

ADDITIONAL CONTROLLER OF EXAMINATION

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Name :

R.R.V. Aswin

Programme & Branch

B.E. Computer Science and Engineering

Date of Exam

15/2/2022 Session: FMAN;Subject Code: CS6021 Subject Title: Software Project Management

Soft Copy Submission (strike-out whichever is not applicable): Microsoft-Teams/Email/Google forms

PART - A			PART - B & C						Grand Total (in words)	
Question No.	✓	Marks	Question No.	✓	(i)	(ii)	(iii)	Total Marks		
					Marks	Marks	Marks			
1			11							
2			12							
3			13							
4			14							
5			15							
6			16							
7			17							
8			18							
9			19							
10			20							
			21						Grand Total: 	
			22							
			23							
			24							
Total										
Declaration by the Examiner: Verified that all the questions attended by the student are valued and the total is found to be correct										
Date		Name of the Examiner					Signature of the Examiner			

Part - AQ) Project Manager appointment in Project life cycle :-

- 4) In the ~~Section~~ Initiation Phase of the project life cycle, the project objective is identified. A feasibility study is conducted. Once the recommended solution is approved, a project is initiated to deliver the approved ~~solt~~ solution. At this part of the initiation phase, the project manager is appointed.

1) Difference between Project Management & Project Engineering:-

Project Engineering is responsible for ~~the~~ the technical deliverables for any given project often without an emphasis on the longer range aspects of the project. Project Engineers conduct field operations with the goal of completion of project but do not have the overall objectives as the basis for completion.

Project Management bears the responsibility for overall objectives beyond just the deliverables.

Frequently larger capital projects require the separation of project engineering & project management.

2) Cost overruns:-

Yes, cost overrun is an unexpected change in the project budget which ends up increasing the total project cost. Cost overruns always happen in normal business.

Software Project Management

7) Defining Statement:-

~~Scope~~ In project management, scope is the set of boundaries that define the extent of a project. It describes what is to be delivered to the customer as a result of the project initiative.

The Project manager interacting with the scope, allows him/her to understand what falls inside or outside the boundaries of the project. If something is "not in scope", it is not factored in the planning work of the project (stages of project). Activities that fall within the boundaries are considered "in scope" & are accounted for the schedule and budget. If something is "out of scope", it is not planned for. A clear scope, allows us to defuse a ~~so~~ unfavourable situation with clients & deal with changes in orderly way.

So, the first step in making project management work must be a complete definition of the scope across which the Project manager must interact.

4) Effective working relationship between project managers themselves:-

3) Project Team and Project Task Force:-

Project team is a group of people in an organization, who can be located in different areas or locations but are connected thru' different technologies of communication. Project teams are setup in the organization, when there is a large project or when a product needs innovation. Team is ~~a~~ permanent group of people.

Software Project Management

Project Task Force comprises of representatives from organizations & discuss the problems on a specific issue. This a temporary group of people. The members, who represent the issues of the respective departments, explain their problems & carry the solution back to the department. It helps in effective horizontal communication. It is used when a difficult situation arises in a particular department.

	when to use	Purpose	Advantages	Drawback
Project Team	To accomplish a major, focused task (not just recommendation)	Assure that adequate time & talent devoted to task	Focuses talent & energy on imp. deliverables	Can suffer from lack of necessary time commitment
Project Task Force	To address a major, focussed complex issue or project	make complex & consequential recommendation	Temporary but of major importance	Can get bogged down, poor commitment, possible etc

Eg :- Task Force - Redesign the curriculum
Team - Funded Research Project.

6) PERT Network :-

Yes, PERT network design depends on the no. of elements in WBS. Based on WBS, the activities are identified & a dependency network is drawn which is used to visualize the flow & sequence of events.

8) Linear Responsibility Chart :-

No, the linear responsibility chart should not be given to the customer. This is something that is private/internal to the organization & needs to be maintained confidentially. Otherwise, if shared with customers, there could be bias view & personal judgements which will lead to conflict in project that may hamper the process down.

Software Project Management5) Training Individuals to be good project managers:-

- => Allow them to start managing projects.
- => Teach skills behind managing projects.
- => Specify the importance of team work
- => Organise teaching programs to train in specific time.
- => Identify training materials.
- => Developing training material.

9) Management Reserve:-

The project manager cannot access or adjust the money or withhold the management reservation without the sponsor's approval.

The most common method of obtaining the management reserves is to add 5 to 10% of the project budget, the greater the uncertainty, the greater the percentage.

Relationship between Project Managers:-

- (o) => Talk with other managers about project that you are currently working on.
- => Contribute to the company news letter / blog.
- => Getting resource for one's project by showing how it would benefit the other.
- => Ask a department head if you can sit in one of their dept mt meetings to learn about their challenges.

Software Project Management -Part-B

13) Given :-

$$\text{Handling of Profit} = \text{£}300$$

(i) Expected loss & its variance. Statistical Data

Type of Damage	Probability (%)	Amount of Damage (%)
Total	0.002	100
Medium	0.0008	40
Low	0.0010	20
No Damage	0.9980	0

Q) Expected loss & its variance :-

Damage type	Probability	Loss	Probability Loss amount
Total	0.002	1,000,000	200
Medium	0.0008	400,000	320
Low	0.0010	200,000	200
No Damage	0.9980	0	0

Thus, $E(x) = \sum a_i P_i (X = a_i)$

$$= \frac{200 + 320 + 200 + 0}{1} = \text{£}720$$

Mean :-

$$\mu = \frac{1,000,000 + 400,000 + 200,000 + 0}{4}$$

$$= \text{£}400,000$$

Variance :-

$$\begin{aligned} \text{Var}(x) &= E[(x - E[x])^2] = \sum (a_i - \mu)^2 P_i \cdot (x=a_i) \\ &= (1,000,000 - 400,000)^2 \times 0.0002 + (400,000 - 400,000)^2 \times 0.0008 \\ &\quad + (200,000 - 400,000)^2 \times 0.001 + (-400,000)^2 \times 0.998 \\ &= \text{₹ } 159,792,000,000 \end{aligned}$$

is the premium amount

14) Given:-

$$\text{no. of user I/p's} = 30$$

$$\text{no. of user O/p's} = 42$$

$$\text{no. of User Enquiries} = 08$$

$$\text{no. of files} = 07$$

$$\text{no. of External Interfaces} = 06$$

As the complexity adjustment is avg,

$$CAF = 0.65 + (0.01 * \sum F_i)$$

$$\begin{aligned} \sum F_i &= 3 + 4 + 3 + 5 + 3 + 3 + 3 + 3 + 3 + 2 + 3 + 0 + 3 + \\ &\approx 41 \end{aligned}$$

$$\therefore CAF = 0.65 + (0.01 \times 41) = 1.06$$

Assuming, ~~assuming~~ average weighing factors,

$$\begin{aligned} UFP &= (30 \times 4) + (42 \times 5) + (8 \times 4) + (7 \times 10) + (6 \times 7) \\ &= 120 + 210 + 32 + 70 + 42 \\ &= 474 \end{aligned}$$

$$FP = UFP \times CAF$$

$$= 474 \times 1.06 \approx 502.44$$

$FP = 502.44$

Software Project Management

15) System for office automation:

Size of five modules:

0.5 KLOC

1.5 KLOC

2.0 KLOC

1.0 KLOC

2.0 KLOC

$$\begin{aligned}\text{Total size} &= (0.5 + 1.5 + 2.0 + 1.0 + 2.0) \text{ KLOC} \\ &= 7.0 \text{ KLOC}\end{aligned}$$

Project size of 7.0 KLOC corresponds to an organic mode of Cocomo.

Since project characteristics contribute to the Effective Adjustment Factor (EAF), we use the Intermediate Cocomo model to arrive at required estimates.

In intermediate Cocomo, for organic mode,

$$a = 3.2$$

$$b = 1.05$$

$$c = 2.5$$

$$d = 0.38$$

$$\text{Effort} = a * \text{EAF} * (\text{size})^b$$

$$\text{Time} = c * (\text{Effort})^d$$

Given that,

Characteristic	Level	EAF
Complexity	high	1.15
Reliability	high	1.15
Programme is capable	low	1.17
Experience	low	1.13

Software Project Management

All other characteristics are of normal rating $\rightarrow 1.0$
 $EAF \rightarrow$ Product of individual characteristics

$$EAF = 1.15 \times 1.15 \times 1.17 \times 1.23$$

$$= 1.7484$$

$$= 1.75$$

$$\begin{aligned} \text{Effort} &= a \times EAF + (\text{size})^b \\ &= 3.2 \times 1.75 \times (7)^{1.05} \\ &= 43.205 \text{ PM} \approx \underline{43.21 \text{ PM}} \end{aligned}$$

$$\begin{aligned} \text{TPme} &= c * (\text{Effort})^{0.38} \\ &= 2.5 \times (43.21)^{0.38} \\ &= 10.458 \\ &\approx \underline{10.46 \text{ months}} \end{aligned}$$

$$\begin{aligned} \text{Avg. Staff size} &= \text{Effort} / \text{TPme} = \frac{43.21}{10.46} \\ &= \underline{4.13 \text{ Persons}} \end{aligned}$$

$$\begin{aligned} \text{Productivity} &= \frac{\text{kLOC}}{\text{Effort}} = \frac{7}{43.21} = 0.16199 \\ &= \underline{0.162} \end{aligned}$$

19) Various Leadership Styles:-

\Rightarrow Leadership is generally taken to mean the activity to influence others in a group to act in a particular way to achieve group goals.

\Rightarrow A leader is not necessarily a good manager or vice versa, as manager has other roles ~~set~~ such as organising, planning & controlling.

=> Leadership is based on the idea of authority or power, although leaders don't necessarily have much formal authority. Power may come either from the person's position or individual's quality.

=> Positional power can be further analysed as,

(i) Coercive power:-

It is the ability to force someone to do something by threatening punishment.

(ii) Connection power:-

It is based on having access to those who have power.

(iii) Legitimate power:-

It is based on a person's title conferring a special status.

(iv) Reward power:-

Holders can give rewards to those who carry out tasks to his/her satisfaction.

Personal power can also be further analysed as,

(i) Expert Power:-

Being the person who is able to do a specialised task.

(ii) Information power:-

Holders has exclusive access to information.

(iii) Referent power:-

Based on the personal attractiveness of the leader.

Leadership Style:-

It is based on the positional & personal power in addition to the work environment.

⇒ The leadership style to be chosen is based on measurement along two axes:

(i) Directive (vs) Permissive &

Authoritative (vs) Democratic -

* Directive authoritarian → makes decisions alone, close supervision of implementation.

* Permissive authoritarian → makes decisions alone, subordinates have latitude in implementation.

* Directive democrat - makes decisions participatively or close supervision of implementation.

* Permissive democrat - makes decisions participatively subordinates have latitude in implementation.

(ii) Degree to which task at hand is paramount & the degree to which manager is concerned ~~and~~ about people (people orientation).

When the work environment involves high degrees of uncertainty, subordinates will seek guidance from above. In such cases, a task oriented leadership style is welcome.

In situations where the team members are relatively inexperienced a task oriented leadership style is preferred.

* A people-oriented leadership style is preferred when uncertainty associated with project reduces, staff control the work they do, without seeking reference or guidance and team members are matured such that consideration of their aspirations and needs becomes more valued.

20) Directing and Supervising Parts:-

(a) Supervising :- It is a part of directing.

It implies overseeing the work of subordinates by their superiors. It is an act of watching & directing work.

(b) Communicating :- It is a part of directing.

It is the process of passing information, expectation from one person to another.

(c) Delegating :- It is a part of controlling

It implies transferring control from one person to another (or responsibility). Delegation is the key to effective control.

(d) Evaluating :- It is a part of controlling

It is the measurement of actual performance & is very important to determine whether or not organisational goals are reached.

Justification:-

* Directing is a part of managerial function which activates organisational methods to work effectively for achievement of organisational purposes. It deals with influencing, guiding, supervising, motivating sub-ordinates for the achievement of organisational goals. Once, supervising & communicating comes under direction, since it is which sets an enterprise in motion. As it starts at direct planning, organising & staffing.

* Controlling implies measurement against the standards & correction of deviation if any to ensure achievement of organisational goals. Delegating is an effective key to discharge the part of controlling, since managers may not be able to discharge the controlling function all by themselves.

Evaluating is an important part of controlling or function management since it helps to identify the areas of improvement & actions necessary to bring the performance back in line with organisational objectives. After you have evaluated the changes required, we try to take control by implementing measures to get back on track.

i. Supervising \Rightarrow - Directing
Communicating

Delegating \Rightarrow - Controlling.
Evaluating

17) Differences among budget, cost & price:-

\Rightarrow Aggregating the estimated costs of the individual scheduled activities for the project is called budget.

\Rightarrow Inputs include WBS, activity last-estimate, project schedule, resource calendar.

\Rightarrow Tools & Techniques include cost aggregation, Reserve analysis.

* Budgeted cost of work scheduled or planned value \Rightarrow sum of budgets for all work packages scheduled to be accomplished within given time..

* Earned value:- sum of budgets for completed work packages and completed portions of open packages
Cost of Project

Actual cost incurred in accomplishing the work performed within a given time period. Actual cost of work performed (ACWP) is calculated only for performed work.

* Cost Variance: Difference between the planned cost of work performed & actual cost incurred for the work.

$$\boxed{\text{Cost Variance} = \text{Budget} - \text{Actual Cost}}$$

Cost Performance Index (CPI):-

- * Ratio of cost of work performed to actual cost.
- * If CPI is 1.0, it implies that actual cost matches to the estimated cost (Budget).
- * If Budget = Cost, CPI = 1.0

Price :-

- * The state at which acquirer (one who wants software) gets software project.
- * Price includes cost incurred by Software Developer along with profit.

$$\boxed{\text{Price} = \text{Cost} + \text{Profit}}$$

Fixed Price Contract:-

In this type of contract, the price is fixed when the contract is signed. This motivates the supplier to be cost effective.

ii) Work Breakdown Structure:-

Work Breakdown Structure involves identifying the main tasks required to complete a project & then breaking each of these down into steps of lower level tasks. The WBS is created as a hierarchy of things that the project will produce & organise a team's work into manageable chunks. The steps involved in creating a WBS for a particular project,

Software Project Management

Step 1: Choose the type of approach based on project requirement
The following are the different types of approach.

(a) Activity Based Approach:-

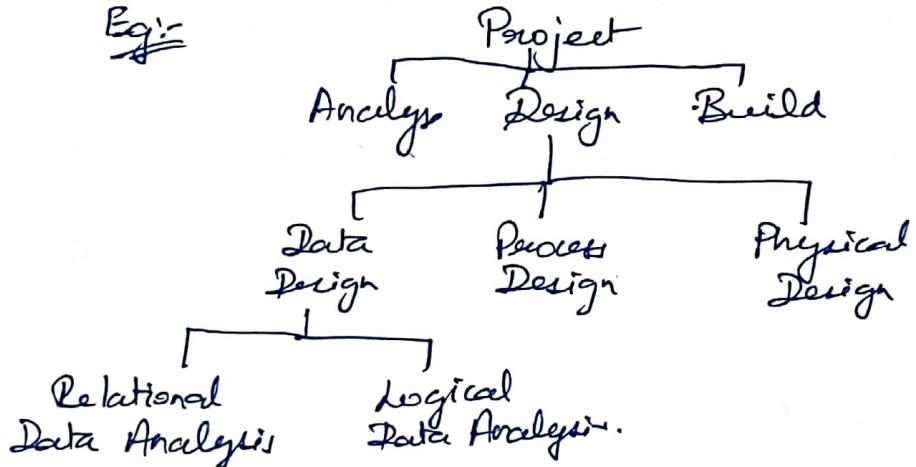
In this approach, the following steps are carried out.

(i) Creating a list of all the activities that a project may involve.

(ii) List the activities as groups & subdivide the project into the main lifecycle stages.

(iii) Create a work Breakdown Structure

Eg:-



(iv) Activities are added to a branch if they contribute to the parent branch.

(v) Decide the final level of detail as too much detail would result in a shallow structure.

(b) Product-Based Approach:-

(i) Need to draw Product Breakdown Structure & Product flow diagram.

(ii) PFD indicates what input is required for each product.

(iii) A UCDP Artifact contains level 1 as requirements, analysis, design, implementation & test. The next level contains artifacts for each branch

like use case model. The final level will contain artifacts like actors for the use case model.

(c) Hybrid Approach:

- (i) Most common model for all projects
- (ii) In hybrid approach, it contains a list of final deliverables & a set of activities to produce that product.
- (iii) No. of recommended levels is 5
 - Level 1 - Project
 - Level 2 - Deliverables
 - Level 3 - Components
 - Level 4 - Work Packages
 - Level 5 - Tasks.

Step 2:- Adhere to 100% rule

The 100% rule states that the WBS includes 100% of the work defined by the project scope & captures all deliverables - internal, external, interim - in terms of work to be completed.

Step 3:- Ensure that each WBS element covers scope of work including deliverables.

WBS for a whole project will be huge & difficult to go in detailed hence same time-phased, department phased division-phased, deliverables based etc.

At different parts of the project, different WBS will be used.

As the name suggests, the work based structure for a fixed time (weekly) is time-phased.

Department phased would be specific to the department handling a part of a project like developer team.

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Division based is the group wise work breakdown structure. Ideally, a main WBS should be made & timely each department or division can make their own WBS (Inclusive to the main one) & maintain dead lines & schedules.

12) Impact of the following groups:-

(i) Top management (Administrative Level)

- => They coordinate services & are keen on planning
- => It controls the management of goals & policies & the ultimate source of authority of the organization.
- => They apply control & co-ordination of all the activities of the firm as they organize the several departments of the enterprise which would include their budget, techniques & agendas.
- => They lay down the policies & objectives of the organization.
- => They strategize the plans of the enterprise & aligning competent managers to the departments or middle level to carry them out.
- => They keep the communication between the enterprise & the outside world.

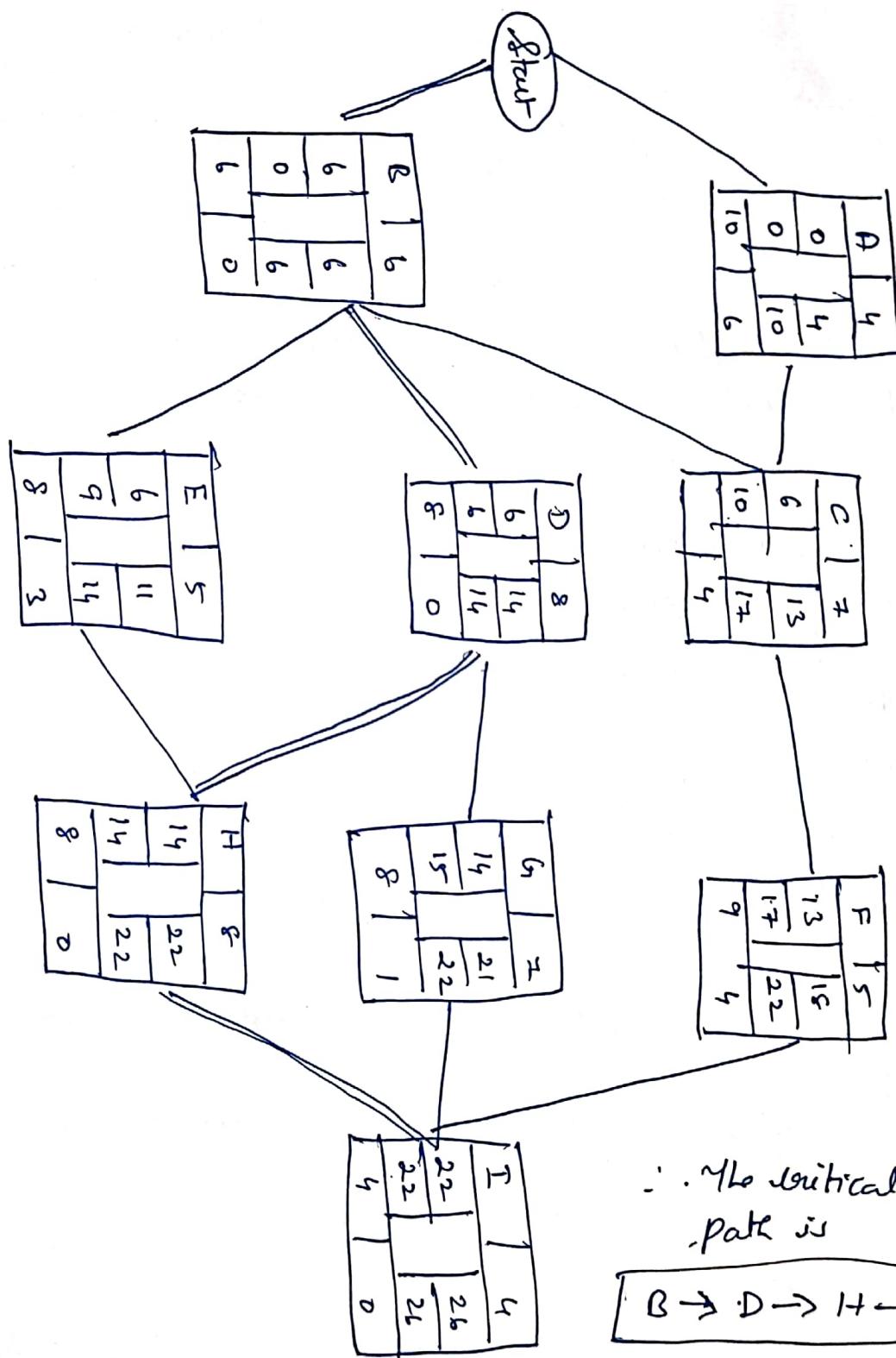
(ii) Middle Management (Executive level)

- => They account for the top-level management for the activities of their departments.
- => They are semi-executives & are made up of the departmental managers & branch managers.

- ⇒ They co-ordinate the responsibilities of the sub-unit of the firm & assess the efficiency of lower-level-managers.
 - ⇒ They are in-charge of the employment & training of the lower levels.
 - ⇒ They carry out the plans of the organisation according to policies & directives laid down by the top-level management.
 - ⇒ They organize the division or department activities.
 - ⇒ They should be an inspiration or create motivation for junior managers to improve their efficiency.
- (iii) Lower Level Management (Supervisory) Operations :-
- ⇒ They oversee & direct the operative employees
 - ⇒ They spend most of the time addressing the functions of the firm, as instructed by the manager above them.
 - ⇒ They are responsible for training, supervising & directing the operative employees.
 - ⇒ They allocate tasks & responsibility to the operative employees.
 - ⇒ They ensure quality & are responsible for the production quantity.
 - ⇒ They give instruction & guided direction to workers on their day to day jobs.
 - ⇒ They communicate the goals & objectives of the firm laid down by the higher level
 - ⇒ They should give periodic reports of the workers to the higher level manager.

Part-C

24)



15/2/22

18

Arun

In the above diagram, its representation is as follows,

$$ES = EF - AT$$

$$LS = LF - AT$$

dated		Duration
ES		EF
LS		LF
Span		Float

ES - Earliest start
LS - Latest Start
EF - Earliest Finish
LF - Latest finish.

23) Parameters:-

Organisational structure plays a crucial role in success of organisation. Based on the organisational structure, its growth & life of an organisation depends.

(a) Project Cost:-

Project cost is the most important for an organization, without working capital, its highly impossible to start any project. Project cost is the cost that obtain all the product, services & resources to complete the project. It is base for project because its profit & loss is involved. Without prior estimation of a project cost, project cannot be started.

(b) Technology Requirements:-

Technology requirement are the resources that are required to work on the project effectively without any failures. There are so many technologies available to work. Based on the requirements technologies are provided. Technology will minimize the manual work & man power. Because their technology errors can be minimized & issues can be identified easily & rectified.

c) Geographical Location:-

Geographical location is also very important for an organisation. Here geographical location, project cost & duration & other factors are estimated. Eg: If organisation is far from the resource, organisation must spend more effort to allocate resources. If the location is near to resource, project can be minimised.

d) Why Required working relations with customer:-

Customer is very important to every organisation. If project is done perfectly without customer-customer relation, project will be in vain. The effective work, cost, & timely delivery will give the best output from the customer. A good relationship brings with the best output of the project & quality services of an organisation.

Declaration:-

"All the answers in this answer booklet have been written by me. In my own handwriting & nobody has helped me. In writing the answers"

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15/2/22