SUMMER– 14 EXAMINATION

Subject Code:12243 **Model Answer**

Important Instructions to examiners:

1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills.
4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any
equivalent figure drawn.
5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
7) For programming language papers, credit may be given to any other program based on equivalent concept.

Q 1 A) Attempt any three of the following.

1) Define the production and productivity**.(02 marks for each definition)**

Ans:--**Production**:- production is any process or procedure developed to transform a set of input elements like men, materials, capital, information and energy into a specified set of out put elements like finished products and services in proper quantity and quality thus achieving the objectives of an enterprise. There are four factors of production. Those are as follows.

A) Land & Natural resources
B) Labour
C) Capital
D) Enterprise

Productivity: Productivity may be defined as a ratio between output and input. Output means the amount produced or the number of items produced and input are the various resources employed, e. g. land & building, equipment & machinery, materials, labour, ect.

Purpose of productivity is to

a) To produce good earnings i.e. Profits
b) To clear loans
c) To increase sale

d) Better working conditions
e) High standard of living
f) Job security and satisfaction

The productivity can be said as increased if more products can be obtained from the same amount of available resources.

2) Explain the importance of site selection with suitable example.(04 marks for suitable answer)

Ans.:-Selection of Plant location is important because of the following

1) Location influences plant layout facilities needed.
2) Location influences capital investment & operating costs.

Site selection decision should be taken very carefully, as any mistake may cause poor location, which could be a constant source of higher cost, higher investment, difficult marketing & transportation, dissatisfied & frustrated employees & customers, frequent interruptions of production, abnormal wastages, delays and substandard quality etc. Therefore site selection should be based upon a careful consideration of all factors that are essentially needed in efficient running of a particular industry. Site selection is not an easy problem because if the selection is not proper then all money spent on factory building, machinery & their installation etc. will go waste and owner has to suffer a great loss. Therefore, while selecting a site, owner must consider technical, commercial, financial aspects which may provide maximum advantages.

Tata nano project shifted to Gujarat is recent example of site selection.

3) What do you mean by process planning? State its significance.(02 marks for definition, 02 marks for significance)

Ans :-- Process planning is used in determining the most economical method of performing an activity. Process planning develops the broad plan of manufacturing a product or a component. For carrying out process planning following information are required

a) Quantity of work to be performed.
b) Specification of product
c) Quality of work
d) Availability of equipment, tools, and manpower.
e) Sequence of operation
f) Standard time for each operation.

Process planning depends upon current production commitments, selection of materials' Right quality , shape & size of raw material. Selection of Jig & fixtures, special attachment, selection of machine, sequence of operation, stages of inspection etc.

Process planning largely affects the overall productivity of the industry.

4 Define routing and sequencing. .(04 marks for suitable answer)

Routing & Sequencing may be defined as the selection of path which each part of the product will follow while being transformed from raw materials to finished products. Path will also give sequence of operations to be performed while being manufactured. Routing means determination of most advantageous path to be followed from department to department and machine to machine till raw materials get its final shape.

Routing determines the best and cheapest sequence of operations to see that sequence is rigidly followed.

Routing in industries depends on type & nature of industry.

a) **Continuous industry** : as such industries are almost automatic, therefore their Routing is very simple. Ones the rout is decided in the beginning, generally , no further control over the route is needed.

b) **Assembly Industry**: In this industry a work flow sheet of every component is prepared. As this type of routing requires good technical knowledge, the staff of the production planning and control department must be qualified & experienced one.

c) **Job order Industry**: As these Industries handle different products, after receiving the orders the planning department has to prepare each time detailed drawing and planning indicating the proper sequence of rout for the job. Therefore in such Industry Production Planning & Control Department should be very expert in their work.

B) Attempt any one of the following.

1) List the various elements of cost and explain any two of them in detail.

Element of cost can be divided in to three main Elements these are as follows

a) Materials cost
b) Labour cost
c) Expenses

a) Material cost

i) Direct materials

These are those materials which when operated or processed in the Industry shops through various stages form final useful shape of the main product or component part of the main product. These are also known as productive materials.

ii) Indirect materials

These are the materials which are essentially needed in various shops for helping the direct materials to be converted into the final useful shapes.

For calculation of material cost following procedure should be adopted.

a) Calculate volume of the product
b) Multiply the volume by density to get the Weight of the material.
c) Multiply the cost per unit weight to the total weight of the material to get cost of the material.

ii) Labour Cost

a) Direct labour

These workers who actually work and process the different materials manually or with the aid of machine.& their wages can be directly charged to the job they are manufacturing.

b) Indirect labour

Any other labour which helps the direct labour in performing their duties is known as indirect labour.

For estimation of labour cost the estimator must consider various allowances like Set up time, operation time , handling time, tear down time, miscellaneous allowances personal allowances tool changing & grinding allowance, fatigue allowance, measurement checking allowances, etc.

(02 marks for listing, 02 marks each for explaining two)

2) What do you mean by meaning of control? States its importance(02 marks for meaning, 02 marks for importance)

Production control is the most important function of an enterprise .It ensures desired output of specified quality in predetermined time in most economical way .However production control directs and regulates various activities of production processes. Production control is the function of management which plans , directs and controls the material supply and processing activities of an enterprise so that specified products are produced as per schedule..It verifies whether all activities are carried out according to plan or not .If there is any deviation in actual performance , steps are suggested to improve performance.

Production control function ensures that plant facilities, labour , capital available used to the best advantage. So the production control is the procedure of Planning ,Routing , Scheduling , Dispatching and expediting the flow of materials , parts , subassemblies , and assemblies with in the plant from raw state to the finished production in orderly and efficient manner.

Following are the important steps

1) Setting up a system to watch and record the progress of the production facility.
2) Making report of the work progress with duration of time.

3) Transmission of report to controlling authority.
4) Analysis of information contained in the progress report.
5) Taking corrective action if necessary.
6) The processing tasks to workstations in such a way that the workstation have approximately equal time requirements.

Q2 Attempt any two of the following

1) Explain the concept of group technology with suitable example(04 marks for concept, 04 marks for example)

Ans: Group technology is based on the general principle that many problems are similar and by grouping similar problems single solution can be found to a set of problems thus saving time and efforts. This principle can be applied to any branch of engineering. The group of machines are formed so that all the components in one family can be manufactured by one machine group. These machine groups can be arranged in two ways:

a) The group lay out system
b) The group flow line system

In the first system the machines are arranged into groups in such a manner that each group can carry out all the machining operations needed for a family of components for eg. A particular family of component requires machining operations on a lathe, a drilling machine, a milling machine and a lapping machine. These four machines grouped in two cell and located in one small area of the floor space.

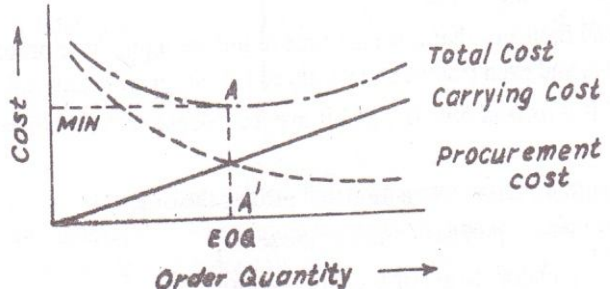
In second, the machines are arranged in the sequence of production operations and usually linked by conveyor arrangement.

The Group technology is also known as " Part Family Manufacture"

This Group technology approach is used for manufacturing in automobile industry.

2) What is the inventory cost relationship? How it is helpful for reducing the cost? (08 marks for suitable answer)

Ans:



The figure shows the procurement cost and inventory carrying cost have been plotted in respect to quantity in lot. Carrying costs are almost directly proportional to the order size or lot size or order quantity.

Total cost is calculated by adding procurement cost and inventory carrying cost. The total cost is minimum at point 'A' and thus A' represents the economic order quantity or economic lot size. Mathematical formula of EOQ is given below

$Q^2 = 2$ U.P/ C.I or

$Q = \sqrt{2}$ U.P/ C.I

Q is economic lot size or EOQ
C is cost for one item
I- is the cost of carrying inventory in percentage per period
P- is the procurement cost associated with one order and
U- is total quantity used per period say annually

Inventory model determines how much inventory to carry. Inventory models handle chiefly two decisions

a. How much to order at one time
b. When to order this quantity to minimize total cost.

3) What is predetermined motion time study? How it improves the final productivity(04 marks for each question)

The methods used for determining standard data are called as pre determined motion time standard. It is a work measurement technique whereby times established for basic human motions are used to build up the time for a job at a defined level of performance. Various methods under PMTS are

i) Work factor system
ii) Method time measurement
iii) Basic motion time study

Uses and Advantages of standard data

I) Standard data helps in determining in advance how long it will take to perform an operation in shop
II) It helps in comparing two methods
III) Helps in estimating the time required and labor cost
IV) Helps improving productivity
V) Standard time can can be found even when the product is not being manufactures
VI) Provides the basis for decision making, budgeting and estimating
VII) Economical than time study by stop watch method
VIII) Rating or efficiency of the operator can be determined correctly

Every operation consists of small work elements which are repeated in various combinations. The time values for these elements are established accurately, and these values are used without further time study, whenever the element occurs. These standardized timings for such element are known as standard data.

For calculation of standard time using the standard data first step is to standardize the method by method study. Break the operation into small elements and note down their timings from standard data tables. Then add the timing of all such elements to get the standard time of the operation.

3. Attempt any Four of the following

1) How can you measure the productivity? Discuss any two techniques that will be helpful to improve productivity.

(2 marks for measure the productivity and 2 marks for improved productivity)

:- Productivity may be measured either on aggregate basis or on individual basis which are called total and partial productivity respectively

Total Productivity index= $\dfrac{\text{Total Production of goods and services}}{\text{(Labour +material+capital+ energy)}}$

For individual input resources is considered , the output is compared with any one of the following

a) Labor Productivity = $\frac{\text{Value of total output}}{\text{Value of Man- hour worked}}$

b) Material Productivity= $\frac{\text{Value of Total output}}{\text{Value of Total material}}$

c) Machine Productivity= $\frac{\text{Value of total output}}{\text{Value of Total machine hours worked}}$

d) Capital Productivity= $\frac{\text{Total Production of goods and services}}{\text{(Labour +material+capital+ energy)}}$

Technique for improving Productivity

a) **Work Study:-** Work study aims two objectives one is to find out the best method of doing job and another one is to find the time taken to do it. This is done by breaking down the job into it various elements, eliminating all unnecessary movements and estimating the time taken to do this job with the help of stopwatch. Second aim is to ensure that all workers engaged in the job are trained to do it in the best way.
b) **Human Relations:-** Good human relations help in co-oprative behavior from workers which results in increase in productivity. Human relations can be improved by labour participation in goal setting, simplification in communication system minimizing the conflicts, encouragement and awarding rewards etc
c) **Incentives:-** When incentives schemes is introduced in a firm, it results a considerable improvement in productivity. It is something that encouraged a worker to put in more productivity effort. Works will not give 100% unless their interest in work is created by some kind of reward.
d) **Cost Control:-** Productivity can be increased by reducing the cost of production. This can be done by keeping careful watch over expenditure, reduction in wastage, reducing machine breakdown time, reducing waiting time for inventory avoiding excessive handling, minimizing overtime expenses etc.
e) **Product design:-** A good design of product helps in economical and convenient manufacturing. It will also minimize wastage or scrap and reduce the cost of production. In order to achieve high productivity, product design must be simple to understand ,

standardization and simplification increases the production efficiency, research and development contributes improvement in product design, product development reduces ineffective time due to change in design, design must considered the current the current available technology.

f) **Working Conditions or ergonomics:-** It is nothing but the design the man machine system in such a way that to ensure high productivity and safety of workers. Working conditions like lighting, ventilation, working hours, supervision etc definitely affects the productivity. Also water facility, sitting room, bathroom, and toilets in sufficient numbers are considered to maintain working conditions. To motivate workers productivity related statement are displayed in a firm such that workers can read it frequently.

g) **Management by objectives:-** It is process where the superior and subordinate management jointly identify common goal and define individual responsibility in terms of results expected from him

h) **Total Quality Management:-** By this it obtained the greater customer satisfaction, fewer defects and less waste improved profitability and increased productivity.

2) What is cellular layout? State its advantages and disadvantages.

Def **(key points for definition One mark)** :- group product according to the process requirements for a set product.

Advantages Any three for ½ marks for each

1) Reduced material handling and transit time.
2) Reduce setup time.
3) Reduced work in process inventory.
4) Better use of human resources
5) Easier to control
6) Easier to automate

Disadvantages Any three for ½ marks for each

1) Inadequate part families.
2) Poorly balanced cells
3) Expanded training and scheduling of workers
4) Increased capital investment

3) Discuss the principles of jigs and fixtures.

Principle of Jigs **(for 2 marks)**

* it is device which holds and locates a work piece as well as guides and controls one or more cutting tools.

*it is tool that guides the cutting or machining tool. The most common types of jigs is the drill jig, which guides the drill bit for creating holes at desired locations. it performed the operation that drill the hole at correct location . the jig holds the part in position and guides the tool.

Principle of Fixtures **(for 2 marks)**

* it is device used for holding and locating a component or work piece securely in an definite position but does not guide the cutting tool.

* The fixture is a tool which holds the work piece with the machine bed precisely at the desired location. The cutting tools are set in position by machine adjustment or by trial and error method or by using slip gauges. It is always fastened to machine in a fixed position .

4) State the importance of operation sheet. How it will help to improve process planning?

Importance of operation sheet **(For 2 marks)**

* Operation sheet provide the detailed record of different operation needed to produce a part in a tabular. In short it is also known as analysis sheet, instructional sheet or process design sheet.

* It provide the all the operations which is carried out on the raw materials and also the sequence of that.

* the operation sheet also gives the standard time required for complete the job on desired machine.

Improve process planning **(For 2 marks)**

* as once different operation needed and standard time required to complete the job is known then we can plan process planning for job.

*if there is difference between time required for actual job manufacture and standard job then we have to work in such a way that the actual job time and standard job time as close as possible.

* once the standard time for job is known then we can do sequencing in such a way that the idle time of machine is zero.

5. **State the importance of '5S' concepts, mentioning each term associated with it.**

Importance of '5S' concepts.(For 2 marks ½ marks for any four of following)

- By applying 5S in industry to systematically achieve total organization, cleanliness and standardization in work piece.
- By applying 5S results in well organized workplace.
- By applying 5S results in more efficient workplace.
- By applying 5S results in more productive operation in workplace.
- By applying 5S results in boost the morale of the workers.
- By applying 5S results worker feel proud in their receptive work.
- By applying 5S results worker realize his responsibility in workplace.

  Terms associated with 5S are as follows :
  1. SEIRI means segregation
  2. SEITON means systematic arrangement
  3. SEISO means getting rid of waste & making cleanliness
  4. SEIKETSU means standardizing
  5. SHITSUKE means self discipline

  (02 marks for mentioning terms)

4 A) Attempt any three of the following.

1) List the materials handling devices and explain any two of them.

Different Material handling devices (**Any four of the following for ½ mark each and explanation of any two for 2 marks and if required with neat sketch)**

* Manually operated equipment (hand wheel borrow, two wheel truck, hand trolleys , and sliding wheel trucks)

*Conveyors (Belt Conveyors, roller conveyors, Screw Conveyors Bucket Conveyors and Vibrating Conveyors)

*Industrial Trucks, tractors and trailers.

* Cranes and hoists (bridge crane, jib crane, gantry cranes Hoist, gravity chutes)

* Automated Guided Vehicle

2) What are the different types of assembly?

Assembly can be classified

A) According to type of layout **(For 2 marks with suitable description)**

i) Fixed Assembly: - Process types or fixed position layouts where parts and subassemblies are brought to the site for final assembly e.g. building of CNC machine.

ii) Progressive Assembly: - Use line type layout where assembly starts at one end and final product is obtained at their end. eg assembly is being done on the production line itself in conjunction with operation

B) According to medium of assembly **(For 2 marks with suitable description)**

i) Manual Assembly: - Where complete assembly is done by operators.

ii) Semi automatic assembly: - where assembly is done partly by automatic machines and partly by operators.

iii) Automatic Assembly: - where assembly is done by special purpose automatic machines and robots.

3) How will you calculate the plant capacity and plant efficiency?

Plant capacity (For 2 marks)

*It is defined as rate of production in a defined time i.e per month or per year. And if company produces more than one product the plant capacity is given in terms of available hours per day.

* e.g suppose particular company produces 1000 diesel engine in a year then the plant capacity is 1000 diesel engine per year. Or it may be in per day or per hour basis also.

Plant Efficiency (For 2 marks)

*Its is defined as the ration of actual working hours in the plant to the total working hours available in the plant for the same period.

***** Plant efficiency factors varies from machine to machine and company to company and it is in between 0.5 to 0.9

*e.g if the actual working hour in industry for particular week is 150 hr and available hour in industry is (24 x 7= 168) then plant efficiency is given by = 150/ 168= 0.893 or 89.3%)S

4) Explain the concept of line balancing. State its importance.

Concept of line balancing (**for 2 marks)**

* Line balancing means balancing the production line or an assembly line.

* Suppose there are three machines A, B and C which performed the operation for different time (e. g 5, 10 and 15 min) and sequencing of operation on the part is from A to B to C. There if all the machine is one then there is improper utilization of the machine because there is different idle time for different machine so to obtained the proper balance of the machine there is need of more B machine and C than A machine so that there is less idle time for the machine.

Importance of Line Balancing (**for 2 marks any four ½ marks for each**)

* By this the proper utilization of machine is taken place.

* By this there is proper utilization of worker is taken place.

* the idle time for man and machine is minimum in line balancing.

* The production rate is more in line balancing.

* The cost of production is cheaper than other method.

B) Attempt any one of the following.

1) State the significance of machine capacity. Discuss its advantages and application.

Def:- It is defined as the rate of output per hour or in one machine hour**. (Def for 1 mark and significance for 2 marks)**

The machine capacity is important for selecting the machine for particular production rate. As it gives the maximum production rate or maximum working hour of machine for particular week or month. It can also be expressed in how much product manufactured in particular time period.

Advantages:- **(for 2 marks)**

i) Machine capacity is important for selecting the machine as per the requirement.

ii) It gives the idea about the production rate of the machine.

Application :- **(for 1 mark)**

i) It is mainly used to give the specification of the machine.

2) Explain the concept of automated guided vehicles. Also state its advantages and application

Concept **(2 marks)**

* AGV is the programmed vehicle used to carry load from one location to another in an automated work place.

* The most common type of such vehicle normally follows a pre determined path on embedded wires into the ground.

* An AGV in therefore a driverless vehicle which is able to select its own route or path to reach the destination without any human interaction.

* An Off board controller is used to send dispatcher commands for the identification of the load , destination of the load and other instruction related to loading and unloading of the load.

Advantages:- **(For 2 marks ½ marks for each,any four)**

i) It can be easily interface with other modules such as robots, automatic storage and retrieval system machine.

ii) It can handle any part of any size without much modification in it.

iii) Area covered by AGV can be easily modified.

iv) Single AGV can handle large floor area in industry.

v) AGV offers elimination or reduction of labor and less transit damaged.

vi) AGV has ability to handle variability in the production rate or changes in product routing.

Application :- **(For 2 marks)**

i) To transfer the material from one place to another.

ii) Can handle bulky job easily and safely.

iii) Can be used in hazardous environment.

5 Attempt any four of the following.

1) Explain the concept of "Poka Yoke" with suitable example.

Concept :- **(For 2 marks)**

* Poka Yoke is sometimes referred to in English by some people as " fool proofing " or " error avoidance" or " mistake proofing" or " fail- safe operation".

*The main objective of Poka Yoke is to achieve zero defect , the main goal is that to eliminate defective products.

* Poke Yoke is more of a concept than a procedure. Thus its implementation is governed by what people think they can do to prevent errors in their workplace and not by a set of step-by- step instruction on how they should do their job.

e.g **(for 2 marks)**

Suppose a operator operate the machine at night if he feel tired but in industry there is no provision for sleep and if the worker is still doing his task then there is chance to produce the part with some defect or there is chance that machine is going in wrong way then Poka Yoke device are usually used to stop the machine and alert the operator if something is about to go wrong. In this way the quality of job is maintained within the range.

2) Discuss the objectives of method study and procedure for the same

Objectives :- **(For 2 marks)**

*Improvement in process and procedures.

* To find the best way of doing job.

*Better workplace layout and better working condition.

* Less fatigue to operators.

* Better product quality.

* Improvement in the use of materials, machines and manpower.

* Efficient and fast material handling.

* Greater job satisfaction, higher standards of safety and health.

*Reduction in waste and scrap.

* Smooth and streamline flow of production and processes.

Procedure for Method Study:- **(For 2 marks points with some description)**

i) Select:-

ii) Record:-

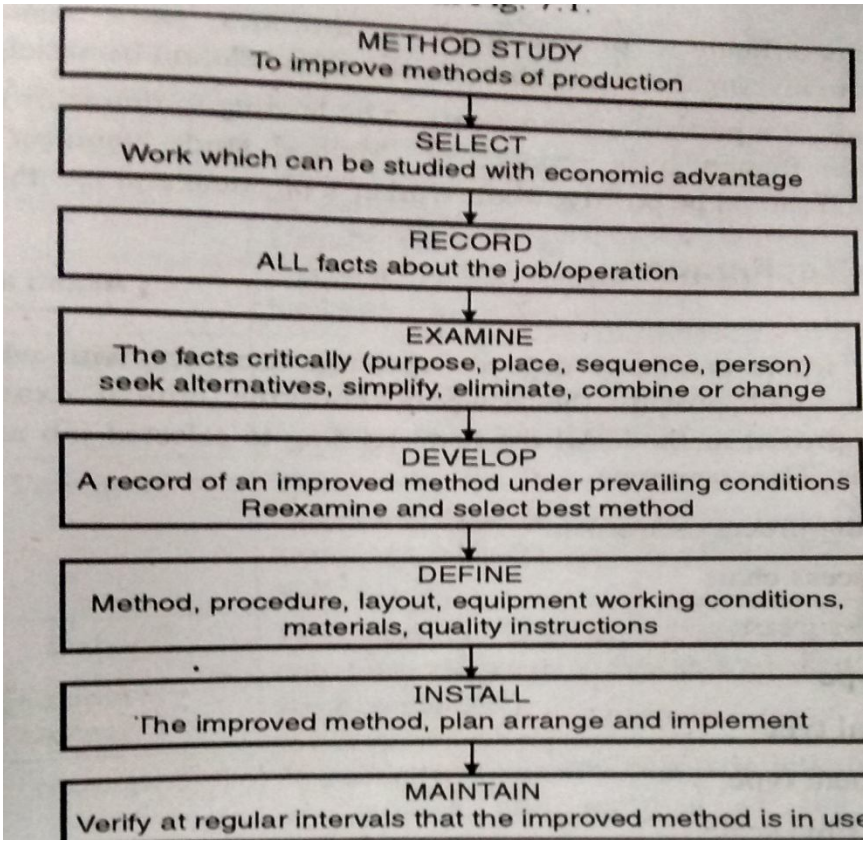
iii) Examine:-

iv) Develop:-

v) Define:-

vi) Install:-

vii) Maintain:-



3) What is micro-motion study? How it will improve the productivity?

:- Micro machine study means the study of small motions known as Therbligs. Each activity is supposed to be divided into these small movements. The purpose of such study is to find for an worker one best pattern of movement which involves less effort less time and less fatigue to completer task. Micro motion study involves talking motion pictures of an activity by cameras while being performed by an operator with timing device. **(For 2 marks)**

Improved Productivity:- **(For 2 mark)**

*after micro motion study it will provide possible alternatives for selection and development of improved method.

*after micro motion study we can design a workplace in such a way that the time required to handle different tools is as minimum as possible.

* After micro motion study operator can compare his performance with another worker and hence he is motivated to reduce the ideal time from it.

4) State the different types of fixture and explain any one of them.

a) Indexing Fixture :- An indexing fixture is used for machining operations that are performed on multiple plane . It helps to locate the given angle with an desired degree of precision. A disc in the indexing fixture is held in angular position by a pin that fits into a finished hole in a angle block and into one of hole in the disc. The disc is clamped against the knee by screw and washer while the machining is being done since holes are properly spaced in indexing plate the work attached to the disc can be rotated at any desired angular position.

b) Milling fixture:- A milling fixture is a work holding device which is firmly clamped to the table of milling machine. It holds the work piece in correct position as the table movement carries it past the cutter or cutters. A heavy base is the most important elements of a milling fixture, which is supposed to be fitted on the machine table. Keys and T slots are used for alignmenet.A milling fixture consists of:

i) a heavy cast iron base

ii) Location and clamping element

iii) a setting block.

Some commonly used milling fixtures are as below

a) Milling machine vice fixture
b) Straddle milling fixture
(01 mark for stating the fixtures, 03 marks for explaining any one, diagram preferred, but not essential)

5) Explain :-i) one bin and ii) two bin system.

i) One bin system **(For 2 marks**):-

A one bin inventory system is a simple inventory control system which depends on supply at fixed time intervals. These time intervals must be set in accordance to bin size, demand and lead time for the bin to be replenished. The bin is drawn down of material or component and then it reaches a certain point a supply common signal is generated and it is replenished by the source. It is essentially a time interval management model. The one bin inventory system is useful when demand is predictable, stable and the process does not require a substantial amount of safety stock this is contrast to the two bin system

ii) Two bin system **(For 2 marks):-** It is common on assembly and moving manufacturing lines where components are added to the product or item being built. The two bin system is just like its name suggests, it composed of two bins where full components or materials are start. As production begins one bin is drawn down of materials and other bin which is still full acts as the buffer or safety stocks. The two bin system is very elementary system uses two containers for inventory. Items are withdrawn from the first bin until its contents are exhausted it is then time to recorder by using the order card placed at the bottom of first bin. The second bin contains enough stock to satisfy expected demand until the order is filled plus an extra cushion of stock that will reduce the chance of stock out if the order is late or if usages are greater than expected.

6) What is material requirement planning? State its need

(2 marks for description and 2 marks for need)

:- Material requirement planning is the scientific technique for planning the order and use of materials at various level of production and for monitoring the inventories during manufacturing. The purpose of MRP is to ensure that materials and components are available in the right quantities and at the right time so that finished products can be completed according to the master production schedule, The MRP technique determine what componensts 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.

Need of MRP

i) It helps to procure the material or componanet as and when neede and thus avaoid excessive inventory levels.

ii) To ensure availability and procurement of materials as well as action required to meet delivery deadlines

iii) using MRP it is possible to give timely information about likely delivery times to prospective customers.

iv) It helps to increase efficiency of production system.

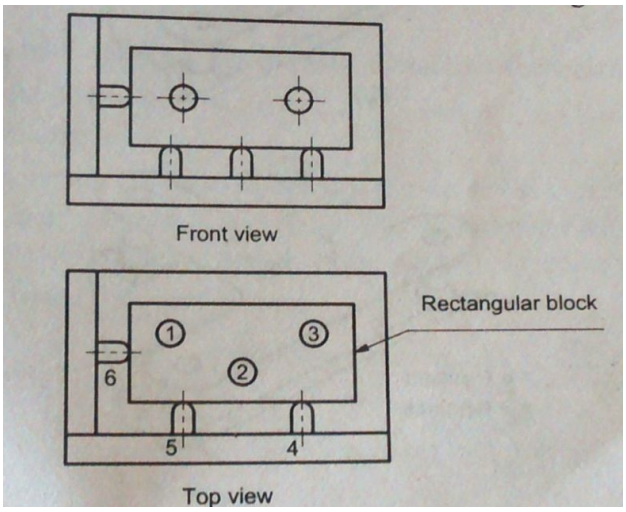
Q.6 . Attempt any four of the following.

1. Discuss the 3-2-1 principle of location with neat diagram.(02 marks for diagram, 02 marks for description)

Ans: Locating the work piece by means six points is known as the six point location method.

A work piece can be exactly located by means of six points.

In this system three pins are located in the first plane, two in the second plane perpendicular to the first and one in the third plane as shown in fig.



This is known as 3-2-1 principle of location. A free body in space has 12 degrees of freedom.(six rotational & six linear)Out of these 12,the six points arrest 9 freedoms of the workpiece. The remaining 3 freedoms are arrested by the clamping device.

2. Explain the single piece production system?(04 marks for appropriate answer)

Ans: It is also called as job order production system.

A production system which manufacture one or few numbers of single product as per the customer specifications within the fixed time period is known as single piece production system.

Examples: Examples of production system are special machine tool producers, special fabricated products. Fixtures etc.

3. What is standard time? How it used to calculate other parameters of work measurement?(02 marks each for two questions)

Standard time for an operation will be the sum of the standard times for all the elements of which it is made up.

The standard time is expressed in standard minutes or standard hours.

The standard time is the total time in which a job should be completed at standard performance.

1) Standard Time =Basic time +Total allowances

2) Rating Factor = $\frac{\text{Rating of the observed worker}}{\text{Rating of qualified worker (Standard rating)}}$

3) Normal Time (Basic Time) =Observed time x Rating Factor

Operator rating

4) Normal Time (Basic Time) = Observed time x ----------

Standard rating

4. What are different methods of inventory management?

(1 mark for each method with description, any four)

:- Different methods for inventory management are given below

i) ABC analysis:- It is technique which is used to classify the items in store into A,B and C class items based on demand of the stock. If the stock on hand of a particular item becomes less than or equal to the reorder level immediately an order is place for its economic quantity.

ii) VED analysis:- In this method items are classified into three groups

V: Vital items without which production may stop.

E: Essential items whose stock out costs are very high .

D: Desirable items

iii) FSN analysis:- FSN analysis classified in three analysis

F:- Fast moving items

S:- Slow moving items

N:- Non moving items

iv) HML analysis:-

In this methods items are classified into three categories

H:- High cost items

M: Medium cost items

L:- Low cost items

This classification is done on the basic of their prices.

v) SDE analysis:- This analysis is based on availability position of each items.

In this analysis

S: refers to scarce items which are in short supply and their availability is scarce. This includes imported items

D:- Refer to difficult items, which cannot be procured easily

E:- Refer to easily available items

5. Explain the multiple activity chart with proper examples.(04 marks for appropriate answer)

Ans: A multiple activity chart records simultaneously the activities of all the workers and machines on a common time scale and shows interrelations between them.

By using separate vertical columns to represent the activities of different operators or machines on a common time of either man or machine during the process.

The activities and their times are recorded in their respective columns i.e. Activities performed by the man are entered in to man column and those performed by the machine are shown in machine column.

Where a number of workers work in a group or an individual operator handles two or more machines, their activities have to be co-ordinate for getting proper results

SUMMER– 14 EXAMINATION

Subject Code:12243 **Model Answer**

Task : Machining of a component Charted by : .....

Chart begins: The part to be machined near machine Charting date : .....

Chart ends : Machined part lying in the container

	Operator			Machine		
0	Description	T	S		T	S
0.20	LOAD JOB	0.2		IDLE		
0.28	SWITCH 'ON'	0.08		IDLE		
1.78	IDLE			MACHINING OF PART "Autocycle"	1.5	
1.83	PICKUP PART	0.05		IDLE		
1.88	KEEP IN TRAY	0.05		IDLE		

Summary

Subject	Cycle time (min)	Time worked per cycle	Percentage utilization
OPERATOR	1.88	0.38	20.22
MACHINE	1.88	1.5	19.78

% utilization of operator = 0.38/1.88 = 20.22%

% utilization of machine = 1.5/1.88=79.78%