of the SBU.

9. Write short notes on any three of the following:

4x3=12

- (a) Name the steps involved in the formulation of production strategy.**
- (b) Write a brief note on 'Behaviour Control' aspect of Strategic Control System.**
- (c) What are the various types of firms/organizations where BPR can be applied?**
- (d) What are the various approaches in Strategic Planning?**

Answer:

9. (a) Steps involved in the formulation of production strategy

- (i) Study the overall corporate plan and define the objectives.
- (ii) Analyse the present production operations and the present and future environment.
- (iii) Review sales - forecast and marketing.
- (iv) Make strategic decisions for production.

Suggested Answers_Sy16_December 2019_Paper 9

(b) 'Behaviour Control' aspect of Strategic Control System

The establishment of a comprehensive system of rules and procedures to direct the actions or behaviour of divisions, functions and individuals is called behaviour control. The main purpose of having behaviour control is not to specify goals but to standardise the way of reaching them. It is felt that if rules are standardised then outcomes are predictable. It is of utmost importance that the management reviews behaviour controls over time. The rules that have been established tend to increase over time leading to inflexibility to react to the changing environment thereby adversely affecting the organisation's competitive advantage.

(c) Types of firms/organizations where BPR can be applied

BPR could be implemented to all firms (manufacturing firms, retailers, services, etc.) and public organizations that satisfy the following criteria:

- Minimum Number of employees: 20 (at least 4 in management positions).
- Strong management commitment to new ways of working and innovation.
- Well formed IT infrastructure.

Business Process Reengineering could be applied to companies that confront problems such as the following:

- High operational costs
- Low quality offered to customers
- High level of "bottleneck" processes at pick seasons
- Poor performance of middle level managers
- Inappropriate distribution of resources and jobs in order to achieve performance, etc.

(d) Approaches in Strategic Planning

There are three approaches that can be adopted to strategic planning:

- (i) A top-down process, in which managers are given targets to achieve which they pass on down the line.
- (ii) A bottom-up process, in which functional and line managers in conjunction with their staff submit plans, targets and budgets for approval by higher authority.
- (iii) An iterative process, which involves both the top-down and bottom-up setting of targets. There is a to-and-from movement between different levels until agreement is reached. However, this agreement will have to be consistent with the overall mission, objectives and priorities and will have to be made within the context of the financial resources available to the organization. The iterative approach, which involves the maximum number of people, is the one most likely to deliver worthwhile and acceptable strategic plans.

Suggested Answer_Syl16_June2019_Paper_9

INTERMEDIATE EXAMINATION

GROUP II

(SYLLABUS 2016)

SUGGESTED ANSWERS TO QUESTIONS

JUNE 2019

Paper- 9: OPERATIONS MANAGEMENT AND STRATEGIC MANAGEMENT

Time Allowed: 3 Hours

Full Marks: 100

The figures in the margin on the right side indicate the full marks.

This paper contains two Sections.

Both Sections are compulsory, subject to instructions provided against each.

All working must form part of your answer.

Assumptions, if any, must be clearly indicated.

Section A

Operations Management

1. (a) Choose the correct answer: **1x10=10**

(i) Inventory cost per product in intermittent production is

- (A) Higher
- (B) Lowest
- (C) Medium
- (D) Abnormal

(ii) The act of assessing the future and make provisions for it is known as

- (A) Planning
- (B) Forecasting
- (C) Assessment
- (D) Scheduling

Suggested Answer_Syl16_June2019_Paper_9

- (iii) One of the important charts used in Programme control is
- Material chart
 - Gantt chart
 - Route chart
 - Inspection chart
- (iv) Cost reduction can be achieved through
- Work sampling
 - Value analysis
 - Quality assurance
 - Supply chain management
- (v) Linear Programming is a technique used for determining
- Production Programme
 - Plant Layout
 - Product Mix
 - Manufacturing Sequence
- (vi) $(\text{Total station time/cycle time} \times \text{Number of work stations}) \times 100$ is known as
- Line efficiency
 - Line smoothness
 - Balance delay of line
 - Station efficiency
- (vii) Arrangement of machines depending on sequence of operations happens in
- Process Layout
 - Product Layout
 - Hybrid Layout
 - Group Technology Layout
- (viii) Line of Best fit is another name given to
- Method of Least Squares
 - Moving Average Method
 - Semi Average Method
 - Trend Line Method
- (ix) In route sheet or operation layout, one has to show
- A list of materials to be used.
 - A list of machine tools to be used.

Suggested Answer_Syl16_June2019_Paper_9

- (C) Every work center and the operation to be done at that work center.
- (D) The cost of product.
- (x) Computers are used in Production control in this area
- (A) follow-up activity.
- (B) to control labour.
- (C) to disseminate information.
- (D) Loading, Scheduling and Assignment works.

(b) Match Column A with Column B:

1x6=6

Column A	Column B
(A) Cost Benefit Analysis	(i) Crashing
(B) Network Analysis	(ii) Product Design
(C) Television Set	(iii) Plant Layout
(D) Use of Templates	(iv) Method Study
(E) Computer Aided Design	(v) Project Viability Checking
(F) Motion Economy	(vi) Assembly Line

(c) State whether the following statements are 'True' or 'False':

1x6=6

- (i) A work stoppage generally reduces the cost of production.
- (ii) Depending on the need, the maintenance activity may be centralized or decentralized.
- (iii) Piece wage system is a substitute for proper supervision.
- (iv) Most suitable layout for continuous production is Matrix Layout.
- (v) Addition of value to raw materials through application of technology is production.
- (vi) Breakdown maintenance doesn't require use of standby machines.

Answer:

1. (a)

- (i) (A) Higher
- (ii) (B) Forecasting
- (iii) (B) Gantt Chart
- (iv) (B) Value analysis
- (v) (C) Product Mix

Suggested Answer_Syl16_June2019_Paper_9

- (vi) (A) Line efficiency
- (vii) (B) Product Layout
- (viii) (A) Method of Least Squares
- (ix) (C) Every work center and the operation to be done at that work center
- (x) (D) Loading, Scheduling and Assignment works.

1. (b)

- A - (v) Project viability checking
- B - (i) Crashing
- C - (vi) Assembly Line
- D - (iii) Plan Layout
- E - (ii) Product design
- F - (iv) Method Study

1. (c)

- (i) False
- (ii) True
- (iii) False
- (iv) False
- (v) True
- (vi) False

Answer any three questions from the following:

16x3=48

- 2. (a) List down various activities lying under Production and Operations Management function.**
- (b) The present layout is shown in the figure. The manager of the department is intending to interchange the departments C and F in the present layout. The handling frequencies between the departments is given. All the departments are of the same size and configuration. The material handling cost per unit length travel between departments is same. What will be the effect of interchange of departments C and F in the layout?**

6+10=16

A	C	E
B	D	F

Suggested Answer_Syl16_June2019_Paper_9

From / To	A	B	C	D	E	F
A	—	0	80	150	60	10
B	—	-	90	0	90	110
C	-	-	-	40	0	5
D	--	-	-	-	160	20
E	—	-	—	—	—	60
F	-	-	-	-	-	-

Answer:

2. (a) Various activities lying under Production and Operations Management functions:

- (i) Location of facilities.
- (ii) Plant layouts and Material Handling.
- (iii) Product Design.
- (iv) Process Design.
- (v) Production Planning and Control.
- (vi) Quality Control.
- (vii) Materials Management.
- (viii) Maintenance Management.

(b) (i) The distance matrix of the present layout:

From / To	A	B	C	D	E	F
A		1	1	2	2	3
B			2	1	3	2
C				1	1	2
D					2	1
E						1
F						-

- (ii) Computation of total cost matrix (combining the inter-departmental material handling frequencies and distance matrix).

Suggested Answer_Syl16_June2019_Paper_9

From / To	A	B	C	D	E	F	Total
A		0	80	300	120	30	530
B			180	0	270	220	670
C				40	0	10	50
D					320	20	340
E						60	60
F							-
Total							1,650

If the departments are interchanged, the layout will be represented as shown below.

A	F	E
B	D	C

(iii) The distance matrix and the cost matrix of the new layout are shown:

From / To	A	B	C	D	E	F
A		1	3	2	2	1
B			2	1	3	2
C				1	1	2
D					2	1
E						1
F						-

(iv) Total cost matrix for the modified layout.

From / To	A	B	C	D	E	F	Total
A		0	240	300	120	10	670
B			180	0	270	220	670
C				40	0	10	50
D					320	20	340
E						60	60
F							-
Total							1,790

(v) Interpretation and conclusion: The interchange of departments C and F increases the total material handling cost. Thus, it is not a desirable modification.

Suggested Answer_Syl16_June2019_Paper_9

3. (a) Examine the following types of Process decisions:

(i) Job Shop Process

(ii) Project Process

(b) Describe the different types of Production Control.

(3x2)+10=16

Answer:

3. (a) Examination of the following types of Process decisions:

(i) **Job shop process:** It is used in job shops when a low volume of high-variety goods are needed. Processing is intermittent, each job requires somewhat different processing requirements. A job shop is characterised by high customisation (made to order), high flexibility of equipment and skilled labour and low volume. A tool and die shop is an example of job shop, where **job process** is carried out to produce one-of-a kind of tools. Firms having job shops often carry out job works for other firms. A job shop uses a flexible flow strategy, with resources organised around the process.

(ii) **Project process:** It is characterised by high degree of job customisation, the large scope for each project and need for substantial resources to complete the project. Examples of projects are building a shopping centre, a dam, a bridge, construction of a factory, hospital, developing a new product, publishing a new book etc. Projects tend to be complex, take a long time and consist of a large number of complex activities. Equipment flexibility and labour skills can range from low to high depending on the type of projects.

(b) Production control can be of six types:

(i) **Block control**

This type of control is most prominent in textiles and book and magazine printing. In these industries it is necessary to keep things separated and this is the fundamental reason why industries resort to block control.

(ii) **Flow control**

This type of control is commonly applied in industries like chemicals, petroleum, glass, and some areas of food manufacturing and processing. Once the production system is thoroughly designed, the production planning and control department controls the rate of flow of work into the system and checks it as it comes out of the system. But, under this method, routing and scheduling are done when the plant is laid out. That is to say, the production line which is established is well balanced and sequenced before production operations begin; this type of control is more prevalent in continuous production systems.

(iii) **Load control**

Load control is typically found wherever a particular bottleneck machine exists in the process of manufacturing.

Suggested Answer_Syl16_June2019_Paper_9

(iv) Order control

The most, common type of production control is called order control. This type of control is commonly employed in companies with intermittent production systems, the so-called job-lot shops. Under this method, orders come into the shop for different quantities for different products. Therefore, production planning and control must be based, on the individual orders.

(v) Special project control

Special production control is necessary in certain projects like the construction of bridges, office buildings, schools, colleges, universities, hospitals and any other construction industries. Under this type of control, instead of having sets of elaborate forms for tooling and scheduling, a man or a group of men keeps in close contact with the work.

(vi) Batch control

Batch control is another important, type of production control which is frequently found in the food processing industries.

- 4. (a) A Project consists of four major jobs, for which four contractors have submitted tenders. The tender amounts, in thousands of Rupees, are given below:**

Contractor	Jobs			
	A	B	C	D
1	110	98	75	95
2	85	95	115	65
3	105	135	125	98
4	95	95	75	95

Find the assignment, which minimizes the total cost of the Project. Each contractor has to be assigned one job.

- (b) A Taxi operator is planning to open a computerised ticket counter in the center of the city, staffed by one ticket agent. It is estimated that requests for tickets and information will average 18 per hour, and requests will have a Poisson distribution.**

Service time is assumed to be exponentially distributed. Previous experience with similar computerised operations suggests that mean service time should average about 2-5 minutes per request.

Determine each of the following:

(i) System utilization

(ii) Percentage of time the server (agent) will be idle.

Suggested Answer_Syl16_June2019_Paper_9

(iii) The expected number of customers waiting to be served

(iv) The average time customers will spend in the system.

$8+(2 \times 4)=16$

Answer:

4. (a)

The given problem is a standard minimization problem. Subtracting the minimum element of each row from all its elements in turn, the given problem reduces to:

Contractor	Jobs			
	A	B	C	D
1	35	23	0	20
2	20	30	50	0
3	7	37	27	0
4	20	20	0	20

Now subtract the minimum element of each column from all of its elements in turn. Draw the minimum number of lines, horizontal or vertical, so as to cover all zeros:

Contractor	Jobs			
	A	B	C	D
1	28	3	0	20
2	13	10	50	0
3	0	17	27	0
4	13	0	0	20

Since the minimum number of lines to cover all zeroes is equal to 4 (= order of the matrix), this matrix will give optimal solution. The optimal assignment is made in the matrix below:

Contractor	Jobs			
	A	B	C	D
1	28	3	0	20
2	13	10	50	0
3	0	17	27	0
4	13	0	0	20

Suggested Answer_Syl16_June2019_Paper_9

The optimal assignment is:

Contractors	Job	Cost (in thousands of Rupees)
1	C	75
2	D	65
3	A	105
4	B	95

Hence, total minimum cost of Project will be ₹ 3,40,000.

Answer:

4. (b)

Arrival Rate = $\lambda = 18$ customers per hour

Service Rate = $\mu = 1 / \text{service time} = (1 \text{ customer} / 2.5 \text{ minutes}) \times 60 \text{ minutes per hour} = 24$ customers per hour

- (i) System Utilisation = $p = \lambda / \mu = 18 / (1 \times 24) = 0.75$
- (ii) Percentage idle time = $1 - p = 1 - 0.75 = 0.25$, or 25 percent
- (iii) Expected no. of customers waiting to be served = $L_q = \lambda^2 / \mu(\mu - \lambda)$
 $= (18)^2 / [24 \times (24 - 18)] = 2.25$ customers
- (iv) Average time customers will spend in the system =
 $W_s = (L_q / \lambda) + (1/\mu) = (2.25/18) + (1/24) = 0.1667$ hrs = 10 minutes.

- 5. (a)** Table shows the time remaining (number of days until due date) and the work remaining (number of days still required to finish the work) for 5 jobs which were assigned the letters A to E as they arrived to the shop. Sequence these jobs by priority rules viz., (i) FCFS, (ii) EDD, (iii) LS, (iv) SPT and (v) LPT.

Job	Number of days until due date	Number of days of work remaining
A	10	8
B	4	5
C	8	7
D	11	4
E	5	9

Suggested Answer_Syl16_June2019_Paper_9

- (b) An electronic device components manufacturing company carries out the 'A' components testing for 2500 hours. A sample of 100 'A' components was put through this quality test during which two components failed. If the average usage of the electronic device by the customer is 5 hours/day and if 12,000 such devices were sold, then in one year how many 'A' components were expected to fail and what is the mean time between failures for these components? $(2 \times 5) + 6 = 16$

Answer:

5. (a)

Job	Number days until due date	Number of days of work remaining
A	10	8
B	4	5
C	8	7
D	11	4
E	5	9

- (i) FCFS (First come first served) : Since the jobs are assigned letters A to E as they arrived /to the shop, the sequence according to FCFS priority rule is A B C D E
- (ii) EDD (Early due date job first) rule : Taking into account the number of days until due date, the sequence of jobs as per EDD rules is

Job	B	E	C	A	D
No. of days until due date	4	5	8	10	11

- (iii) L.S. (Least slack) rule also called as Minimum slack rule.

Calculation of slack:

Slack = (Number of days until due date) - (Number of days of work remaining)

Job	No. of days until/due date	No. of days of work remaining	Slack (Days)
A	10	8	$10 - 8 = 2$
B	4	5	$4 - 5 = -1$
C	8	7	$8 - 7 = 1$
D	11	4	$11 - 4 = 7$
E	5	9	$5 - 9 = -4$

Suggested Answer_Syl16_June2019_Paper_9

Sequence :

Job	E	B	C	A	D
Slack	-4	-1	1	2	7

Here the jobs are sequenced in ascending order of magnitude of their respective slacks.

- (iv) SPT (Shortest Processing Time job first) also referred as SOT (Shortest Operation time job First) rule or MINPRT (Minimum Processing time job first) rule. As per this rule, jobs are sequenced in ascending order of magnitude of their respective processing time.

Sequence :

Job	D	B	C	A	E
Processing Time (Days)	4	5	7	8	9

- (v) LPT (Longest Processing time job first) also referred to as LOT (Longest operation time job first) rule.

As per this rule jobs are sequenced in descending order of magnitude of their respective processing times.

Sequence:

Job	E	A	C	B	D
Processing Time (Days)	9	8	7	5	4

- (b) The total test time = (100 components) \times 2500 hours = 250,000 component-hours.

There are two components which have failed and hence the total time is to be adjusted for the number of hours lost due to the failures during the testing.

The lost hours are computed as = $(2 \times 2500) / 2 = 2500$ hours.

The assumption is made here is that each of the failed tubes have lasted an average of half of the test period.

Therefore, the test shows that there are two failures during $(2,50,000 - 2500) = 2,47,500$ component hours of testing.

During 365 days a year (four hours a day) for 12,000 components the number of expected failures = $(2 \times 12,000 \times 365 \times 5) / 2,47,500 = 176.97 = 177$ components approximately.

Mean time between failures = $2,47,500$ components hrs. of testing / 2 failures = $1,23,750$ components hours per failure = $1,23,750 / (5/365) = 67.8$ components year per failure.

Suggested Answer_Syl16_June2019_Paper_9

Section B

Strategic Management

6. Choose the correct answer:

1x6=6

- (i) Offensive strategy is a strategy
 - (A) for small companies that consider offensive attacks in the market.
 - (B) for those companies that search for new inventory opportunities to create competitive advantage.
 - (C) for the market leader who should attack the competitor by introducing new products that make existing ones obsolete.
 - (D) for those companies who are strong in the market but not leaders and might capture a market share from the leader.
- (ii) The BCG growth matrix is based on the two dimensions:
 - (A) Market Size and Market Share
 - (B) Market Size and Profit Margins
 - (C) Market Size and Competitive Intensity
 - (D) None of the above
- (iii) For an entrepreneur
 - (A) Vision is before the mission.
 - (B) Mission is before the vision.
 - (C) Both are developed simultaneously.
 - (D) Vision or mission are un-important issues.
- (iv) Benchmarking is
 - (A) the analytical tool to identify high cost activities based on the 'Pareto Analysis'.
 - (A) the search for industries best practices that lead to superior performance.
 - (B) the simulation of cost reduction schemes that help to build commitment and improvement of actions.
 - (B) the process of marketing and redesigning the way a typical company works.
- (v) Strategic analysis is concerned with stating the position of the organisation in terms of
 - (A) Mission, choice of market segments, product selection, financial targets and external appraisal.
 - (B) Mission, goals, corporate appraisal, position audit and gap analysis.

Suggested Answer_Syl16_June2019_Paper_9

- (C) Mission, goals, identification of key competitors, SWOT and environmental appraisal.
- (D) Mission, targeted ROI, manpower planning and position audit.
- (vi) Intensity of competition is in low return industries.
- (A) low
- (B) non-existent
- (C) high
- (D) not important

Answer:

6. Choose the correct answer:

- (i) - (D) For those companies who are strong in the market but not leaders and might capture a market share from the leader.
- (ii) - (D) None of the above
- (iii) - (A) Vision is before the mission
- (iv) - (B) The search for industries best practices that lead to superior performance.
- (v) - (B) Mission, goals, corporate appraisal, position audit and gap analysis.
- (vi) - (C) high.

Answer any two questions from the following:**12x2=24**

7. (a) What is a Company Mission? List the guidelines for formulation of 'mission' statement.

(b) Briefly describe the limitations of the BCG model.

8+4=12**Answer:**

7. (a) The mission is a broadly framed but enduring statement of company intent. It embodies the business philosophy of strategic decision makers; implies the image the company seeks to project; reflects the firm's self-concept; indicates the principal product or service areas and primary customer needs the company will attempt to satisfy. In short, the mission describes the product, market, and technological areas of emphasis for the business. And it does so in a way that reflects the values and priorities of strategic decision makers.

Guidelines for formulation of "mission" statement

- It should be based on existing business capabilities "Who we are and what we do?"
- It should follow the long term strategy principles

Suggested Answer_Syl16_June2019_Paper_9

- Profit making should not be the only mission of organisation
- It should be logical extension of business existing capabilities
- It should clearly and precisely present the future orientation of business
- It should include achievable missions
- It should be stated in a form that it becomes the motivating force to every member of organisation
- Mission statement once formed shall be communicated to every member of organisations
- It should include interest of customers and society

(b) Limitations of the BCG Model:

- (i) How do you define your market? Segmentation strategies can provide a niche. A niche is inevitably a low or restricted share of the market, yet it is the heart of a focus strategy.
Firms can profit servicing small low-growth niches.
- (ii) Market growth and market share are assumed to be reliable pointers for cash flow. This is often not true. High market share does not necessarily mean high profits, especially if a firm has high costs, or has bought market share by low pricing.
- (iii) Relative market share amongst competitors is not necessarily an indication of their competitive strengths at any particular time. After all, market leaders are vulnerable.
- (iv) The BCG model might become a self-fulfilling prophecy: Dogs which could be made profitable might simply be left to the rather than be resuscitated.
- (v) It does not suggest any response to declining markets other than withdrawal: many firms can make money in 'sunset industries'.
- (vi) It ignores the extent to which a firm which serves a number of markets can exploit production synergies.
- (vii) It ignores the threat of substitute products.

Suggested Answer_Syl16_June2019_Paper_9

- 8. (a) State the basic distinctions between Strategic Management and Strategic Planning.** **6+6=12**
- (b) State the various advantages and disadvantages of SBU structure.**

Answer:

- 8. (a)** The basic differences between Strategic management and Strategic planning are as follows:

Strategic Management	Strategic Planning
1. It is focused on producing strategic results; new markets; new products; new technologies etc.	1. It is focused on making optimal strategic decisions.
2. It is management by results.	2. It is management by plans.
3. It is an organizational action process.	3. It is an analytical process.
4. It broadens focus to include psychological, sociological and political variables.	4. It is focused on business, economic and technological variables.
5. It is about choosing things to do and also about the people who will do them.	5. It is about choosing things to do.

- (b)** Various advantages and disadvantages of SBU structure:

Advantages:

- (i) Promotes accountability since units' heads are responsible for individual SBU profitability
- (ii) Career development opportunities are further higher in this structure
- (iii) Allow better control of categories of products manufacturing, marketing and distributions
- (iv) Helps to expand in different related and unrelated businesses.

Disadvantages:

- (i) May provide inconsistent approach to tackle customers, etc., because each unit may work in its own way to handle situations
- (ii) High cost approach.

- 9. Write short notes on any three of the following:** **4x3=12**
- (a) Features of Human Resources Strategy**
- (b) McKinsey's 7-S Framework**
- (c) Principle of BPR**

Suggested Answer_Syl16_June2019_Paper_9

(d) Stages involved in Strategic Planning

Answer:

9. (a) Features of Human Resources Strategy

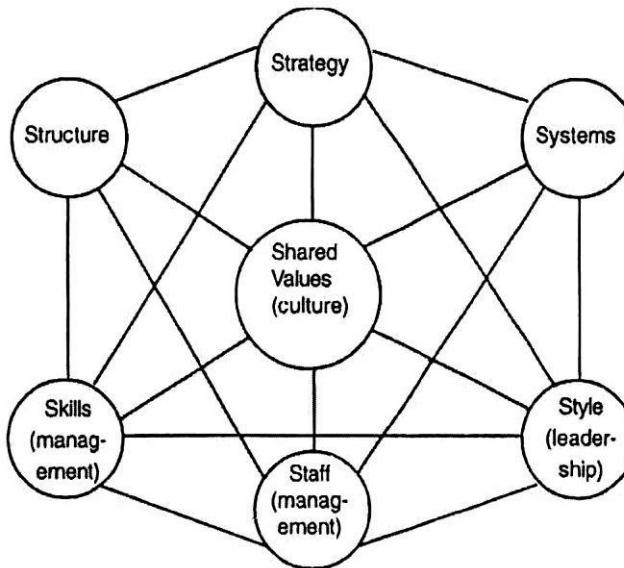
The more important features which human resource strategy may bring to bear on the organisation are as follows:

- (i) **Orientation of the members.** HRM strategy has to ensure that individuals employed in the organisation have necessary orientation so that the mission and objectives of the organisation are internalised by the members and they have a sense of identification with the values and culture of the organisation.
- (ii) **Facilitation of organisational changes as and when called for.** The practices and procedures are required to be in conformity with the changing internal and external conditions. This is a vital role of HR strategy management.
- (iii) **Coping with diversity of workforce.** Modern organisations with highly complex nature of jobs and processes generally have a highly diversified workforce differentiated in terms of age, sex, religion, professional and technical skills and educational background. To maintain a balanced workforce with harmonious relations and providing equitable incentives and rewards are aspects of HRM functions which can sustain an effective workforce. This is a responsibility of HR strategy managers.
- (iv) **Maintaining competent and committed workforce in a competitive environment.** The intensity of market competition for enterprises has been growing fast with globalisation and liberalisation of economic policies. There are competitive strategies of low cost production and differentiation of products which may enable companies to secure a competitive edge. HRM has the responsibility of managing workforce so as to make it competent in ability as well as committed to organisational success.
- (v) **Development of core competency.** An enterprise succeeds in achieving its strategic objectives mainly on the basis of capabilities in the technical, marketing or human skills in areas of crucial importance. These are known as core competencies of the organisation which are unique internal strengths not possessed by competitors. HRM is required to undertake building up of core competency by the organisation as to secure dynamic leadership in the product market.
- (vi) **Empowered workforce as an active resource.** HR strategy is best managed when the members of an organisation are individually in control of their work and are able to realise their potentials with empowerment to take relevant decisions on their own. This is likely to secure enduring performance based achievements.
- (vii) **Appropriate work culture and ethical norms.** No organisation can get the best contribution from its members unless individuals develop a liking for challenging jobs and follow the ethical norms of the organisation functionally. This may require redesigning of jobs and work processes as well as developing trust and confidence among individuals and work groups, as also emphasizing intrinsic

Suggested Answer_Syl16_June2019_Paper_9

motivation for improving performance. HRM encompasses creation of an appropriate work culture on the above lines.

(b) McKinsey's 7-S Framework



Strategy is dependent on many variables - Internal as well as external. All factors are interrelated.

- **Strategy:** A set of decisions and actions aimed at gaining a sustainable competitive advantage.
- **Structure:** The organisation chart and associated information that shows who reports to whom and how tasks are both divided and integrated.
- **Systems:** The flow of activities involved in the daily operation of a business, including its core processes and its support systems.
- **Style:** How managers collectively spend their time and attention and how they use symbolic behaviour. How management acts is more important than what management says.
- **Staff:** How companies develop employees and shape basic values.
- **Shared Values:** Commonly held beliefs, mindsets and assumptions that shape how an organisation behaves—its corporate culture.
- **Skills:** An organisation's dominant capabilities and competencies.

(c) Principle of BPR

Suggested Answer_Syl16_June2019_Paper_9

BPR is achieving dramatic performance improvements through radical change in organizational processes, re-architecting) of business and management processes. It involves the redrawing of organizational boundaries, the reconsideration of jobs, tasks, and skills. This occurs with the creation and the use of models. Whether those be physical models, mathematical, computer or structural models, engineers build and analyze models to predict the performance of designs or to understand the behavior of devices. More specifically, BPR is defined as the use of scientific methods, models and tools to bring about the radical restructuring of an enterprise that result in significant improvements in performance.

Re-design, re-tooling and re-orchestrating form the key components of BPR that are essential for an organization to focus on the outcome that it needs to achieve. The outcome pursued should be an ambitious outcome (as for instance, are a 24 hour delivery to any customer anywhere in the world, approval of mortgage loans within 60 minutes of application, or ability to have on-line access to a patient's medical records no matter where they are in any major city in the world). These types of visionary goals require rethinking the way most organizations do business, careful redesign. They will additionally need very sophisticated supporting information systems and a transformation from a traditional organizational structure to a network type organization.

(d) Stages involved in Strategic Planning:

Stage I: Strategic Option Generations

At this stage, a variety of alternatives are considered, relating to the firm's product and markets, its competitors and so forth. Examples of strategies might be:

- (i) increase market share
- (ii) penetration into international market
- (iii) concentration on core competencies
- (iv) acquisition or expansion etc.

Stage II - Strategic Options Evaluation

Each option is then examined on its merits.

- (i) does it increase existing strengths?
- (ii) does it alleviate existing weaknesses?
- (iii) is it suitable for the firm's existing position?
- (iv) is it acceptable to stakeholders?

Stage III - Strategic Selection

It involves choosing between the alternative strategies. This process is strongly influenced by the values of the managers in selecting the strategies.

Suggested Answer_SyI2016_Dec2018_Paper 9

INTERMEDIATE EXAMINATION
GROUP II
(SYLLABUS 2016)

SUGGESTED ANSWERS TO QUESTIONS**DECEMBER 2018****Paper- 9: OPERATION MANAGEMENT AND STRATEGIC MANAGEMENT****Time Allowed: 3 Hours****Full Marks: 100**

The figures in the margin on the right side indicate full marks.

This paper contains two Sections.

Both Sections are compulsory, subject to instructions provided against each.

All workings must form part of your answer.

Assumptions, if any, must be clearly indicated.

SECTION – A**Operations Management**

1. (a) Choose the correct answer: $1 \times 10 = 10$

- (i) Which one of the following recent trends in Production/Operations management involves drastic measures or break through improvements to improve the performance of a firm?
- (A) Corporate Downsizing
 (B) Re-Engineering
 (C) Technology
 (D) TQM
- (ii) The starting point of Production cycle is
- (A) Product design
 (B) Production planning
 (C) Routing
 (D) Market research

Suggested Answer_Syl2016_Dec2018_Paper 9

- (iii) Which of the following process types is used when a very highly standardized product is desired in high volumes?
- (A) Repetitive Process
 - (B) Batch Process
 - (C) Project Process
 - (D) Continuous Process
- (iv) Which of the following aims at finding the best and most efficient way of using the available resources—men, materials, money and machinery?
- (A) Method Study
 - (B) Work Study
 - (C) Time Study
 - (D) Motion Study
- (v) Generally the size of the order for production in Job production is
- (A) small
 - (B) large
 - (C) medium
 - (D) very large
- (vi) Which one of the following statements is NOT correct?
- (A) LFT is calculated from the LFT of the head event.
 - (B) Slack can be calculated by adding EFT and LFT of any job.
 - (C) EFT is the sum of the EST and the time of duration for any event.
 - (D) The Total Project time is the shortest possible time required in completing the project.
- (vii) Which one of the following is NOT the advantage of Preventive Maintenance?
- (A) Better product quality
 - (B) Greater safety to workers
 - (C) Increased breakdowns and downtime
 - (D) Fewer large-scale repairs
- (viii) Which one of the following establishes time sequence of operations?
- (A) Routing
 - (B) Sequencing
 - (C) Scheduling
 - (D) Dispatching

Suggested Answer_Syl2016_Dec2018_Paper 9

(ix) MRP stands for

- (A) Material Requirement Planning
- (B) Material Reordering Planning
- (C) Material Requisition Procedure
- (D) Material Recording Procedure

(x) With reference to Aggregate Planning, identify which of the following statements is NOT correct?

- (A) It is an Intermediate-term planning.
- (B) It is made operational through a master schedule, that gives the manufacturing schedule.
- (C) Facility planning and scheduling are closely related with the aggregate planning.
- (D) It deals with the strategic decisions, such as purchase of facilities, introduction of new products, processes, etc.

(b) Match Column A with Column B:

1×6=6

Column A	Column B
(A) Any place in a production process where materials tend to pile up or produced at rates of speed less rapid than the previous or subsequent operations	(i) Assignment
(B) It is used when a low volume of high variety goods are needed	(ii) Globalisation
(C) A special Linear Programming Problem	(iii) Bottleneck
(D) Steep increase in the level of competition among manufacturing firms throughout the world	(iv) Maintenance Request
(E) Systematic Quantitative structural approach to the problem of managing a project through to successful completion	(v) Job-Shop Process
(F) This must be made in writing to a central point in the organization	(vi) Network Analysis

(c) State whether the following statements are 'True' or 'False':

1×6=6

- (i) Short-term forecasting is useful to serve the purpose of estimating the inventory requirement.
- (ii) The life cycle of a product has many points of similarity with the human life cycle.
- (iii) The Linear Programming problem has two basic parts: the objective function and the constraint set.
- (iv) The most widely used index of productivity is to work out the output per machine-hour.
- (v) PERT is designed for repetitive projects, whereas CPM is suitable for non-repetitive projects.
- (vi) Wear and obsolescence are two main causes for replacement of machinery in every aspect of life.

Suggested Answer_Syl2016_Dec2018_Paper 9

Answer: 1(a)

- (i) - (B) Re-engineering
- (ii) - (D) Market Research
- (iii) - (D) Continuous Process
- (iv) - (B) Work Study
- (v) - (A) Small
- (vi) - (B) Slack can be calculated by adding EFT and LFT of any job.
- (vii) - (C) Increased breakdowns and downtime
- (viii) - (C) Scheduling
- (ix) - (A) Material Requirement Planning
- (x) - (D) It deals with the strategic decisions, such as purchase of facilities, introduction of new products, processes, etc.

Answer: 1(b)

Column A	Column B
(A) Any place in a production process where materials tend to pile up or produced at rates of speed less rapid than the previous or subsequent operations	(iii) Bottleneck
(B) It is used when a low volume of high variety goods are needed	(v) Job-Shop Process
(C) A special Linear Programming Problem	(i) Assignment
(D) Steep increase in the level of competition among manufacturing firms throughout the world	(ii) Globalisation
(E) Systematic Quantitative structural approach to the problem of managing a project through to successful completion	(vi) Network Analysis
(F) This must be made in writing to a central point in the organization	(iv) Maintenance Request

Answer: 1(c)

- (i) True
- (ii) True
- (iii) True
- (iv) False
- (v) False
- (vi) True

Answer any three questions from the following:

$16 \times 3 = 48$

- 2. (a) Explain the concept of Operating System in order to have a clear idea of Operations Management.**
- (b) With the help of following data, project the trend of sales for the next 5 years: $6+10=16$**

Suggested Answer_Syl2016_Dec2018_Paper 9

Years	2002	2003	2004	2005	2006	2007
Sales in Lakhs of Rupees	120	130	135	140	150	165

Answer: 2(a)

In order to have a clear idea of Operations Management, one must have an idea of 'Operating Systems'.

An Operating System is defined as a configuration of resources combined for the provision of goods or services.

Retail organizations, hospitals, bus and taxi services, tailors, hotels and dentists are all examples of operating systems. Any operating system converts inputs, using physical resources, to create outputs, the function of which is to satisfy customers wants. The creation of goods or services involves transforming or converting inputs into outputs. Various inputs such as capital, labour, and information are used to create goods or services using one or more transformation processes (e.g., storing, transporting, and cutting). To ensure that the desired output are obtained, an organization takes measurements at various points in the transformation process (feedback) and then compares with them with previously established standards to determine whether corrective action is needed (control).

It is important to note that goods and services often occur jointly. For example, having the oil changed in your car is a service, but the oil that is delivered is a good. Similarly, house painting is a service, but the paint is a good.

The goods-service combination is a continuum. It can range from primarily goods, with little service, to primarily service, with few goods. Because there are relatively few pure goods or pure services, companies usually sell product packages, which are a combination of goods and services. There are elements of both goods production and service delivery in these product packages. This makes managing operations more interesting, and also more challenging.

Answer: 2(b)

Computation of trend values of sales:

Year	Time deviations from the middle of 2004 and 2005 assuring 5 years = 1	Sales (in lakhs of Rs.)	Squares of time deviation	Product of time deviation and sales
	X	Y	X^2	XY
2002	-5	120	25	-600
2003	-3	130	9	-390
2004	-1	135	1	-135
2005	+1	140	1	+140
2006	+3	150	9	+450
2007	+5	165	25	+825
n=6	$\sum x = 0$	$\sum x = 840$	$\sum x^2 = 70$	$\sum XY = 290$

Regression equation of Y on X:

$$\sum Y = a + bX$$

To find the values of a and b:

Suggested Answer_Syl2016_Dec2018_Paper 9

$$a = \sum Y/n = 840/6 = 140$$

$$b = \sum XY / \sum X^2$$

$$= 290/70 = 4.143 \text{ approx.}$$

Sales forecast for the next five years, i.e., 2008 to 2012:

$$Y_{2008} = 140 + [29/7 \times (+7)] = 169 \text{ lacs}$$

$$Y_{2009} = 140 + [29/7 \times (+9)] = 177.28 \text{ lacs}$$

$$Y_{2010} = 140 + [29/7 \times (+11)] = 185.57 \text{ lacs}$$

$$Y_{2011} = 140 + [29/7 \times (+13)] = 193.85 \text{ lacs}$$

$$Y_{2012} = 140 + [29/7 \times (+15)] = 202.14 \text{ lacs}$$

3. (a) What are the various activities and responsibilities of product design?

(b) Describe the objectives of Production Planning and Control.

6+10=16

Answer: 3(a)

Various activities & responsibilities of Product design:

- (i) Translating customer needs and wants into product and service requirements (marketing).
- (ii) Refining existing products (marketing).
- (iii) Developing new products (marketing, product design and production).
- (iv) Formulating quality goals (quality assurance, production).
- (v) Formulating cost targets (accounting).
- (vi) Constructing and testing prototype (marketing, production).
- (vii) Documenting specifications (product design).

Answer: 3(b)

Objectives of Production Planning and Control:

- (i) Analysing the orders to determine the raw materials and parts that will be required for their completion,
- (ii) Answering questions from customers and salesmen concerning the status of their orders,
- (iii) Assisting the costing department in making cost estimates of orders,
- (iv) Assisting the human resource departments in the manpower planning and assignment of men to particular jobs,
- (v) Controlling the stock of finished parts and products,
- (vi) Determining the necessary tools required for manufacturing,
- (vii) Direction and control of the movement of materials through production process,
- (viii) Initiating changes in orders as requested by customers while orders are in process,

Suggested Answer_Syl2016_Dec2018_Paper 9

- (ix) Issuing requisitions for the purchase of necessary materials,
- (x) Issuing requisitions for the purchase or manufacture of necessary tools and parts,
- (xi) Keeping the up-to-date records scheduled and in process,
- (xii) Maintaining stocks of materials and parts,
- (xiii) Notifying sales and accounting of the acceptance of orders in terms of production feasibility,
- (xiv) Preparing the route sheets and schedules showing the sequence of operation required to produce particular products,
- (xv) Production of work orders to initiate production activities,
- (xvi) Receiving and evaluating reports of progress on particular orders and initiating corrective action, if necessary,
- (xvii) Receiving orders from customers,
- (xviii) Revising plans when production activities cannot conform to original plans and when revisions in scheduled production are necessary because of rush orders.

4. (a) Find initial Feasible Solution by North-West Corner method.

	W1	W2	W3	W4	SUPPLIES
F1	47	59	55	57	150
F2	44	54	52	59	270
F3	49	64	59	61	370
F4	51	63	54	60	230
DEMAND	210	330	260	220	

$W_j \rightarrow$ Warehouse

$F_j \rightarrow$ Factory, and

Cell entries are unit costs.

(b) A departmental store is running a snack items selling outlet. Past data of snack items' demand per week in hundred kgs with frequency is given below:

Demand/Week	0	6	12	18	24	30
Frequency	3	10	9	20	6	2

Using the following sequence of random numbers, generate the demand for next 10 weeks. Also find out the average demand per week.

Random Numbers	21	34	48	97	72	31	45	56
	47	37	82	44	67	75	63	

$6+(8+2)=16$

Suggested Answer_Syl2016_Dec2018_Paper 9

Answer: 4(a)

Initial Feasible Solution by North- West Corner method.

	W1	W2	W3	W4	SUPPLIES
F1	150				150
F2	47	59	55	57	270
F3	60	210			370
F4	44	54	52	59	
	49	120	250	61	
	51	64	59	10	
DEMAND	210	330	260	220	

Answer: 4(b)

Random No. Range Table for demand

Demand per week	Frequency	Probability	Cumulative Probability	Range
0	3	0.06	0.06	0-5
6	10	0.20	0.26	6-25
12	9	0.18	0.44	26-43
18	20	0.40	0.84	44-83
24	6	0.12	0.96	84-95
30	2	0.04	1.00	96-99
	$\sum f = 50$	1.00		

Simulated value for next 10 weeks

Weeks	R. Nos.	Demand
1	21	6
2	34	12
3	48	18
4	97	30
5	72	18
6	31	12
7	45	18
8	56	18
9	47	18
10	37	12
	TOTAL	162

Average Weekly Demand: $162/10 = 16.2$

Suggested Answer_Syl2016_Dec2018_Paper 9

5. (a) Draw the network for the following activities and find the critical path and total duration of the project.

Activity	Duration(months)
1-2	3
2-3	4
2-4	5
2-5	6
3-4	3
3-6	5
4-6	7
5-6	4
6-7	5

- (b) An automotive firm is using a machine whose purchase price is Rs. 18,000.

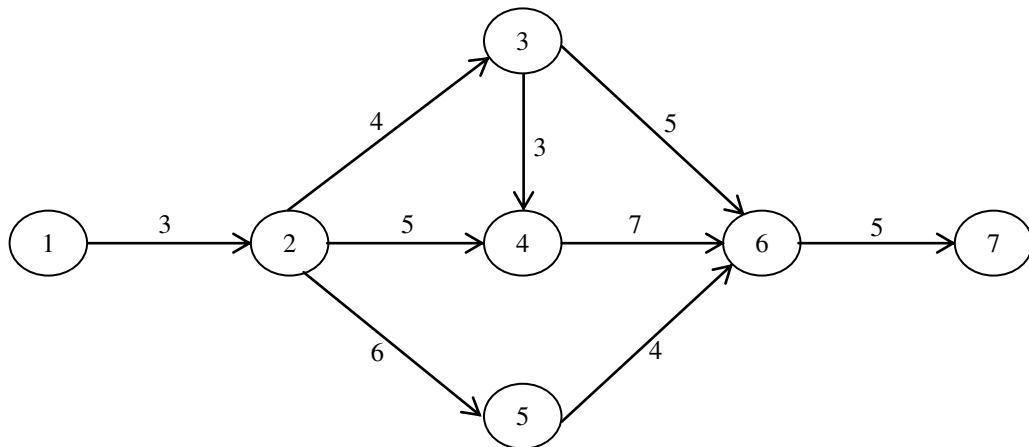
The Installation charges amount to Rs.3,800 and the machine has a scrap value of only Rs.1,800 because the firm has a monopoly of this type of work. The maintenance cost in various years is given in the following table:

Year	1	2	3	4	5	6	7	8	9
Maintenance cost (Rs.)	250	720	1200	1700	2300	3200	4300	4800	6300

The firm wants to determine after how many years should the machine be replaced on economic considerations, assuming that the machine replacement can be done only at the year end.
 $(2 \times 3) + 10 = 16$

Answer: 5(a)

Network diagram:



Paths and their durations: -

1-2-3-6-7 $\rightarrow 3+4+5+5 = 17$ months

1-2-3-4-6-7 $\rightarrow 3+4+3+7+5 = 22$ months \rightarrow Critical Path

Suggested Answer_Syl2016_Dec2018_Paper 9

1-2-4-6-7 → 3+5+7+5 = 20 months

1-2-5-6-7 → 3+6+4+5 = 18 months

Answer: 5(b)

An automotive firm is using a machine...

Cost of machine, C = Rs. 18,000 + 3,800 = 21,800

Scrap Value, S = Rs. 1,800

Year	Maintenance Cost, M_j (Rs.)	Cumulative Maintenance Cost, $\sum M_j$ (Rs.)	$C - S$ (Rs.)	Total Cost $T(n)$ (Rs.)	Annual Cost $A(n)$ (Rs.)
(i)	(ii)	(iii)	(iv)	(v) = (iii) + (iv)	(vi) = (v)/n
1	250	250	21,800 - 1,800 = 20,000	20,250	20,250
2	720	970	20,000	20,970	10,485
3	1,200	2,170	20,000	22,170	7,390
4	1,700	3,870	20,000	23,870	5,967.5
5	2,300	6,170	20,000	26,170	5,234
6	3,200	9,370	20,000	29,370	4,895
7	4,300	13,670	20,000	33,670	4,810
8	4,800	18,470	20,000	38,470	4,808.8
9	6,300	24,770	20,000	44,770	4,974.4

Lowest average cost is Rs. 4808.8 approx., which corresponds to n = 8 in above table. Thus machine needs to be replaced every 8th year.

SECTION – B

Strategic Management

6. Choose the correct answer: 1×6=6
- (i) A corporate strategy can be defined as
- (A) A list of actions about operational planning and statement of organisation structure and control system.
 - (B) A statement of how to compete, direction of growth and method of assessing environment.
 - (C) Abatement of organisation's activities and allocation of resources.
 - (D) A course of action or choice of alternatives, specifying the resources required to achieve certain stated objectives.
- (ii) The existence of price-wars in the airline industry in India indicates that
- (A) customers are relatively weak because of the high switching costs created by frequent flyer programmes.
 - (B) the industry is moving towards differentiation of services.
 - (C) the competitive rivalry in the industry is severe.
 - (D) the economic segment of the external environment has shifted, but the airline strategies have not changed.

Suggested Answer_Syl2016_Dec2018_Paper 9

- (iii) Business Process Re-engineering is
- (A) eliminating loss-making process.
 - (B) redesigning operational processes.
 - (C) redesigning the product and services.
 - (D) recruiting the process engineers.
- (iv) Which one or more of the following are appropriate as a judicious mix for a Product line, which is a group of products?
- (A) That are closely related.
 - (B) That are marketed through the same channel.
 - (C) That perform a similar function for being sold to the same customers.
 - (D) All of the above
- (v) The Product Market matrix comprising of Strategies of Market Penetration, Market Development, Product Development, and Diversification was first formulated by
- (A) Ansoff
 - (B) Drucker
 - (C) Porter
 - (D) Prahalad
- (vi) Price fixation for the first time takes place when
- (A) a company develops or acquires a new product.
 - (B) introducing existing product into a new geographic area or a new distribution channel.
 - (C) a service, the company bids for a new contract work.
 - (D) All of the above

Answer: 6

- (i) - (D) A course of action or choice of alternatives, specifying the resources required to achieve certain stated objectives.
- (ii) - (C) The competitive rivalry in the industry is severe.
- (iii) - (B) Redesigning operational processes.
- (iv) - (D) All of the above.
- (v) - (A) Ansoff.
- (vi) - (D) All of the above.

Answer any two questions from the following:

12×2=24

7. (a) 'There are primarily three levels of strategies in the organisation'. List the three levels. Build up one or two meaningful sentences to clarify the role of each level.
- (b) What is meant by SWOT analysis?

8+4=12

Answer: 7(a)

Suggested Answer_Syl2016_Dec2018_Paper 9

There are primarily three levels of strategies in the organisation.

- i) Corporate Level
- ii) Business Level
- iii) Functional Level

i) Corporate Level:

The corporate level of management consisting of the chief executive officer (CEO), other senior executives, the board of directors, and corporate staff, empowered in decision-making within the organisation, is to oversee the development of strategies for the whole organisation. This role includes defining the mission and goals of the organisation, determining what businesses it should be in, allocating resources among the different businesses, formulating and implementing strategies that span individual businesses, and providing leadership for the organisation.

ii) Business Level:

A business unit is a self-contained division (with its own functions-for example, finance, purchasing, production, and marketing departments) that provides a product or service for a particular market. The strategic role of these managers is to translate the general statements of direction and intent that come from the corporate level into concrete strategies for individual businesses..

iii) Functional Level:

Functional-level managers are responsible for the specific business functions or operations (human resources, purchasing, product development, customer service, and so on) that constitute a company or one of its divisions. Thus, a functional manager's sphere of responsibility is generally confined to one organizational activity, whereas general managers oversee the operation of a whole company or division.

Answer: 7(b)

SWOT Analysis: Gathering data about the general, operating, and internal environments provides the raw material from which to develop a picture of the organizational environment.

SWOT analysis refines this body of information by applying a general framework for understanding and managing the environment in which an organisation operates. The acronym SWOT stands for Strengths, Weaknesses, Opportunities, and Threats.. In many respects, the sophisticated analytical techniques discussed throughout the text are further refinements of basic SWOT analysis. In addition, SWOT is an excellent way to begin a case analysis. SWOT analysis attempts to assess the internal strengths and weaknesses of an organisation and the opportunities and threats that its external environment presents. SWOT seeks to isolate the major issues facing an organisation through careful analysis of each of these four elements. Managers can then formulate strategies to address key issues.

The purpose of such appraisal is to express, qualitatively or quantitatively, which areas of the business have strengths to exploit, and which areas have weaknesses which must be improved. Although every area of the business should be investigated, only the areas of significant strength or weakness should warrant further attention

8. (a) Categorise seven-steps process of Contingency Planning.

(b) How does Matrix Organisation Structure differ from SBU Structure? Analyse related advantages and disadvantages of Matrix Organisation Structure.

6+6=12

Suggested Answer_Syl2016_Dec2018_Paper 9

Answer: 8(a)**Steps in Contingency Planning**

- Step 1 - Identify the beneficial and unfavourable events that could possibly derail the strategy or strategies.
- Step 2 - Specify trigger points. Calculate about when contingent events are likely to occur.
- Step 3 - Assess the impact of each contingent event. Estimate the potential benefit or harm, of each contingent event.
- Step 4 - Develop contingency plans. Be sure that contingency plans are compatible with current strategy and are economically feasible.
- Step 5 - Assess the counter impact of each contingency plan. That is, estimate how much each contingency plan will capitalize on or cancel out its associated contingent event. Doing this will quantify the potential value of each contingency plan.
- Step 6 - Determine early warning signals for key contingency event. Monitor the early warning signals.
- Step 7 - For contingent event with reliable early warning signals, develop advance action plans to take advantage of the available lead time.

Answer: 8(b)

SBU Organisation Structure consist of flow of authority from top to bottom i.e. vertical flow whereas Matrix Organisation Structure contains both vertical and horizontal flow of communications or authority. This type of structure is frequently used in IT organization for managing different projects. Each individual project is managed by a project manager and projects manager will have his team arranged under him.

Advantages:

- (i) Useful for some specific industries like Information Technology, Healthcare etc.
- (ii) Employee can see visible results of their efforts
- (iii) Remove barrier to communications
- (iv) Managing projects are easy
- (v) Effective structures when environment is very dynamic

Disadvantages:

- (i) Complex structure as this contains both vertical and horizontal flow of information
- (ii) High cost approach due to more management positions
- (iii) Dual lines of authority
- (iv) Conflicts arises in the allocation of resources

9. Write short notes on any three of the following:**4×3=12**

- (a) Corporate Planning**
- (b) Definition of the terms 'Re-engineering' and 'Process' in Business Process Re-engineering**
- (c) Stages of Strategic Management Framework**
- (d) Steps involved in the formulation of production strategy**

Answer: 9(a)

Suggested Answer_Syl2016_Dec2018_Paper 9

Corporate Planning is concerned with determination of objectives treating the company as a whole. It develops means to achieve the company's overall objectives. The corporate plans may relate to achieve corporate objectives for short-run and/or long-run. It is an integrated systems approach considering different functions, divisions and units of the organization. Such corporate plans are framed at the corporate level by the top management.

Answer: 9(b)

Re-engineering is the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical contemporary measures of performance such as cost, quality, service and speed.

Process is a structured, measured set of activities designed to produce a specified output for a particular customer or market. It implies a strong emphasis on how work is done within an organization. Each process is composed of related steps or activities that use people, information, and other resources to create value for customers.

Answer: 9(c)

The basic framework of strategic management involves five stages:

Stage 1: In this stage, organisation analyse about their present situation in terms of their Strengths, Weaknesses, Opportunities and Threats.

Stage 2: In this stage, organisations setup their missions, goals and objectives by analysing where they want to go in future.

Stage 3: In this stage organisation analyses various strategic alternatives to achieve their - goals and objectives. The alternatives are analysed in terms of what business portfolio/product mix to adopt, expansion, merger, acquisition and divestment options etc. are analysed to achieve the goals.

Stage 4: In this organisations select the best suitable alternatives in line with their SWOT analysis

Stage 5: This is implementation stage in which organisation implement and execute the selected alternatives to achieve their strategic goals and objectives.

Answer: 9(d)

The following steps are involved in the formulation of production strategy:

- (i) Study the overall corporate plan and define the objectives.
- (ii) Analyse the present production operations and the present and future environment.
- (iii) Review sales- forecast and marketing.
- (iv) Make strategic decisions for production.

**INTERMEDIATE EXAMINATION
GROUP - II
(SYLLABUS 2016)**

SUGGESTED ANSWERS TO QUESTIONS

JUNE - 2018

Paper-9 : OPERATIONS MANAGEMENT AND STRATEGIC MANAGEMENT

Time Allowed : 3 Hours

Full Marks : 100

This figures in the margin on the right side indicate full marks.

This paper contains 2 Sections.

Both Sections are compulsory, subject to instructions provided against each.

All working must form part of your answer.

Assumptions, if any, must be clearly indicated.

**Section - A
(Operations Management)**

1. (a) Choose the correct answer: 1x10=10

- (i) The recent trend in the Production/Operations management which suggests the use of minimal amount of resources to produce a high volume of high quality goods with some variety is referred to as:
 - (a) SCM
 - (b) TQM
 - (c) Lean Production
 - (d) Just-In-Time
- (ii) Effective capacity can NOT be determined by which of the following factors?
 - (a) Product design and product-mix
 - (b) Quantity and quality capabilities
 - (c) Facilities
 - (d) None of the above
- (iii) In which of the following stages the management should try to change its approach by changing its strategy from "buy my product" to "try my product"?
 - (a) Introduction
 - (b) Growth
 - (c) Maturity
 - (d) Decline
- (iv) Conducting occasional check-ups of the products manufactured or assembled to ensure high quality of the production is known as:
 - (a) Planning
 - (b) Scheduling
 - (c) Inspection
 - (d) Routing
- (v) Which one of the following standards is associated with the "Quality Assurance in Final Inspection Test"?
 - (a) ISO 9001
 - (b) ISO 9002
 - (c) ISO 9003
 - (d) ISO 9004

Suggested Answers_Syl2016_June2018_Paper 9

- (vi) With reference to project management, identify which of the following statement is NOT correct?
- Gantt chart is a principal tool used in scheduling and also in some methods of loading.
 - Routing is the first step in the production planning.
 - The cost of any activity is proportional to its time of completion.
 - The free float can be calculated by subtracting EFT from EST.
- (vii) Identify which one of the following statement is NOT correct?
- Preventing maintenance includes lubrication, cleaning, periodic overhaul, etc.
 - The two types of cost-cost of premature replacement and cost of breakdown-need to be balanced.
 - Wear and obsolescence are the two main causes of replacement of machinery in every aspect of life.
 - A machine is technically obsolete when another machine can do the same job more efficiently with reduced time and also at a lower cost.
- (viii) To determine where the plant should be located for maximum operating economy and effectiveness, refers to which one of the following?
- Plant layout
 - Facility location
 - Capacity planning
 - Capacity requirement
- (ix) Which of the following models deals with the physical movement of goods from different supply origins to a number of different demand destinations?
- Simulation
 - Transportation
 - Lean operations
 - Line balancing
- (x) One of the objectives of maintenance is:
- to prevent obsolescence.
 - to ensure spare parts management.
 - to satisfy customers.
 - to extend the useful life of Plant & Machinery without sacrificing the level of performance.

(b) Match Column A with Column B:

1x6=6

Column A	Column B
(A) The ability to adapt quickly to changes in volume of demand, in the product mix demanded and in product design or in delivery schedules	(i) Method Study
(B) To address the planning and controlling of a manufacturing process and all of its related support functions	(ii) Maintenance Stores
(C) Degree to which the system can be adjusted to changes in processing requirements	(iii) Flexibility
(D) Eliminating unnecessary motions or by changing the sequence of operation or the process itself	(iv) Network Analysis
(E) Certain specific techniques which can be used for planning, management and control of project	(v) MRP-II
(F) Availability of vital spare parts needs to be ascertained to meet an emergency like breakdown	(vi) Process Flexibility

Suggested Answers_Syl2016_June2018_Paper 9

- (c) State whether the following statements are 'True' or 'False': 1x6=6**
- (i) The primary concern of production planning and control is the delivery of products to customers or to inventory stocks according to some predetermined schedule.
 - (ii) Capacity refers to the minimum load an operating unit can handle.
 - (iii) Job-shop process is used when a very highly standardized product is desired in high volumes.
 - (iv) The productivity is a measure of how much input is required to achieve a given output.
 - (v) One of the limitations of Gantt Chart is that it does not clearly indicate the details regarding progress of activities.
 - (vi) Preventive maintenance ensures greater safety to workers.

Answer:

1. **(a)**
- | | | |
|--------|-----|---|
| (i) | (c) | Lean Production |
| (ii) | (d) | None of the above |
| (iii) | (b) | Growth |
| (iv) | (c) | Inspection |
| (v) | (c) | ISO 9003 |
| (vi) | (d) | The free float can be calculated by subtracting EFT from EST. |
| (vii) | (a) | Preventive maintenance includes lubrication, cleaning, periodic overhaul, etc. |
| (viii) | (b) | Facility location |
| (ix) | (b) | Transportation |
| (x) | (d) | To extend the useful life of Plant & Machinery without sacrificing the level of performance |

(b)

Column A	Column B
(A) The ability to adapt quickly to changes in volume of demand, in the product mix demanded and in product design or in delivery schedules	(iii) Flexibility
(B) To address the planning and controlling of a manufacturing process and all of its related support functions	(v) MRP-II
(C) Degree to which the system can be adjusted to changes in processing requirements	(vi) Process Flexibility
(D) Eliminating unnecessary motions or by changing the sequence of operation or the process itself	(i) Method Study
(E) Certain specific techniques which can be used for planning, management and control of project	(iv) Network Analysis
(F) Availability of vital spare parts needs to be ascertained to meet an emergency like breakdown	(ii) Maintenance Stores

- (c)**
- | | |
|-------|-------|
| (i) | True |
| (ii) | False |
| (iii) | False |
| (iv) | True |
| (v) | True |
| (vi) | True |

Answer any three questions from the following:**16x3=48**

2. **(a) Categorise the objectives of operations management and discuss about each category. 2+4=6**
- (b) The monthly requirement of raw material for a company is 3200 units. The carrying cost is estimated to be 25% of the purchase price per unit, in addition to ₹ 2.5 per unit.**

Suggested Answers_SyI2016_June2018_Paper 9

The purchase price of raw material is ₹ 24 per unit.

The ordering cost is ₹ 28 per order.

- (i) You are required to find EOQ and Total cost.
- (ii) What is the total cost when the company gets a concession of 6% on the purchase price if it orders 3200 units or more but less than 6200 units per month?
- (iii) What happens when the company gets a concession of 15% on the purchase price when it orders 6,200 units or more?
- (iv) Which of the above three ways of orders the company should adopt?

4+2+2+2=10

Answer:

2. (a) Objectives of operations management can be categorised into:

- (i) Customer service, and
- (ii) Resource utilization

(i) Customer service

The first objective is the customer service for the satisfaction of customer wants. Customer service is therefore a key objective of operations management. The Operations Management must provide something to a specification which can satisfy the customer in terms cost and timing. Thus, primary objective can be satisfied by providing the 'right thing at the right price at the right time'. These three aspects of customer service - specification, cost and timing - are the principal sources of customer satisfaction and must, therefore, be the principal dimension of the customer service objective for operation managers. Generally an organization will aim reliably and consistently to achieve certain standards, or levels, on these dimensions, and operations managers will be influential in attempting to achieve these standards.

Hence, this objective will influence the operations manager's decisions to achieve the required customer service.

(ii) Resource Utilization

Another major objective is to utilize resources for the satisfaction of customer wants effectively, i.e., customer service must be provided with the achievement of effective operations through efficient use of resources. Inefficient use of resources or inadequate customer service leads to commercial failure of an operating system. Operations management is concerned essentially with the utilization of resources, i.e., obtaining maximum effect from resources or minimizing their loss, under-utilization or waste. The extent of the utilization of the resources' potential might be expressed in terms of the proportion of available time used or occupied, space utilization, levels of activity, etc. Each measure indicates the extent to which the potential or capacity of such resources is utilized. This is referred to as the objective of resource utilization.

Operations management is also concerned with the achievement of both satisfactory customer service and resource utilization. An improvement in one will often give rise to deterioration in the other. Often both cannot be maximized, and hence a satisfactory performance must be achieved on both objectives. All the activities of operations management must be tackled with these two objectives in mind, and many of the problems will be faced by operations managers because of this conflict. Hence, operations managers must attempt to balance these basic objectives.

(b) (i) $D=3200 \times 12 = 38,400$ units per annum

$$C_0 = 28$$

$$C_h = 2.5 + 25\% \text{ of } 24 = 8.5$$

$$EOQ = \sqrt{[2 \times 28 \times 38,400]/8.5]} = 502.97 = 503 \text{ units (approx.)}$$

Suggested Answers_SyI2016_June2018_Paper 9

$$\begin{aligned}
 \text{Total Cost} &= C_o + C_{rm} + C_h \\
 &= [(38,400 \times 28)/503] + (38,400 \times 24) + [(503 \times 8.5)/2] \\
 &= 2,137.57 + 9,21,600 + 2,137.75 \\
 &= 9,25,875.32
 \end{aligned}$$

- (ii) When the company has an option to order between 3200 and 6200 units, the EOQ should be calculated with a reduction in price by 6% (due to concession); The purchase price = 94% of 24 = 22.56.
 $D = 38,400$ units per annum;
 $C_o = 28$;
 $C_h = 2.5 + 25\% \text{ of } 22.56 = 8.14$
 $EOQ = \sqrt{[(2 \times 28 \times 38,400)/8.14]} = 513.98 = 514 \text{ units (approx.)}$
 $\text{Total Cost} = C_o + C_{rm} + C_h$
 $= [(38,400 \times 28)/514] + (38,400 \times 22.56) + [(514 \times 8.14)/2]$
 $= 2091.828 + 8,66,304 + 2,091.98 = 8,70,487.8$
- (iii) When the company orders more than 6,200 units purchase price = 85% of 24 (because 15% concession) = 20.4;
 $D = 38,400$ units per annum;
 $C_o = 28$
 $C_h = 2.5 + 25\% \text{ of } 20.4 = 7.6$
 $EOQ = \sqrt{[(2 \times 28 \times 38,400)/7.6]} = 531.92 = 532 \text{ units (approx.)}$
 $\text{Total Cost} = C_o + C_{rm} + C_h$
 $= [(38,400 \times 28)/532] + (38,400 \times 20.4) + [(532 \times 7.6)/2]$
 $= 2021.052 + 7,83,360 + 2,021.6 = 7,87,402.65$
- (iv) Comparing these costs, we notice that the cost is minimum (7,87,402.65) for (iii) order. Therefore the company should adopt a policy of ordering 532 units per order.

3. (a) "Virtually all goods or services are made by using some variation of one of three process Strategies". Discuss about each of the three process strategies. Also state the situation during the decline stage of a product life cycle. $(2 \times 3) + 2 = 8$

(b) Discuss the principles of scheduling. Explain briefly the relationship between routing and scheduling. $6 + 2 = 8$

Answer:

3. (a) The process strategies are: (i) process focus (ii) repetitive focus and (iii) product focus. Each of these three strategies are discussed below:

- (i) **Process Focus:** Majority (about 75 per cent) of global production is devoted to low volume, high variety products in manufacturing facilities called job shops. Such facilities are organised around performing processes. For example, the processes might be welding, grinding or painting carried out in departments devoted to these processes. Such facilities are process focussed in terms of equipment, machines, layout and supervision. They provide a high degree of product flexibility as products move intermittently between processes. Each process is designed to perform a wide variety of activities and handle frequent changes. Such processes are called intermittent processes. These facilities have high variable costs and low utilisation of facilities.
- (ii) **Repetitive Focus:** A repetitive process is a product oriented production process that uses modules. It falls between product focus and process focus. It uses modules which are parts or components prepared often in a continuous or mass production process. A good example of repetitive process is the assembly line

Suggested Answers_SyI2016_June2018_Paper 9

which is used for assembling automobiles and household appliances and is less flexible than process-focused facility. Personal computer is an example of a repetitive process using modules in which the modules are assembled to get a custom product with the desired configuration.

- (iii) **Product Focus:** It is a facility organised around products, a product oriented, high-volume low-variety process. It is also referred to as continuous process because it has very long continuous production run. Examples of product focussed processes are steel, glass, paper, electric bulbs, chemicals and pharmaceutical products, bolts and nuts etc. Product-focussed facilities need standardisation and effective quality control. The specialised nature of the facility requires high fixed cost, but low variable costs requiring high facility utilisation.

Situation during the decline stage of a product life cycle:

At the final stage of decline, profit margins touch a low level, competition becomes severe and customers start using newer and better products. It is here that the story of a product ends - a natural but hard end.

(b) The principles of scheduling are:

- (i) **The principle of optimum task size:** Scheduling tends to achieve its maximum efficiency when the task sizes are small and all tasks are of the same order of magnitude.
- (ii) **The principle of the optimum Production plan:** Scheduling tends to achieve its maximum efficiency when the work is planned, so that it imposes an equal/even load on all the plant.
- (iii) **The principle of the optimum operation sequence:** Scheduling tends to achieve its maximum efficiency when the work is planned so that the work centers are normally used in the same sequence.

The first principle has a tendency when applied, not only give good results but also to be self-correcting if it is ignored. For example, if in a functional batch production machine shop the loads imposed by different operations vary greatly in length it is possible that it will be necessary to break many of the long operations into one or more small batches, in order to get the other orders completed by due date. In effect, this principle only repeats the known advantage of maintaining a high rate of stock turn over, and of single phase ordering. The second principle merely states that the obvious fact that there will be less idle time and waiting time, if all the plant is evenly loaded by the production planners, then if some of the machines are over loaded perhaps because direct labour cost on them are lower and others are idle for part of the time due to shortage of work. The third principle says about principle of flow. Sometimes it is also true if we sequence some jobs, which need the same machine set up, at a time, this avoids machine ancillary time needed, in case, the jobs of the above type are done at different times.

For example, consider drilling a 10 mm hole in five different jobs may be done at a time so that the set up time required for five jobs can be once only.

Relationship between Routing and Scheduling:

Both routing and scheduling are interconnected as scheduling is difficult without routing and routing is also not effective without scheduling. Routing is a prerequisite for scheduling while time to be taken may form the basis of routing and that is fixed by scheduling.

- 4. (a) A blacksmith supervisor in his workshop is considering how he should assign the four jobs that are to be performed, to four of the workers under him. He wants to assign the jobs to the workers such that the aggregate time to perform the jobs is the least.**

Suggested Answers_SyI2016_June2018_Paper 9

Based on previous experience, he has the information on the time taken by the four workers in performing these jobs and the same is given in the table below:

Time Taken (in minutes) by 4 Workers

Worker	Job			
	A	B	C	D
1	46	40	51	68
2	57	42	63	55
3	49	53	48	64
4	41	45	61	55

Solve the assignment problem for optimal solution using Hungarian Method. 8

- (b) At a tool service centre, the arrival rate is 3 per hour and the service potentials 4 per hour. Simple queue conditions exist. The hourly wage paid to the attendant at the service centre is ₹ 2 per hour and the hourly cost of a machinist away from his work is ₹ 5.

Calculate:

2x4=8

- (i) The average number of machinists being served or waiting to be served at any given time.
- (ii) The average time a machinist spends waiting for service.
- (iii) The total cost of operating the system for an eight-hour day.
- (iv) The cost of the system if there were two attendants working together as a team, each paid ₹ 2 per hour and each able to service on average 3 per hour.

Answer:

4. (a) Step - 1 :

The minimum value of each row is subtracted from all elements in the row. It is shown in the reduced cost table, also called opportunity cost table, given below:

Table-1: Reduced Cost Table - 1

Worker	Job			
	A	B	C	D
1	6	0	11	28
2	15	0	21	13
3	1	5	0	16
4	0	4	20	14

Step 2:

For each column of this table, the minimum value is subtracted from all the other values. The columns that contain a zero would remain unaffected by this operation. Hence, only the fourth column values would change. Table-2 shows this.

Table - 2: Reduced Cost Table - 2

Worker	Job			
	A	B	C	D
1	6	0	11	15
2	15	0	21	0
3	1	5	0	3
4	0	4	20	1

Step 3:

Draw the minimum number of lines covering all zeros. As a general rule, we should first cover those rows/columns which contain larger number of zeros. Table 3 shows this.

Worker	Job			
	A	B	C	D

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1	6	0	11	15
2	15	0	21	0
3	1	5	0	3
4	0	4	20	1

Step 4:

Since the number of lines drawn is equal to 4 (= n), the optimal solution is obtained. The assignments are made after scanning the rows and columns for unit zeros. Assignments made are shown with squares as shown in Table 4.

Table - 4: Assignment of Jobs

Worker	Job			
	A	B	C	D
1	6	0	11	15
2	15	0	21	0
3	1	5	0	3
4	0	4	20	1

Assignments are made in the following order. Rows 1, 3, and 4 contain only one zero each. So assigned 1-B, 3-C, and 4-A. Since worker 1 has been assigned job B, we cross the zero in the second column of the second row. After making these assignments, only worker 2 and job D are left for assignment. The final pattern of assignments is 1-B, 2-D, 3-C, and 4-A, involving a total time of $40 + 55 + 48 + 41 = 184$ minutes. This is the optimal solution to the problem.

- (b)** At a tool service centre, the arrival rate is 3 per hour and the service potentials are 4 per hour.

Arrival Rate: $= \lambda = 3$ per hour

Service Rate: $= \mu = 4$ per hour

- (i) The average number of machinists being served or waiting to be served at any given time:

$$L_n = [\lambda / (\mu - \lambda)] = 3/(4-3) = 3$$

- (ii) The average time a machinist spends waiting for service:

$$W_q = [(\lambda/\mu) \times 1/(\mu - \lambda)] = (3/4) \times 1/(4-3) = 0.75 \text{ hours} = 45 \text{ minutes.}$$

- (iii) Average time in the system:

$$W_s = [1 / \mu - \lambda)] = 1/(4-3) = 1 \text{ hr.}$$

Average number of machinists in the system = 3 [As per (i) above]

Cost of three machinists being away from work = $5 \times 3 = 15$ per hour.

Attendant cost = 2 per hour

Total Cost / hour = 17 per hour

The total cost of operating the system for an eight - hour day: $17 \times 8 = 136$

- (iv) It is assumed that there is still a single service point, but the average service rate is now

= 6 per hour.

\Rightarrow Now $\lambda = 3$ per hour

$\mu = 6$ per hour

\Rightarrow Average number in the system $L_n = [\lambda / (\mu - \lambda)] = 3/(6-3) = 1$

Average time spent in the system $W_s = 1/(\mu - \lambda)] = 1/(6-3)$

= $1/3$ hours.

= $(1/3) \times 60 = 20$ minutes.

Suggested Answers_SyI2016_June2018_Paper 9

Machinists cost = 1/3 hour x 5 =	1.67
Attendant cost	4.00
Total Cost	5.67

Cost per 8 hour day = $5.67 \times 8 = 45.36$

5. (a) The following jobs have to be shipped a week from now(week has 5 working days)

Job	A	B	C	D	E	F
Number of day's work remaining	4	5	8	7	6	3

Sequence the jobs according to priority established by: $4 \times 2 = 8$

- (i) Least slack rule
- (ii) Critical ratio rule

- (b) A cab operations company is experiencing the following number of breakdowns for months over the past 2 years in their new fleet of cabs:

Number of breakdowns	0	1	2	3	4
Number of months this occurred	3	7	9	4	1

Each breakdown costs the firm an average of 2,500. For a cost of 1,600 per month, preventive maintenance can be carried out to limit the breakdowns to an average of one per month. Which policy is suitable for the firm? 8

Answer:

5. (a) (i) Calculation of slack:

Number of days until due date is 5 days for all jobs:

Job	Slack	(Days)
A	5-4	1
B	5-5	0
C	5-8	(-3)
D	5-7	(-2)
E	5-6	(-1)
F	5-3	2

C	D	E	B	A	F
-3	-2	-1	0	1	2

- (ii) Calculation of Critical ratio:

Critical ratio = Available time / Operation time

Critical Ratio for job A = $5/4 = 1.25$

Critical Ratio for job B = $5/5 = 1.00$

Critical Ratio for job C = $5/8 = 0.625$

Critical Ratio for job D = $5/7 = 0.714$

Critical Ratio for job E = $5/6 = 0.833$

Critical Ratio for job F = $5/3 = 1.667$

Job having least critical ratio is given the first priority and so on.

Sequence	C	D	E	B	A	F
Critical Ratio	0.625	0.714	0.833	1.00	1.25	1.667

Suggested Answers_SyI2016_June2018_Paper 9

(b) Converting the frequencies to a probability distribution and determining the expected cost/month of breakdowns we get:

Number of breakdowns	Frequency in months	Frequency in percent	Expected value
0	3	$3/24=0.125$	0
1	7	$7/24=0.292$	0.292
2	9	$9/24=0.375$	0.750
3	4	$4/24=0.167$	0.501
4	1	$1/24=0.042$	0.167
Total:	24	Total = 1	Total: 1.710

Breakdown cost per month; Expected cost = $1.710 * 2500 = 4,275$.

Preventive maintenance cost per month: -

Average cost of one breakdown / month	= 2,500
Maintenance contract cost/month	<u>= 1,600</u>
Total	= 4,100.

Thus, preventive maintenance policy is suitable for the firm.

Section - B (Strategic Management)

6. Choose the correct answer:

1×6=6

- (i) Which one of the following does NOT seem to be an advantage of the strategic management?**
 - (a) Discharges board responsibility
 - (b) Provides a framework for decision-making
 - (c) Forces an objective assessment
 - (d) It can be expensive

- (ii) Which of the following analyses 'products and businesses by market share and market growth'?**
 - (a) SWOT Analysis
 - (b) BCG Matrix
 - (c) PEST Analysis
 - (d) Portfolio Analysis

- (iii) Which one of the following is NOT part of the McKinsey's 7-S framework?**
 - (a) Skills
 - (b) Staff
 - (c) Systems
 - (d) Supervision

- (iv) Which one of the following statement is NOT correct?**
 - (a) Vision is the statement of the future.
 - (b) The corporate mission is the purpose or reason for its existence.
 - (c) Targets are formed from vision and mission statement of organizations.
 - (d) Goals are objectives that are scheduled for attainment during planned period.

- (v) Which of the following can NOT be the called as a strength of an organization?**
 - (a) Good Industrial relations
 - (b) Incentives from State Government
 - (c) Financially very sound
 - (d) Raw materials source at a distance

- (vi) Strategic Business Unit (SBU) structure does NOT experience one of the following as an advantage:**
 - (a) Higher career development opportunities

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- (b) Better control of categories of products manufacturing, marketing and distributions
 (c) High cost approach
 (d) Help in expanding in different related and unrelated businesses

Answer:

6. (i) (d) It can be expensive
 (ii) (b) BCG Matrix
 (iii) (d) Supervision
 (iv) (c) Targets are formed from vision and mission statement of organizations
 (v) (d) Raw Materials source at a distance
 (vi) (c) High Cost approach

Answer any two questions from the following:**12×2=24**

7. (a) Identify basic elements of strategic vision and discuss about the important purposes served by such strategic vision. $1\frac{1}{2} + 2\frac{1}{2} = 4$

- (b) Discuss in brief about the areas of attention for SWOT appraisal. State the purpose of such appraisal. $6+2=8$

Answer:

7. (a) Strategic vision specifies primarily three elements:

1. Forming a mission statement that defines what business the company presently is in? And "who we are and where we are now?"
2. Using this mission statement as base to define long term path by indicating choices about "Where we are going?"
3. Finally, communicating above strategic vision in clear and committed term.

Strategic Vision has important purposes, such as:

1. Clearly provides the direction that company wants to follow.
2. Identify the need of changing from existing direction or products, if stated in vision statement.
3. Create passionate environment in the organisation to steer the company with great excitement in selected direction.
4. Create creativity in every member of company to prepare company for future.
5. Promote entrepreneurship.

- (b) SWOT appraisal should give particular attention to the following:

- (i) **A study of past accounts and the use of ratios.** By looking at trends, or by comparing ratios (if possible) with those of other firms in a similar industry, it might be possible to identify strengths and weaknesses in major areas of the business. The assistance of a management accountant should be of great value in this work.
- (ii) **Product position and product-market mix.**
- (iii) **Cash and financial structure.** If a company intends to expand or diversify, it will need cash or sufficient financial standing in order to acquire subsidiaries by issuing shares.
- (iv) **Cost structure.** If a company operates with high fixed costs and relatively low variable costs, it might be in a relatively weak position with regard to production capacity. High volumes of production and sale might be required to break even. In contrast, a company with low fixed costs might be more flexible and adaptable so that it should be able to operate at a lower breakeven point.
- (v) **Managerial ability.** There may be a problem in attempting to assess this and objective measurements should be sought. The danger is that a poor management might overestimate their own ability and incorrectly analyse their weakness as strength.

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The purpose of such appraisal is to express, qualitatively or quantitatively, which areas of the business have strengths to exploit, and which areas have weaknesses which must be improved. Although every area of the business should be investigated, only the areas of significant strength or weakness should warrant further attention.

While finalising the corporate plan together with corporate objectives, growth strategies, it would be necessary to make a review of the corporate strengths and weaknesses in connection with its mission and objectives. This is an important managerial task linked with corporate planning process.

- 8. (a) State the different approaches in Strategic Planning. 4**
(b) Categorise major reasons of SBU approach. 8

Answer:

- 8. (a)** There are three approaches that can be adopted to strategic planning:
- (i) A top-down process, in which managers are given targets to achieve which they pass on down the line.
 - (ii) A bottom-up process, in which functional and line managers in conjunction with their staff submit plans, targets and budgets for approval by higher authority.
 - (iii) An iterative process, which involves both the top-down and bottom-up setting of targets. There is a to-and-from movement between different levels until agreement is reached. However, this agreement will have to be consistent with the overall mission, objectives and priorities and will have to be made within the context of the financial resources available to the organization. The iterative approach, which involves the maximum number of people, is the one most likely to deliver worthwhile and acceptable strategic plans.
- (b)** Some of major reasons of using SBU approach are as follow:
- A scientific method of grouping the businesses of a multi-business corporation which helps the firm in strategic planning.
 - An improvement over the geographical grouping of businesses and strategic planning based on locational units.
 - An SBU is a grouping of related businesses that can be taken up for strategic planning distinct from the rest of the businesses.
 - Grouping the businesses on SBU lines helps the firm in strategic planning by removing the ambiguity and confusion generally seen in grouping businesses.
 - Each SBU is a separate business from the strategic planning standpoint. In the basic factors, viz., mission, objectives, competition and strategy-one SBU will be distinct from another.
 - Each SBU will have its own distinct set of competitors and its own distinct strategy.
 - Each SBU will have a CEO. He will be responsible for strategic planning for the SBU.

- 9. Write short notes on any three of the following: 4×3=12**
- (a) Marketing Plan and Strategy
 (b) Geographic and Matrix structure for implementation of organisational strategy
 (c) Types of firms/organisations for which BPR can be applied
 (d) Difference between strategic management and strategic planning

Answer:

- 9. (a) Marketing Plan and Strategy.**
 Marketing plan is a written document that specifies in detail the firm's marketing objectives and how marketing management will use the controllable marketing tools such as product design, channels, promotion and pricing to achieve these objectives. Marketing strategy means finding attractive opportunities and developing profitable ways to capture the market.

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A marketing strategy specifies a target market and a related marketing mix. It is a big picture of what a firm will do in some market. The job of planning strategies to guide a whole company is called strategic planning. It is the managerial process of developing and maintaining a match between an organisation's resources and its market opportunities.

(b) Geographic structure:

In geographic structure, activities and personnel are grouped by specific geographic locations. Each geographic unit includes all functions required to produce and market products in that region. Organization according to geographic areas or territories is rather common structural form for large-scale enterprise whose strategies need to be tailored to fit the particular needs and features of different geographic locations.

Matrix structure:

Another way to achieve focus on multiple outcomes is with the matrix structure. The matrix structure creates a dual chain of command; two lines of budget authority and two sources of performance and reward. The key feature of the matrix is that product (or business) and functional lines of authority are overlaid to form a matrix or grid, between the product manager and functional manager.

(c) Types of firms / organisations for which BPR can be applied.

BPR could be implemented to all firms (manufacturing firms, retailers, services, etc.) and public organizations that satisfy the following criteria:

- Minimum Number of employees: 20 (at least 4 in management positions).
- Strong management commitment to new ways of working and innovation.
- Well formed IT infrastructure.

Business Process Reengineering could be applied to companies that confront problems such as the following:

- High operational costs
- Low quality offered to customers
- High level of "bottleneck" processes at pick seasons
- Poor performance of middle level managers
- Inappropriate distribution of resources and jobs in order to achieve maximum performance, etc.

(d) The basic difference between Strategic management and Strategic planning are as follows

Strategic Management	Strategic Planning
(i) It is focused on producing strategic results; new markets; new products; new technologies etc.	(i) It is focused on making optimal strategic decisions.
(ii) It is management by results.	(ii) It is management by plans
(iii) It is an organizational action process.	(iii) It is an analytical process.
(iv) It broadens focus to include psychological, sociological and political variables	(iv) It is focused on business, economic and technological variables.
(v) It is about choosing things to do and also about the people who will do them.	(v) It is about choosing things to do.

**INTERMEDIATE EXAMINATION
GROUP - II
(SYLLABUS 2016)**

**SUGGESTED ANSWERS TO QUESTIONS
DECEMBER - 2017**

Paper-9 : OPERATIONS MANAGEMENT AND STRATEGIC MANAGEMENT

Time Allowed : 3 Hours

Full Marks : 100

This figures in the margin on the right side indicate full marks.

This paper contains 2 Sections.

Both Sections are compulsory, subject to instructions provided against each.

All working must form part of your answer.

Assumptions, if any, must be clearly indicated.

**Section - A
(Operations Management)**

1. (a) Choose the correct answer: 1x10=10

- (i) The effective capacity is NOT influenced by which of the following factors:
 - (a) Forecasts of demand
 - (b) Plant and labour efficiency
 - (c) Subcontracting
 - (d) None of the above
- (ii) Key aspects in process strategy does NOT include which of the following:
 - (a) Make or buy decisions
 - (b) Capital intensity
 - (c) Process flexibility
 - (d) Packaging
- (iii) The example of worker involvement, as a recent trend in production/operations management is
 - (a) SCM
 - (b) Just-in-Time
 - (c) Quality Circle
 - (d) MRP
- (iv) In an organization, the Production Planning and Control department comes under
 - (a) Planning department
 - (b) Manufacturing department
 - (c) Personnel department
 - (d) R & D department
- (v) JIT stands for
 - (a) Just In Time Purchase
 - (b) Just In Time Production
 - (c) Just In Time use of Materials
 - (d) Just In Time Order the Material
- (vi) In route sheet or operation layout, one has to show
 - (a) a list of materials to be used
 - (b) a list of machine tools to be used
 - (c) every work center and operation to be done at that work center
 - (d) the cost of product

SUGGESTED_ANSWERS TO QUESTIONS_SYL2016_DEC2017_PAPER-9

- (vii) One of the important charts used in Programme control is
 (a) Material chart
 (b) Gantt chart
 (c) Route chart
 (d) Inspection chart
- (viii) Production planning in the intermediate range of time is termed as
 (a) Production planning.
 (b) Long range production planning.
 (c) Scheduling.
 (d) Aggregate planning.
- (ix) Preventive maintenance is useful in reducing
 (a) Inspection Cost
 (b) Cost of premature replacement
 (c) Shutdown Cost
 (d) Set-up Cost of machine
- (x) Which one of the following standards is associated with the "Quality Assurance in Production and Installation"?
 (a) ISO 9001
 (b) ISO 9002
 (c) ISO 9003
 (d) ISO 9004

(b) Match Column A with Column B:**1x6=6**

Column A	Column B
(A) Fixture	(i) Conversion of Inputs into outputs
(B) Process layout	(ii) Network Analysis
(C) Capital Intensity	(iii) General purpose machines
(D) Operations Management	(iv) Mix of equipment and labour which will be used by the firm
(E) Crashing	(v) Appliance for holding the work
(F) Less prone to Obsolescence	(vi) Grouping together of similar machines in one department

(c) State whether the following statements are 'True' or 'False':**1x6=6**

- (i) Customer service is a key objective of operations management.
 (ii) In general short term forecasting will be more useful in production planning.
 (iii) If the total float value is zero, it means the resources are just sufficient to complete the activity without any delay.
 (iv) Job Evaluation is a systematic approach to ascertain the labour worth of a job.
 (v) Load control is typically found wherever a particular bottleneck machine does not exist in the process of manufacturing.
 (vi) The term "aesthetics" which appeals to the human sense does not add value to the product.

Answer:

1. (a) (i) (d)
 (ii) (d)
 (iii) (c)
 (iv) (b)
 (v) (b)
 (vi) (c)
 (vii) (b)
 (viii) (d)
 (ix) (c)
 (x) (b)

SUGGESTED ANSWERS TO QUESTIONS SYL2016_DEC2017_PAPER-9

(b)

I	II
(A) Fixture	(v) Appliance for holding the work
(B) Process layout	(vi) Grouping together of similar machines in one department
(C) Capital Intensity	(iv) Mix of equipment and labour which will be used by the firm
(D) Operations Management	(i) Conversion of Inputs into outputs
(E) Crashing	(ii) Network Analysis
(F) Less prone to Obsolescence	(iii) General purpose machines

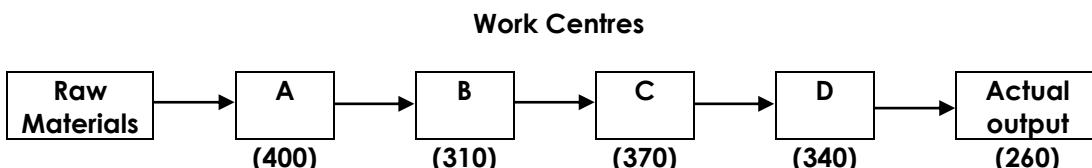
- (c) (i) True
 (ii) True
 (iii) True
 (iv) True
 (v) False
 (vi) False

2. Answer any three questions from the following:

16×3=48

(a) Briefly explain the characteristics of the modern production system. 7

(b) A firm has four work centres, A, B, C & D, in series with individual capacities in units per day shown in the figure below.



- (i) Identify the bottle neck centre.
 (ii) What is the system capacity?
 (iii) What is the system efficiency?

9

Answer:

2. (a) The production management of today presents certain characteristics which make it look totally different from what it was during the past as follows:

- Manufacturing as Competitive Advantage:** In the past production was considered to be like any other function in the organisation. When the demand was high and production capacities were inadequate, the concern was to somehow muster all inputs and use them to produce goods which would be grabbed by market. But today's scenario is contrasting. Plants have excess capacities, competition is mounting and firms look and gain competitive advantage to survive and succeed. Production system offers vast scope to gain competitive edge and firms intend to exploit the potential. Total Quality Management (TQM), Time-Based Competition, Business Process Re-engineering (BPRE), Just-in-Time (JIT), Focused Factory, Flexible Manufacturing Systems (FMS), Computer Integrated Manufacturing (CIM), and The Virtual Corporation are some techniques which the companies are employing to gain competitive advantage.
- Services Orientation:** Service sector is gaining greater relevance these days. The production system, therefore, needs to be organised keeping in mind the peculiar requirements of the service component. The entire manufacturing needs to be geared to serve (i) intangible and perishable nature of the services, (ii)

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constant interaction with clients or customers, (iii) small volumes of production to serve local markets, and (iv) need to locate facilities to serve local markets. There is increased presence of professionals on the production, instead of technicians and engineers.

3. **Disappearance of Smokestacks:** Protective labour legislation, environmental movement and gradual emergence of knowledge based organisations have brought total transformation in the production system. Today's factories are aesthetically designed and built, environment friendly - in fact, they are homes away from homes. Going to factory every day is no more excruciating experience, it is like holidaying at a scenic spot.
 4. **Small has Become Beautiful:** It was E.F. Schumacher who, in his famous book Small is Beautiful, opposed giant organisations and increased specialisation. He advocated instead, intermediate technology based on smaller working units, community ownership, and regional workplaces utilising local labour and resources. For him, small was beautiful. Businessmen, all over the world, did not believe in Schumacher's philosophy. Inspired by economies of scale, industrialists went in for huge organisations and mass production systems.
- (b) (i) The bottle neck centre is the work centre having the minimum capacity. Hence, work centre 'B' is the bottleneck centre.
- (ii) System capacity is the maximum units that are possible to produce in the system as a whole. Hence, system capacity is the capacity of the bottle neck centre i.e., 310 units.
- (iii) System efficiency = Actual output/ System capacity

$$= (260/310) \times 100 \text{ (i.e., maximum possible output)}$$

$$= 83.87\%$$

3. (a) **Discuss about the following process types to be implemented by a Production Manager as a strategy:** 3+4=7

- (i) **Batch Process,**
(ii) **Repetitive Process.**

- (b) **Workers come to a tool store room to enquire about special tools (required by them) for accomplishing a particular project assigned to them. The average time between the two arrivals is 60 seconds and the arrivals are assumed to be in Poisson distribution. The average service time (of the tool room attendant) is 48 seconds.**

Determine:

3x3=9

- (i) **Average Queue Length**
(ii) **Average Length of non-empty queues**
(iii) **Average number of workers in system including the worker being attended**

Answer:

3. (a) (i) **Batch process:** Batch processing is used when a moderate volume of goods or services is required and also a moderate variety in products or services. A batch process differs from the job process with respect to volume and variety. In batch processing, volumes are higher because same or similar products or services are repeatedly provided, examples of products produced in batches include paint, ice cream, soft drinks, books and magazines.
- (ii) **Repetitive process:** This is used when higher volumes of more standardised goods or services are needed. This type of process is characterised by slight flexibility of equipment (as products are standardised) and generally low labour skills. Products produced include automobiles, home appliances, television sets, computers, toys etc. Repetitive process is also referred to as line process as it includes production lines and assembly lines in mass production. Resources are organised around a product or service and materials move in a line flow from

SUGGESTED ANSWERS TO QUESTIONS SYL2016_DEC2017_PAPER-9

one operation to the next according to a fixed sequence with little work-in-progress inventory. This kind of process is suitable to "manufacture-to-stock" strategy with standard products held in finished goods inventory. However, "assemble-to-order" strategy and "mass customisation" are also possible in repetitive process.

(b) Arrival Rate: $\lambda = 60/60$ per second = 1 per minute
Service Rate: $\mu = 60/48$ per second = 1.25 per minute

$$\begin{aligned} \text{(i) Average Queue Length: } L_q &= (\lambda/\mu) \times [\lambda/(\mu - \lambda)] &= (1/1.25) \times [(1/(1.25 - 1)] \\ &= 1/(1.25 \times 0.25) &= 16/5 \\ &= 3.2 \text{ workers} & \end{aligned}$$

$$\begin{aligned} \text{(ii) Average Length of non-empty queues: } L_n &= [\mu/(\mu - \lambda)] = 1.25/(1.25 - 1) = 1.25/0.25 = 5 \text{ workers} \\ \text{(iii) Average number of workers in system: } L_s &= [\lambda/(\mu - \lambda)] = 1/(1.25 - 1) = 1/0.25 = 4 \text{ workers} \end{aligned}$$

4. (a) The below Table shows the time remaining (number of days until due date) and the work remaining (number of days' work) for 5 jobs which were assigned the Letters A to E as they arrived to the shop. Sequence these jobs by priority rules viz., $2 \times 5 = 10$
- (i) FCFS (ii) EDD (iii) LS (iv) SPT (v) LPT.

Job	Number of days until due date	Number of days' work remaining
A	9	5
B	4	7
C	5	3
D	6	6
E	8	2

- (b) A department works on 8 hours shift, 285 days a year and has the usage data of a machine, as given below:

Product	Annual Demand (units)	Processing time (Standard time in hours)
A	360	7-0
B	435	5-0
C	570	60

Calculate:

- (i) Processing time needed in hours to produce products A, B and C,
(ii) Annual production capacity of one machine in standard hours, and
(iii) Number of machines required.

$2 \times 3 = 6$

Answer:

4. (a) Numerical: The below Table shows the time remaining

Job	Number of days until due date	Number of days work remaining
A	9	5
B	4	7
C	5	3
D	6	6
E	8	2

- (i) FCFS (First come first served): Since the jobs are assigned letters A to E as they arrived to the shop, the sequence according to FCFS priority rule is ABCDE.
- (ii) EDD (Early Due Date job first) rule: Taking into account the number of days until due date, the sequence of jobs as per EDD rules is B C D E A (4 5 6 8 9).

SUGGESTED ANSWERS TO QUESTIONS SYL2016_DEC2017_PAPER-9

(iii) L.S. (Least slack) rule also called as Minimum slack rule.

Calculation of slack:

Slack = (Number of days until due date) - (Number of days work remaining)

Job	Slack	(Days)
A	9-5	=4
B	4-7	=(-3)
C	5-3	=2
D	6-6	= 0
E	8-2	=6

Sequence = B D C A E
(-3 0 2 4 6)

(iv) SPT (Shortest Processing Time job first) also referred as SOT (Shortest Operation time job First) rule or MINPRT (Minimum Processing time job first) rule.

Sequence: E C A D B
(2 3 5 6 7)

(v) LPT (Longest Processing time job first) also referred to as LOT (Longest operation time job first) rule.

Sequence: B D A C E
(7 6 5 3 2)

(b) (i) The processing time needed in hours to produce products A, B and C in the quantities demanded visiting the standard time data:

Product	Annual Demand (units)	Processing time (Standard time in hours)	Processing time needed (hours)
A	360	7.0	360 x 7 = 2,520
B	435	5.0	435 x 5 = 2,175
C	570	6.0	570 x 6 = 3,420
			Total = 8,115 hrs.

(ii) Annual production capacity of one machine in standard hours = $8 \times 285 = 2,280$ hours/year

(iii) Number of machines required = Work load per year/Production capacity per machine = $8,115/2,280 = 3.5592$ machines = 4 Machines

5. (a) A Public Transport Company is experiencing the following number of breakdowns for months over the past 2 years in their new fleet of vehicles:

Number of breakdowns	0	1	2	3	4
Number of months this occurred	3	6	9	4	2

Each breakdown costs the company an average of ₹ 2,500. For a cost of ₹ 1,700 per month, preventive maintenance can be carried out to limit the breakdowns to an average of one per month. Which policy is suitable for the company? 10

(b) Draw the network for the following activities and find critical path and total duration of the project. 2+2+2=6

Activity	Duration (months)
1-2	2
2-3	3
2-4	1
3-4	2
4-5	3
5-6	2
5-7	4
6-8	1
7-8	3
8-9	4

SUGGESTED ANSWERS TO QUESTIONS SYL2016_DEC2017_PAPER-9**Answer:**

5. (a) After converting the frequencies to a probability distribution and determining the expected cost/month of breakdowns, we get:

Number of breakdowns	Frequency in months	Frequency in percent	Expected value
0	3	$3/24 = 0.125$	0
1	6	$6/24 = 0.25$	0.25
2	9	$9/24 = 0.375$	0.75
3	4	$4/24 = 0.167$	0.5
4	2	$2/24 = 0.083$	0.334
		Total : 1	Total: 1.834

Breakdown cost per month; Expected cost = $1.834 \times ₹ 2500 = ₹ 4,585$.

Preventive maintenance cost per month: -

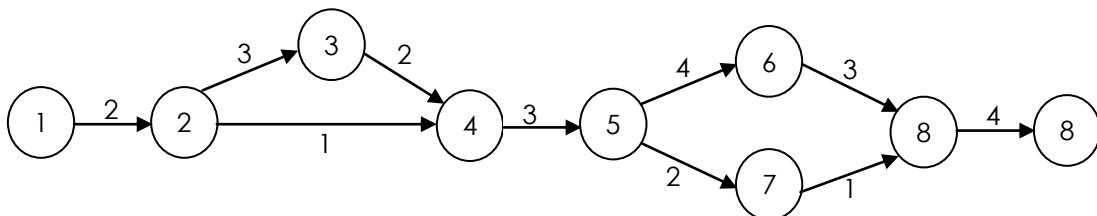
Average cost of one breakdown/month = ₹ 2,500

Maintenance contract cost/month = ₹ 1,700

Total = ₹ 4,200.

Thus, preventive maintenance policy is suitable for the firm.

- (b) Network diagram:



Paths	Duration (months)
1-2-3-4-5-7-8-9	$2+3+2+3+4+3+4=21$ (Critical path)
1-2-3-4-5-6-8-9	$2+3+2+3+2+1+4=17$
1-2-4-5-7-8-9	$2+1+3+4+3+4=17$
1-2-4-5-6-8-9	$2+1+3+2+1+4=13$

Section - B (Strategic Management)

6. Choose the correct answer:

$1 \times 6 = 6$

- (i) Board of directors has certain basic tasks as follows:
 - (a) To monitor plans and programs of production.
 - (b) To design the course of strategic options and appointment of top management.
 - (c) To control utilization of resources.
 - (d) To monitor courses of actions for marketing management.
- (ii) A Strategic Business Unit (SBU) is defined as a division of an organization:
 - (a) That helps in the marketing operation.
 - (b) That helps in the choice of technology.
 - (c) That enables managers to have better control over the resources.
 - (d) That helps in identifying talents and potentials of people.
- (iii) McKinsey's 7-s framework consists of:
 - (a) Structure, Strategy, Software, Skills, Styles, Staff and Supervision
 - (b) Structure, Strategy, Systems, Skills, Styles, Syndication and Shared values
 - (c) Structure, Strategy, Systems, Skills, Steering power, Styles and Shared values
 - (d) Structure, Strategy, Staff, Skills, Systems, Shared values, Style
 - (e) None of the above

SUGGESTED_ANSWERS TO QUESTIONS_SYL2016_DEC2017_PAPER-9

- (iv) What are enduring statements of purpose that distinguish one business from other similar Firms?
 (a) Policies
 (b) Mission statements
 (c) Objectives
 (d) Rules
 (e) Nature of ownership
- (v) Outsourcing is the
 (a) spinning off of a value-creating activity to create a new firm.
 (b) selling of a value-creating activity to other firms.
 (c) purchase of a value-creating activity from an external supplier.
 (d) use of computers to obtain value-creating data from the Internet.
- (vi) For an actress in Bollywood, her pretty face would be a/an
 (a) Asset
 (b) Strategic asset
 (c) Core competency
 (d) Capability
 (e) All of the above

Answer:

6. (i) (b)
 (ii) (c)
 (iii) (d)
 (iv) (b)
 (v) (c)
 (vi) (b)

Answer any two questions from the following:**12×2=24**

7. (a) Explain, in one or two statements, a Company mission. State any three major objectives. **3+3=6**
- (b) Define the term 'Portfolio Analysis'. List the factors influencing Portfolio Strategy. **2+4=6**

Answer:

7. (a) A Company mission
 The mission is a broadly framed but enduring statement of company intent. It embodies the business philosophy of strategic decision makers; implies the image the company seeks to project; reflects the firm's self-concept; indicates the principal product or service areas and primary customer needs the company will attempt to satisfy. In short, the mission describes the product, market, and technological areas of emphasis for the business in a way that reflects the values and priorities of the strategic decision makers.

Objectives:

1. To ensure unanimity of purpose within the organisation.
2. To provide a basis for motivating the use of the organisation's resources.
3. To develop a basis, or standard, for allocating organisational resources.
4. To establish a general tone or organisational climate, for example, to suggest a businesslike operation.
5. To serve as a focal point for those who can identify with the organisation's purpose and direction, and to deter those who cannot from participating further in the organisation's activities.
6. To facilitate the translation of objectives and goals into a work structure involving the assignment of tasks to responsible elements within the organisation.
7. To specify organisational purposes and the translation of these purposes into goals in such a way that cost, time, and performance parameters can be assessed and controlled.

SUGGESTED_ANSWERS TO QUESTIONS_SYL2016_DEC2017_PAPER-9

- (b) Portfolio analysis is a term used in describing methods of analysing a product -market portfolio with the following aims.
- To identify the current strengths and weaknesses of an organisation's products in its markets, and the state of growth or decline in each of these markets.
 - To identify what strategy is needed to maintain a strong position or improve a weak one.

Factors influencing Portfolio Strategy:

- Mission/Vision.
- Value system.
- Future of Current Business.
- Position on the Portfolio Matrix/PLC.
- Government Policy.
- Competitive Environment.
- Company Resources.
- Supply/Demand Conditions.
- Competitive Moves.
- Portfolio Strategy of Parent.
- Business Environment.

8. (a) Explain the terms: (i) Marketing Plan and (ii) Social Marketing. 3+3=6

(b) What is meant by a contingency plan? List its benefits. 2+4=6

Answer:

8. (a) (i) Marketing Plan: Marketing plan is a written document that specifies in detail the firm's marketing objectives and how marketing management will use the controllable marketing tools such as product design, channels, promotion and pricing to achieve these objectives.

Marketing strategy means finding attractive opportunities and developing profitable ways to capture the market.

A marketing strategy specifies a target market and a related marketing mix. It is a big picture of what a firm will do in some market. The job of planning strategies to guide a whole company is called strategic planning. It is the managerial process of developing and maintaining a match between an organisation's resources and its market opportunities.

(ii) Social Marketing: Societal marketing concept calls for a customer orientation backed by integrated marketing aimed at generating customer satisfaction and long-run consumer welfare as the key to attaining long-run profitable volume.

(b) Contingency Plan: A basic premise of good strategic management is that firms plan ways to deal with unfavorable and favorable events before they occur. Too many organizations prepare contingency plans just for unfavorable events; this is a mistake, because both minimizing threats and capitalizing on opportunities can improve a firm's competitive position.

Regardless of how carefully strategies are formulated, implemented, and evaluated, unforeseen events, such as strikes, boycotts, natural disasters, arrival of foreign competitors, and government actions, can make a strategy obsolete. To minimize the impact of potential threats, organizations should develop contingency plans as part of their strategy-evaluation process. Contingency plans can be defined as alternative plans that can be put into effect if certain key events do not occur as expected. Only high-priority areas require the insurance of contingency plans. Strategists cannot and should not try to cover all bases by planning for all possible contingencies. But in any case, contingency plans should be as simple as possible.

Benefits of Contingency Planning:

- It will make the future through their proactive planning and advanced preparation.

SUGGESTED_ANSWERS TO QUESTIONS_SYL2016_DEC2017_PAPER-9

- (ii) It will introduce original action by removing present difficulties.
- (iii) It enables to anticipate future problems.
- (iv) It will change the goals to suit internal and external changes.
- (v) It experiments with creative ideas and take initiative.
- (vi) It will attempt to shape the future and create a more desirable environment.
- (vii) It permits quick response to change.
- (viii) It prevents panic in crisis situations.
- (ix) It makes managers more adaptable to unforeseen changes.

9. Write short notes on any three of the following:**4x3=12**

- (a) Unrelated Diversification
- (b) Hybrid Organization
- (c) Strategy
- (d) Time Frame of Objectives

Answer:**9. (a) Unrelated Diversification**

Unrelated Diversification is also termed conglomerate growth because the resulting corporation is a conglomerate, i.e. a collection of businesses without any relationship to one another. The strategic justifications advanced for this strategy are to:

- take advantage of poorly managed companies which can then be turned around and either run at a gain to the shareholders or sold-on at a profit;
- spread the risks of the firm across a wide range of industries;
- escape a mature or declining industry by using the positive cash flows from it to develop into new and more profitable areas of business.

(b) Hybrid Organization

A single type of structural design is not always sufficient to meet the requirements of strategy. When this occurs, one opinion is to mix and blend the basic organizations forms, matching structure to strategy, requirement by requirement, and unit by unit. Hybrid structure is a form of departmentalization that adopts parts of both functional and divisional structures at the same level of management. The major potential advantage of the hybrid structures is that the combination may allow the firm to gain the advantages offered by the primary structure while at least diminishing the impact of the disadvantages.

(c) Strategy

Strategy is all about integrating organizational activities and utilizing and allocating the scarce resources within the organizational environment so as to meet the present objectives. While planning a strategy it is essential to consider that decisions are not taken in a vacuum and that any act taken by a firm is likely to be met by a reaction from those affected, competitors, customers, employees or suppliers. Strategy can also be defined as knowledge of the goals, the uncertainty of events and the need to take into consideration the likely or actual behaviour of others. Strategy is the outline of decisions in an organization that shows its objectives and goals, reduces the key policies, and plans for achieving these goals, and defines the business the company is to carry on, the type of economic and human organization it wants to be, and the contribution it plans to make to its shareholders, customers and society at large.

(d) Time Frame of Objectives

Objectives are timeless, enduring, and unending; goals are temporal, time-phased, and intended to be superseded by subsequent goals. Because objectives relate to the ongoing activities of an organisation, their achievement tends to be open-ended in the sense of not being bounded by time. For example, the survival objective of a business organisation is never completely attained since failure is always a future possibility.

Suggested Answer_ Syllabus 2016_June2017_Paper 9

INTERMEDIATE EXAMINATION
GROUP - III
(SYLLABUS 2016)

SUGGESTED ANSWERS TO QUESTIONS

JUNE - 2017

Paper-9 : OPERATIONS MANAGEMENT AND STRATEGIC MANAGEMENT INDIRECT

Time Allowed : 3 Hours

Full Marks : 100

This paper contains two Sections.

Both Sections are compulsory, subject to instructions provided against each.

This figures in the margin on the right side indicate full marks.

All working must form part of your answer.

Assumptions, if any, must be clearly indicated.

Section - A
(Operations Management)

1. (a) Choose the correct answer: **1x10=10**

- (i) Out of the following trends in production/operations management, which one is sometimes called as agile manufacturing?
 (A) Re-engineering
 (B) Supply-Chain Management
 (C) Lean Production
 (D) Flexibility
- (ii) Out of the following factors that are affecting Capacity Planning, which one is Less Controllable one?
 (A) Machine break-downs
 (B) Amount of labour employed
 (C) Facilities installed
 (D) Shifts of work per day
- (iii) Which of the following stages of Product Life Cycle does attribute beginning of substantial increase in Sales and Profits?
 (A) Introduction
 (B) Growth
 (C) Maturity
 (D) Decline
- (iv) This aims at finding the best and most efficient way of using the available resources - men, materials, money and machinery:
 (A) Time Study
 (B) Work Study
 (C) Method Study
 (D) Job Evaluation
- (v) Which one is NOT an index of Productivity?
 (A) Man-hour output
 (B) Productivity ratio
 (C) TQM
 (D) Use of Financial Ratios

Suggested Answer_ Syllabus 2016_June2017_Paper 9

- (vi) The time by which an activity can be rescheduled without affecting the other activities - preceding or succeeding is called as
 (A) Slack
 (B) Independent Float
 (C) Free Float
 (D) Total Float
- (vii) Reliability and per unit cost of which of the following spares are less?
 (A) Regular spares
 (B) Insurance spares
 (C) Capital spares
 (D) Rotable spares
- (viii) For a marketing manager, the sales forecast is
 (A) estimate of the amount of unit sales for a specified future period.
 (B) arranging the salesmen to different segments of the market.
 (C) to distribute the goods through transport to satisfy the market demand.
 (D) to plan the sales methods.
- (ix) The activity of specifying when to start the job and when to end the job is known as
 (A) Planning
 (B) Scheduling
 (C) Timing
 (D) Follow-up
- (x) The lead time is
 (A) Time for placeholders for materials
 (B) Time of receiving materials
 (C) Time between receipt of material and using materials
 (D) Time between placing the order and receiving the materials

(b) Match Column-I with Column-II:

1×6=6

I	II
(A) Aviation Fuel	(i) Value Analysis
(B) Brainstorming	(ii) Machine Shop
(C) Forgings	(iii) Turbo-Alternator
(D) Tools	(iv) Refinery
(E) Hydro-electricity	(v) Job Evaluation
(F) Ranking Method	(vi) Smithy

(c) State whether the following statements are 'True' or 'False':

1×6=6

- (i) Merit Rating is used to determine the cost of a product.
- (ii) Project costs increase as the duration of the project increases.
- (iii) In carrying out Job Evaluation studies, point system is the best method.
- (iv) Production planning and control is essentially concerned with the control of Finished goods.
- (v) A Productivity Index is a device of expressing the ratio between outputs and the inputs of the resources numerically.
- (vi) If the total float value is zero, it means the resources are just sufficient to complete the activity without delay.

Answer:

1. (a) (i) (d) Flexibility
 (ii) (a) Machine break-downs
 (iii) (b) Growth
 (iv) (b) Work Study
 (v) (c) TQM

Suggested Answer_ Syllabus 2016_June2017_Paper 9

- (vi) (b) Independent Float.
 (vii) (a) Regular Spares.
 (viii) (a) Estimate of the amount of unit sales for a specified future period.
 (ix) (b) Scheduling.
 (x) (d) Time between placing the order and receiving the materials.

(b)

	I		II
(A) Aviation Fuel	(iv)	Refinery	
(B) Brainstorming	(i)	Value Analysis	
(C) Forgings	(vi)	Smithy	
(D) Tools	(ii)	Machine Shop	
(E) Hydro-electricity	(iii)	Turbo-Alternator	
(F) Ranking Method	(v)	Job Evaluation	

- (c)** (i) False
 (ii) True
 (iii) True
 (iv) False
 (v) True
 (vi) True

2. Answer any three questions from the following:**16×3=48**

(a) 'An important objective of Operations Management is Resource Utilization.' Enumerate. Also list the scope of Operations Management. **3+3=6**

(b) Briefly explain various methods of sales forecasting.

10**Answer:**

2. (a) A major objective of Operations Management is to utilize resources for the satisfaction of customer wants effectively, i.e., customer service must be provided with the achievement of effective operations through efficient use of resources. Inefficient use of resources or inadequate customer service leads to commercial failure of an operating system. Operations management is concerned essentially with the utilization of resources, i.e., obtaining maximum effect from resources or minimizing their loss, underutilization or waste. The extent of the utilization of the resources' potential might be expressed in terms of the proportion of available time used or occupied, space utilization, levels of activity, etc. Each measure indicates the extent to which the potential or capacity of such resources is utilized. This is referred to as the objective of resource utilization.

The following are the scope of Operation Management:

1. Location of facilities.
2. Plant layouts and Material Handling.
3. Product Design.
4. Process Design.
5. Production and Planning Control.
6. Quality Control.
7. Materials Management.
8. Maintenance Management

- (b)** (1) Survey of buyer's intentions or the user's expectation method:
 (2) Collective opinion or sales force composite method:
 (3) Group executive judgment or executive judgment method:
 (4) Experts' opinions:

Suggested Answer_ Syllabus 2016_June2017_Paper 9

- (5) Market test method:
 (6) Trend projection method:

3. (a) Discuss the term 'Process Strategy'. What does it involve? 3+3=6

(b) Calculate the standard time per article produced from the following data obtained by a work sampling study: 10

Total no. of observations = 2,600
No. of working observations = 2,000
No. of units produced in 100 hours duration = 5,000 numbers
Proportion of manual labour = $\frac{3}{4}$
Proportion of machine time = $\frac{1}{4}$
Observed rating factor = 120%
Total allowances = 15% of normal time

Answer:

3. (a) A process strategy is an organisation's approach to process selection for the purpose of transforming resource inputs into goods and services (outputs). The objective of a process strategy is to find a way to produce goods and services that meet customer requirement and product specification (i.e., design specifications) within the constraints of cost and other managerial limitations. The process selected will have a long-term effect on efficiency and production as well as flexibility, cost, and quality of the goods produced. Hence it is necessary that a firm has a sound process strategy at the time of selecting the process.

Key aspects in process strategy include:

- (i) **Make or buy decisions** - It refers to the extent to which a firm will produce goods or provide services in-house or go for outsourcing (buying or subcontracting).
- (ii) **Capital intensity** - It refers to the mix of equipment and labour which will be used by the firm.
- (iii) **Process flexibility** - This refers to the degree to which the system can be adjusted to changes in processing requirements due to such factors as changes in product or service design, changes in volume of products produced and changes in technology.

- (b)**
- (1) Actual working time in the duration of 100 hours = $100 \times (2,000/2,600) = 76.923$ hours
 - (2) Time taken per article = $(76.923 \times 60)/5,000 = 0.923$ minute
 - (3) Observed manual labour time per article = $0.923 \times (3/4) = 0.6922$ minute
 - (4) Observed machine time per article = $0.923 \times (1/4) = 0.230$ minute
 - (5) Normal labour time per unit = Observed time/unit \times Rating factor = $0.6922 \times 1.20 = 0.8306$ minute
 - (6) Standard labour time per unit = $0.8306 + (15/100) \times 0.8306 = 0.9552$ minute
 - (7) Standard time per unit of article produced = $0.9552 + 0.230 = 1.185$ minutes.

4. (a) A Bakery shop sells bakery items. Past data of demand per week in hundred kilograms with frequency is given below:

Demand/Week	0	6	12	18	24	30
Frequency	1	12	19	8	6	4

Using the following sequence of random numbers, generate the demand for the next 10 weeks. Also find out the average demand per week. 10

Random numbers	12	27	18	58	43	75	31
	62	47	35	53	42	68	71

- (b) An incentive scheme allows proportionate production bonus beyond 100% performance level.**

Calculate the amount of

Suggested Answer_ Syllabus 2016_June2017_Paper 9

- (i) Incentive bonus and
 (ii) Total payment received by an operator on a particular day during which the following particulars apply:
 Operation : Assembling a table clock set
 Work Content : 40 Standard minutes per assembled set
 Attended Time: 8 Hours
 Time spent on unmeasured work : 3 Hours
 Number of sets assembled during the day : 10
 Wage rate : ₹ 5 per hour
 (iii) What is the net labour productivity achieved by the operator during the day?

2×3=6

Answer:

4. (a)

Random No. Range Table for Demand				
Demand per week	Frequency	Probability	Cumulative Probability	Range
0	1	0.02	0.02	0-1
6	12	0.24	0.26	2-25
12	19	0.38	0.64	26-63
18	8	0.16	0.80	64-79
24	6	0.12	0.92	80-91
30	4	0.08	1.00	92-99
$\Sigma f = 50$		1.00		

Simulated values for next 10 weeks		
Weeks	R. Nos.	Demand
1	12	6
2	27	12
3	18	6
4	58	12
5	43	12
6	75	18
7	31	12
8	62	12
9	47	12
10	35	12
		Total: 114

Average Weekly demand = $114/10 = 11.4$

- (b)** Total standard minutes worked during the day = $40 \times 10 = 400$, working time = $8-3 = 5$ hours = 300 minutes.
 Performance = $(400 \times 100)/300 = 133.34\%$ or 0.3333

- (i) Incentive bonus = $0.3333 \times 5 \times 5 = ₹ 8.33$ for five hours on measured work
 (ii) Guaranteed wage for 8 hours = $8 \times 5 = ₹ 40$;
 Total earnings for the day = $₹ (8.33+40) = ₹ 48.33$
 (iii) Net labour productivity = Output in units/Net person hours = $10/5 = 2$ sets per hour.

- 5. (a)** A project consists of eleven activities A, B, C, D, E, F, G, H, I, J and K. The relationship among various activities is as follows:

Activity	Preceding Activity
A	—
B	A
C	A

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D	B
E	C
F	D,E
G	F
H	F
I	G
J	I,H
K	J

Draw the network diagram.

6

(b) Product A has a Mean Time Between Failures (MTBF) of 35 hours and a Mean Time to Repairs (MTTR) of 6 hours. Product B has a MTBF of 45 hours, and has a MTTR of 3 hours.

- (i) Which product has higher reliability?
- (ii) Which product has greater maintainability?
- (iii) Which product has greater availability?

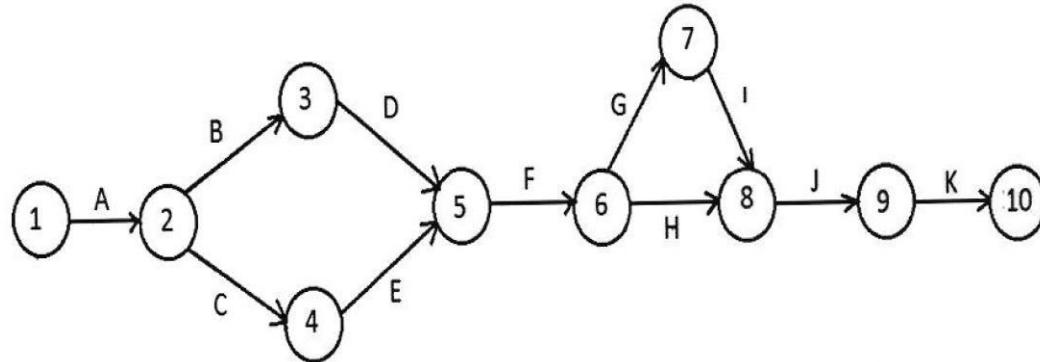
3+3+4=10

Answer:

5. (a) The relationships among various activities is as follows:

Activity	Preceding Activity
A	-
B	A
C	A
D	B
E	C
F	D,E
G	F
H	F
I	G
J	I,H
K	J

The network diagram:



- (b) (i) Product B, with the higher MTBF (i.e. 45 hours) than product A (i.e. 35 hours), is more reliable since it has lesser chances for failure during servicing.
- (ii) The MTTR means time taken to repair a machine. Thus lesser MTTR (of 3 hours) pertaining to Product B vis-a-vis of 6 hrs of Product A makes Product B to have greater maintainability.
- (iii) Availability of a machine/product = $MTBF/(MTBF+MTTR)$

Thus Availability of Product A = $35/(35+6) = 35/41 = 85.366\%$ Availability of Product B = $45/(45+3)=45/48 = 93.75\%$

Hence, Product B has more availability.

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Section - B (Strategic Management)

6. Choose the correct answer: 1×6=6

- (i) Benchmarking is
 - (A) the analytical tool to identify high cost activities based on the 'Pareto Analysis'.
 - (B) the search for industries best practices that lead to superior performance.
 - (C) the simulation of cost reduction schemes that helps to build commitment and improvement of actions.
 - (D) the process of marketing and redesigning the way a typical company works.
 - (E) the framework that earmarks a linkage with suppliers and customers.
- (ii) Successful differentiation strategy allows the company to
 - (A) gain buyer loyalty to its brands.
 - (B) charge too high a price premium.
 - (C) depend only on intrinsic product attributes.
 - (D) have product quality that exceeds buyers' needs.
 - (E) segment a market into distinct group of buyers.
- (iii) The essential ingredients of Business Process Re-engineering (BPR) are
 - (A) continuous improvements of products, processes and technologies.
 - (B) planning for the technologies, processes and strategic partnerships etc.
 - (C) fundamental re-thinking and radical redesign of business process to achieve dramatic results.
 - (D) generation, comparison and evolution of many ideas to find one worthy of development.
 - (E) identification and selection of lay-outs most suited for products and processes.
- (iv) Marketing Research Studies are undertaken
 - (A) to measure brand loyalty of a class of consumers.
 - (B) to predict market potential of a product on a future date.
 - (C) to understand product-price relationship.
 - (D) to make out a case for revision of an existing strategy.
 - (E) All of the above
- (v) Organisation culture is
 - (A) appreciation for the arts in the organisation.
 - (B) ability of the organization to act in a responsible manner to its employees.
 - (C) combination of (A) and (B) above
 - (D) deeper level of basic assumptions and beliefs that are shared by the members of the firm.
 - (E) None of the above
- (vi) Innovation strategy is
 - (A) defensive strategy
 - (B) offensive strategy
 - (C) responding to anticipating customers and market demands
 - (D) guerrilla strategy
 - (E) harvesting strategy

Answer:

6. (i) (b)
 (ii) (a)
 (iii) (c)
 (iv) (e)
 (v) (d)
 (vi) (c)

Suggested Answer_ Syllabus 2016_June2017_Paper 9

Answer any two questions from the following: 12×2=24

- 7. (a) Enlist the advantages of Strategic Management. 6**
(b) State various limitations of the BCG model. 6

Answer:

- 7. (a) Advantages of Strategic Management:**
- (i) Discharges Board Responsibility
 - (ii) Forces an Objective Assessment
 - (iii) Provides a Framework for Decision-Making
 - (iv) Supports Understanding & Buy-In
 - (v) Enables Measurement of Progress
 - (vi) Provides an Organizational Perspective
- (b) Limitations of BCG model:**
- (i) How do you define your market? Segmentation strategies can provide a niche. A niche is inevitably a low or restricted share of the market, yet it is the heart of a focus strategy. Firms can profit servicing small low-growth niches.
 - (ii) Market growth and market share are assumed to be reliable pointers for cash flow. This is often not true. High market share does not necessarily mean high profits, especially if a firm has high costs, or has bought market share by low pricing.
 - (iii) Relative market share amongst competitors is not necessarily an indication of their competitive strengths at any particular time. After all, market leaders are vulnerable.
 - (iv) The BCG model might become a self-fulfilling prophecy: Dogs which could be made profitable might simply be left to the rather than be resuscitated.
 - (v) It does not suggest any response to declining markets other than withdrawal: many firms can make money in 'sunset industries'.
 - (vi) It ignores the extent to which a firm which serves a number of markets can exploit production synergies.
 - (vii) It ignores the threat of substitute products.

- 8. (a) Briefly discuss important features which Human Resource Strategy may bring to bear on the organization. 6**

- (b) List down some guidelines for formulation of the "Mission Statement". 6**

Answer:

- 8. (a) Important features of Human Resource Strategy:**
- (i) Orientation of the members.
 - (ii) Facilitation of organizational changes as and when called for
 - (iii) Coping with diversity of workforce.
 - (iv) Maintaining competent and committed workforce in a competitive environment.
 - (v) Development of core competency.
 - (vi) Empowered workforce as an active resource.
 - (vii) Appropriate work culture and ethical norms.
- (b) Guidelines for formulation of the "Mission Statement":**
- It should be based on existing business capabilities "Who we are and what we do?"
 - It should follow the long term strategy principles
 - Profit making should not be the only mission of organisation
 - It should be logical extension of business existing capabilities
 - It should clearly and precisely present the future orientation of business
 - It should include achievable missions

Suggested Answer_ Syllabus 2016_June2017_Paper 9

- It should be stated in a form that it becomes the motivating force to every member of organisation
- Mission statement once formed shall be communicated to every member of organisations
- It should include interest of customers and society

9. Write short notes on any three of the following:

4×3=12

- (a) Functional organisational structure**
- (b) Role of marketing**
- (c) Contingency plan**
- (d) Managerial Communication**

Answer:

9. (a) Functional organisational structure: The functional structure is characterized by the simultaneous combination of similar activities and the separation of dissimilar activities on the basis of function. All Cost Accountants are located in the Cost Accounting Department, and the HOD of Cost Accounting is responsible for all cost related activities. The same is true in marketing, research and development, and manufacturing.

The functional organization form is one of the most common organizational structures found in firms pursuing strategy of concentration or very high relatedness. A functional structure is most appropriate when the organization is small to medium size and relatively stable.

(b) Role of marketing: The first and foremost role of marketing is that it stimulates potential aggregate demand and thus enlarges the size of the market. It helps in the economic growth of a country. Through stimulation of demand people are motivated to work harder and earn additional money to buy the various ideas, goods and services being marketed. An additional advantage which accrues in the above context that it accelerates the process. (In India, it is believed that about one-fourth of GNP and more than one-third of agricultural output are still non-monetised).

Marketing plays a role in the discovery of entrepreneurial talent. Peter Drucker, a celebrated writer in the field of management, makes this point very succinctly when he observes that marketing is a multiplier of managers and entrepreneurs. It also helps in sustaining and improving the existing levels of employment.

(c) Contingency plan: A basic premise of good strategic management is that firms plan ways to deal with unfavourable and favourable events before they occur. Regardless of how carefully strategies are formulated, implemented, and evaluated, unforeseen events, such as strikes, boycotts, natural disasters, arrival of foreign competitors, and government actions, can make a strategy obsolete. To minimize the impact of potential threats, organizations should develop contingency plans as part of their strategy-evaluation process. Contingency plans can be defined as alternative plans that can be put into effect if certain key events do not occur as expected. Only high-priority areas require the insurance of contingency plans. Strategists cannot and should not try to cover all bases by planning for all possible contingencies. Contingency plans should be as simple as possible.

(d) Managerial Communication: The most important and basic strategy for a manager is simply to communicate well with the organisational people. This satisfies such basic human needs as recognition, a sense of belonging, and security. For example, such a simple action as a manager's attempting to become better acquainted with subordinates can contribute substantially to the satisfaction of each of these three needs. As another example, a message from a manager to a subordinate that praises the subordinate for a job well done can help satisfy the subordinate's recognition and security needs.