

Objective Part

Compulsory

Q.No.1: Attempt all parts and each require answer 2 – 3 lines

(16*2=32)

1. Define Backward Pass?

A backward pass in the area of project management refers to the calculation of late finish dates and late start dates for the portions of schedule activities that have not been completed. This is determined by starting at the project's scheduled end date and working backwards through the schedule network logic.

2. What is RMMM?

RMM stands for Risk Management, Mitigation and Monitoring. It is a part of the software development plan or a separate document. The RMMM plan documents all work executed as a part of risk analysis and used by the project manager as a part of the overall project plan. The risk mitigation and monitoring start after the project is started and the documentation of RMMM is completed.

3. What is Portfolio Management?

Portfolio management is the art and science of selecting and overseeing a group of investments that meet the long-term financial objectives and risk tolerance of a client, a company, or an institution. Portfolio management is a process of choosing the appropriate mix of investments to be held in the portfolio and the percentage allocation of those investments.

4. Differentiate between Project, Process and Product?

A software process specifies a method of development software. A software project, on the other hand is a development project in which a software process is used. And software products are the outcomes of a software project.

5. Define Stakeholder?

A stakeholder is a party that has an interest in a company and can either affect or be affected by the business. The primary stakeholders in a typical corporation are its investors, employees, customers and suppliers.

6. What is Configuration Management?

Software Configuration Management is defined as a process to systematically manage, organize, and control the changes in the documents, codes, and other entities during the Software Development Life Cycle. It is abbreviated as the SCM process in software engineering. The primary goal is to increase productivity with minimal mistakes.

7. What are Quadruple Constraints?

Quadruple Constraint consists of SCOPE, SCHEDULE, COST and QUALITY. Each constraint deal with the performance of project management, and decide whether the project to be success or failure. Each constraint is measurable. A change in one constraint will automatically affect other constraints. For example, if you reduce the quality of the product, you will automatically reduce the time and the cost.

8. What's the difference between BCWP and BCWS?

Budgeted cost for work performed (BCWP) also called earned value (EV), is the budgeted cost of work that has actually been performed in carrying out a scheduled task during a specific time period. **Budgeted Cost of Work Scheduled (BCWS)** is the sum of the budgets for all work scheduled to be accomplished with a given time period. It also includes the cost of previous work completed and can address a specific period of performance or a date in time.

9. What is Gantt Chart?

A Gantt chart is a horizontal bar chart developed as a production control tool in 1917 by Henry L. Gantt. A Gantt Chart is a timeline that is used as a project management tool to illustrate how the project will run. You can view individual tasks, their durations and the sequencing of these tasks. View the overall timeline of the project and the expected completion date.

10. What is procurement management?

Project procurement management is the creation of relationships with outside vendors and suppliers for goods and services needed to complete a project. This process is comprised of five steps, including initiating and planning, selecting, contract writing, monitoring, and closing and completing.

11. What's the difference between Testing and Debugging?

Testing	Debugging
The purpose of testing is to find bugs and errors.	The purpose of debugging is to correct those bugs found during testing.
Testing is done by tester.	Debugging is done by programmer or developer.
It can be automated.	It can't be automated.
It can be done by outsider like client.	It must be done only by insider i.e. programmer.
Most of the testing can be done without design knowledge.	Debugging can't be done without proper design knowledge.

12. Define Preliminary Investigation?

The purpose of the preliminary investigation is to determine whether the problem or deficiency in the current system really exists. The project team may reexamine some of the feasibility aspects of the project. At this point, the purpose is to make a "go" or "no-go" decision.

13. How can slack be negative?

Negative float, also known as negative slack, is the amount of time beyond a project's scheduled completion that a task within the project requires.

14. Differentiate between Schedule Variance and Cost Variance?

Cost variance is basically related with the budget of the project. Cost variance is the difference of the actual cost and the expected cost. Cost Variance is calculated by taking the difference of the Earned Value and the Actual Cost.

Schedule variance basically related with the scheduled time for the project. Schedule variance is the measurement of deviation of consumed time from the scheduled time. Scheduled Variance is calculated by taking difference between Earned Value and Planned Value.

15. Define term "Statement of Work".

Statement of Work (or SOW) is a formal document that defines the entire scope of the work involved for a vendor and clarifies deliverables, costs, and timeline. It is needed in situations where a project involves vendors and external contributors in addition to the internal project team. The statement of work should include:

- ✓ All deliverables and due dates.
- ✓ The individual tasks that lead to the deliverable, and who these tasks are assigned to.
- ✓ The resources needed for the project including facilities, equipment, and QA procedures.
- ✓ The governance process for the project.
- ✓ Costs and deadlines for payment.

16. What is change control?

Change control is a systematic approach to managing all changes made to a product or system. The purpose is to ensure that no unnecessary changes are made, that all changes are documented, that services are not unnecessarily disrupted and that resources are used efficiently.

Subjective Part (16*3)

Q2. What is Preliminary Investigation? What's the importance of this investigation? At which point during SDLC this investigation is being done? What is the end product of this investigation?

Preliminary investigation is to determine whether the problem or deficiency in the current system really exists. It determines whether the problem or deficiency in the current system really exists. The project team may reexamine some of the feasibility aspects of the project. At this point, the purpose is to make a "go" or "no-go" decision.

Importance of investigation

- ✓ improve your chances of achieving the desired result.
- ✓ gain a fresh perspective on your project, and how it fits with your business strategy.
- ✓ priorities your business' resources and ensure their efficient use.
- ✓ set the scope, schedule and budget accurately from the start.
- ✓ stay on schedule and keep costs and resources to budget
- ✓ improve productivity and quality of work
- ✓ encourage consistent communications amongst staff, suppliers and clients
- ✓ satisfy the various needs of the project's stakeholders
- ✓ mitigate risks of a project failing
- ✓ increase customer satisfaction
- ✓ gain a competitive advantage and boost your bottom line

The SDLC has different phases to develop the product. The phases are followed in a particular sequence. All the phases are interlinked and each phase produces deliverable required by the next phase.

Requirement analysis is the first step of the software development cycle.

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Q3. (a) What is the difference between ROI (return on investment) and payback period? Explain with example?

Return on Investment (ROI):

Simple ROI is the incremental gains of an action divided by the cost of the action. This metric will predict the percentage or ratio of gains to cost. You will hear ROI given as a number, usually a percentage. For example, if someone tells you that your \$100,000 investment has an ROI of 25%, you can expect your incremental gains to be 25% more than the investment.

$$\text{Simple ROI} = (\text{Gains} - \text{Investment Costs}) / \text{Investment Costs} = (\$125,000 - \$100,000) / \$100,000 = 0.25 \text{ or } 25\%$$

The problem with looking at simple ROI alone is that this tells you nothing about time. How long will it take for your business to see that 25% return on investment? 2 years? 10 years? 50 years? Simple ROI also doesn't illustrate the risk of an investment.

Payback Period:

Payback period is the length of time that it takes for the cumulative gains from an investment to equal the cumulative cost. In other words, how much time it takes for an investment to pay for itself. Investments with shorter payback periods are considered to have lower risk than those with longer payback periods. The calculation is more cumbersome than that of simple ROI. However, like simple ROI, payback period analysis does not tell the whole story. What are the gains once the investment has paid for itself? Payback period doesn't calculate this information.

In reality, there is no single best financial metric that will tell you "go or no go" on an investment decision. The key is to know what is important to your business and to understand the information you are working with.

ROI	Payback Period
It is used to calculate benefit investor will receive	The payback period is the time required to earn back the amount invested in an asset from its net cash flows.
Simple and Easy to Calculate	Payback period is very simple to calculate.
Universally Understood	It can be a measure of risk inherent in a project
Disregards the Factor of Time	Easy to understand because it provides quick Estimate to organization that in how much time the invested amount would get recovered
Susceptible to Manipulation	lower the payback period better the project 1. Ignores time value of money 2. Ignores Cash inflow generated after payback period
Formula Calculator in Excel	Calculate in excel
ROI Formula $ROI = \text{Net Income} / \text{Cost of Investment}$	Divide the initial investment by the annuity: $\$100,000 / \$35,000 = 2.86$ (or 10.32 months).
Example of the ROI Formula Calculation: An investor purchases property A, which is valued at \$500,000. Two years later, the investor sells the property for \$1,000,000. We use the investment gain formula in this case. $ROI = (1,000,000 - 500,000) / (500,000) = 1$ or 100%	The management of Health Supplement Inc. wants to reduce its labor cost by installing a new machine. Two types of machines are available in the market – machine X and machine Y. Machine X would cost \$18,000 whereas machine Y would cost \$15,000. Both the machines can reduce annual labor cost by \$3,000 Solution: Payback period of machine X: $\$18,000 / \$3,000 = 6$ years Payback period of machine y: $\$15,000 / \$3,000 = 5$ years

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(b) A project has following activities: Environment Permits, Traffic report, Utility Locates and Intersection Design. To complete this project, the approval of these activities (Environment Permits, Traffic Report, and Intersection Design) is given by project manager. The project manager is also informed the Utility Locates. Environmental coordinator is responsible for environment permits and he is also consulted in intersection design. Traffic officer is responsible for traffic report and intersection design and also informed utility locates. Utility officer is responsible for utility locates and consulted for intersection design.

a. Identify the roles and responsibilities and draw RAM for this project?

A Responsibility Assignment Matrix (RAM) uses the Work Breakdown Structure (WBS) and the organizational structure to link deliverables and/or activities to resources. The RAM provides a realistic picture of the resources needed and can identify if you have enough resources for the project. Additionally, it clearly shows who is responsible for what; if it is associated with the schedule it can identify when the deliverable is needed. By creating a RAM; deliverables are assigned a responsible party, who will review or add input and the appropriate approval authority is identified.

The RAM can be as simple as placing a check mark in a matrix to assign the deliverables or activities.

Use the WBS to identify deliverables and activities.

Identify Office, Role, or Person i.e. Utilities Office, Utilities Coordinator, or persons name

Deliverable:	Office, Role or person	Office, Role or person	Office, Role or person
Enviro. Permits	✓		
Traffic Report		✓	
Utility Locates			✓
Intersection Design		✓	✓

Additionally, roles and assignments are identified by using a coding structure such as RACI or PARIS.

RACI

- **Responsible** - owner, the person who owns the work. Each deliverable/activity must have an owner.
- **Approval** - the person who approves the deliverable or activity. There should only be one approver.
- **Consulted** - this person delivers information required to do the work.
- **Informed** - a person that needs to be informed of the progress of the work.

Deliverable:	Project Manager Mark Cross	Environment al Coordinator	Traffic Office Tammi Bailey	Utilities or Cindy Santos
Enviro. Permits	A	R		
Traffic Report	A		R	
Utility Locates	I		I	R
Intersection Design	A	C	R	C

RACI – Responsible, Approval, Consulted, Informed

PARIS

- Participant - involved but not at a critical level
- Accountable - must answer to management for the project task status
- Review needed or required
- Input needed or required
- Sign Off Required

Deliverable:	Team Leader Marcia Weeks	Environment al Office	Traffic Design Frank Morelli	Utilities
Enviro. Permits	A	S		
Traffic Report	A	R	A	R
Utility Locates	I	R	R	A
Intersection Design	A	R	S	R

PARIS – Participant, Accountable, Review, Input, Sign off

There are many possible variations to this coding structure; the project team may create unique codes that are more meaningful to the project.

Additional codes that may be used are:

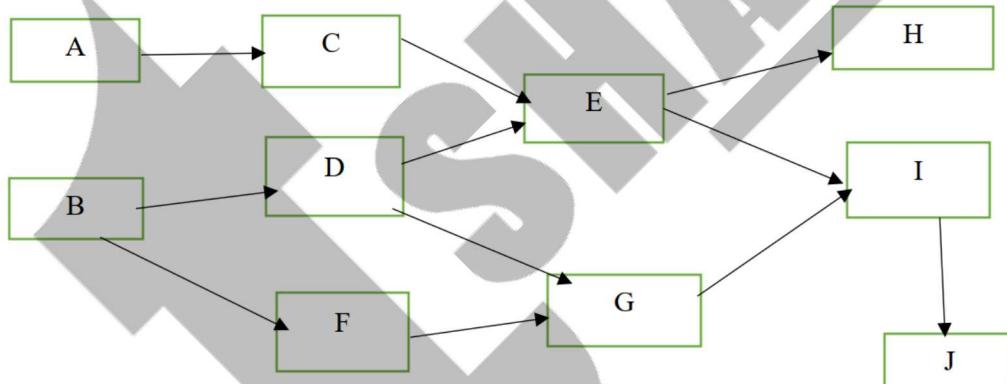
Verifies - the person who ensures the work meets quality standards.

Final Authority - the person who puts the final stamp on the completed work.

Q4. Consider the following scenario and answer the following question

Activities	Predecessor	Duration
A	-	10
B	-	15
C	A	5
D	B	12
E	C, D	14
F	B	8
G	D, F	15
H	E	10
I	E, G	6
J	F, I	9

a) Draw the project network diagram.



b) Develop the project schedule (EST, EFT, LST, LFT, Slack).

Activity	Duration	EST	EFT	LST	LFT
A	10	0	10	11	22
B	15	0	15	0	15
C	5	10	15	22	27
D	12	15	27	15	27
E	14	27	41	27	41
F	8	15	23	28	36
G	15	27	42	36	51
H	10	41	51	41	51
I	6	51	57	51	57
J	9	57	66	57	66

c) What are the critical activities and critical path?

The Critical Path: Method is the sequence of scheduled activities that determines the duration of the project. **Critical path activities** are the project tasks that must start and finish on time to ensure that the project ends on schedule? A delay in any critical path activity will delay completion of the project, unless the project plan can be adjusted so that successor tasks finish more quickly than planned.

d) What is the project completion duration?

From the start event to the end event, the time required to complete all the activities of the project in the specified sequence is known as the project completion time

e) If there is an option to delay one activity without delaying the entire merge project, which activity would you delay and why?

Q5. Suppose you are managing a software development project. This project is expected to be completed in 6 months at a cost of \$15000 per month. After 4 months, planned completion should have been 70%. But you realize that the project is 50% completed at a cost of \$70,000.

a) Find BCWP, BCWS and ACWP

$$\text{BCWP or EV} = \text{completion plane} * \text{task budget} = 70\% * 90000 = 63000$$

$$\text{BCWS or PV} = \text{complete plane} * \text{task budget} = 50\% * 90000 = 45000$$

$$\text{ACWP or AC} = 70000$$

b) Calculate SPI and CPI and interpret these indexes?

$$\text{SPI} = \text{EV/PV} = 63000/45000 = 1.4$$

$$\text{CPI} = \text{EV/AC} = 63000/70000 = 0.9$$

c) Calculate EAC for this project

$$\text{EAC} (\text{Estimate at completion}) = \text{AC} + (\text{BAC} - \text{EV}) = 70000 + (90000 - 63000) = 70000 + 27000 = 97000$$

Q6. Write a Note on any two of following option?

a) Skill requirements for project manager

Project managers streamline processes, manage the work of dozens or even hundreds of people, and keep production on time. The job requires extensive soft skills, including communication and organization, to succeed. Here are some of the top skills necessary to be successful:

Communication: Project managers spend most of their time communicating with staff, reporting progress or problems to clients, or negotiating with vendors. Verbal and written communication skills are keys to success. They may be called on often to give presentations, so it is important to be comfortable using presentation software and speaking in front of large groups of people.

Leadership: The ability to lead and motivate a team is critical to progressing any project. Project managers need to resolve personality conflicts and boost team spirit while also guarding against late or sloppy work.

Management: To work effectively, managing people is essential. From delegating work to holding individuals accountable, it's a project manager's responsibility to set goals, evaluate performance, and encourage collaboration.

Negotiation: Project managers will negotiate with clients on an appropriate schedule and scope of work. They will bargain for certain resources and manpower. Knowing how to negotiate to get what they need to succeed and keep everyone involved satisfied is a skill developed and improved through experience.

Organization: Project managers are unlikely to be successful if they are sloppy or forgetful. Because they are juggling so many different aspects, they need to be organized in both their professional and personal lives. It's important for project managers to develop an organizational system, whether it's an electronic note-taker or a paper planner, to keep all of the details on top of mind.

Problem Solving: Issues that need attention regularly come up for project managers, and it's their duty to predict potential problems in advance and brainstorm solutions in case these issues arise. Having backup plans and alternatives available can prevent costly delays and keep work on track. Most risks are not urgent if they are anticipated. However, not every issue can be predicted, so it's also important for project managers to nimbly deal with unexpected problems and make sure that minor issues do not turn into major setbacks.

Budgeting: All projects are going to have a fixed amount of funding available to them. It's a project manager's responsibility to develop a budget for that money and make sure it is being followed closely. This is a skill that requires experience. Only with time spent working on large projects can managers develop the knowledge necessary to know where costs likely will mount and where savings can be found.

b) Process Groups in Project Management

Process Groups Initiating phase triggers the planning process group. After preparing the required documents and steps for initiating the project the next process group begins.

- **Planning** phase triggers the execution process group. The project must have a proper planning in order to start the execution phase.
- **Execution** is the phase where the most of the project work is delivered.
- **Monitoring and controlling** are the only project management process group that interacts with all other four. In this phase, the project team checks whether everything is going as planned.
- **Closing** helps to close the project after all objectives are met.

c) Formulation of Network Model

The first stage in creating a network model is to represent the activities and their interrelationships as a graph. In CPM we do this by representing activities as links (arrowed lines) in the graph - the nodes (circles) representing the events of activities starting and finishing.

Critical Path method

In the critical path method, the critical activities of a program or a project are identified. These are the activities that have a direct impact on the completion date of the project.

Network diagram

Once the activity sequence is correctly identified, the network diagram can be drawn (refer to the sample diagram above). Although the early diagrams were drawn on paper, there are a number of computers software's, such as Primavera, for this purpose nowadays.

Critical path diagram to show project progresses

Critical path diagram is a live artefact. Therefore, this diagram should be updated with actual values once the task is completed. This gives more realistic figure for the deadline and the project management can know whether they are on track regarding the deliverables.

- Offers a visual representation of the project activities.
- Presents the time to complete the tasks and the overall project.
- Tracking of critical activities.
