

**Hall Ticket Number:**

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**IV/IV B.Tech (Regular\Supplementary) DEGREE EXAMINATION****November, 2022****Institutional Electives (Common to all branches)****Seventh Semester****Project Management****Time:** Three Hours**Maximum:** 50 Marks*Answer question 1 compulsory.***(10X1 = 10Marks)***Answer one question from each unit.***(4X10=40 Marks)**

- |                       |   |     |    |     |
|-----------------------|---|-----|----|-----|
|                       |   | CO  | BL | M   |
| 1                     | a) What is WBS?   | CO1 | L1 |     |
|                       | b) Define project.  | CO1 | L3 |     |
|                       | c) What is network analysis used for?   | CO1 | L2 |     |
|                       | d) Define Project Crashing.   | CO2 | L4 |     |
|                       | e) Dummy Activity.  | CO2 | L1 |     |
|                       | f) What is slack in PERT?   | CO2 | L1 |     |
|                       | g) What is resource leveling?   | CO3 | L3 |     |
|                       | h) What do you mean by performance measurement?                               | CO3 | L2 |     |
|                       | i) What is organizational structure and culture?                              | CO4 | L3 |     |
|                       | j) What are the elements of a maturity model?                                 | CO4 | L4 |     |
| <b><u>Unit-I</u></b>  |   |     |    |     |
| 2                     | Discuss the classification of projects on various bases                       | CO1 | L2 | 10M |
| <b>(OR)</b>           |   |     |    |     |
| 3                     | a) Explain the importance of project management.                              | CO1 | L1 | 5M  |
|                       | b) How to Develop a Project Management Plan.                                  | CO1 | L2 | 5M  |
| <b><u>Unit-II</u></b> |   |     |    |     |
| 4                     | A project schedule has the following characteristics as shown in Table below: | CO2 | L3 | 10M |
|                       | a) Construct Project network.   |     |    |     |
|                       | b) Compute earliest time, latest time and Total Float for each activity.      |     |    |     |
|                       | c) Find the critical path.  |     |    |     |

Activity	Name	Time (Days)	Activity	Name	Time (Days)
1-2	A	4	5-6	G	4
1-3	B	1	5-7	H	8
2-4	C	1	6-8	I	1
3-4	D	1	7-8	J	2
3-5	E	6	8-10	K	5
4-9	F	5	9-10	L	7

**(OR)**

- 5 An R & D project has a list of tasks to be performed whose time estimates are given in the Table as follows.a) Draw the project network.b) Find the critical path.c) Find the probability that the project is completed in 19 days.(d) If the probability is less than 20%, then find the number of days required to complete the project

Activity i-j	Activity Name	to	tm	tp
1-2	A	4	6	8
1-3	B	2	3	10
1-4	C	6	8	16
2-4	D	1	2	3
3-4	E	6	7	8
3-5	F	6	7	14
4-6	G	3	5	7
4-7	H	4	11	12
5-7	I	2	4	6
6-7	J	2	9	10

### Unit-III

- |   |   |     |    |    |
|---|---|-----|----|----|
| 6 | a) Discuss different Cost Estimation Techniques.        | CO3 | L2 | 5M |
|   | b) How do you measure project performance and progress? | CO3 | L3 | 5M |

(OR)

- |   |   |     |    |    |
|---|---|-----|----|----|
| 7 | a) What are the types of resource scheduling methods? What are the benefits of resource scheduling? | CO3 | L2 | 5M |
|   | b) What are the problem solving techniques in management?   | CO3 | L2 | 5M |

## Unit-IV

- |   |  |     |    |    |
|---|--|-----|----|----|
| 8 | a) Discuss about how you design a project structure. | CO4 | L1 | 5M |
|   | b) What do you mean by managing a project team?      | CO4 | L4 | 5M |

**(OR)**

- 9 What are the five levels of maturity model? What are the benefits of project CO4 L3 10M management maturity models?

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## Z-TABLE FOR PROBABILITY ESTIMATION

[illegible]

## SCHEME OF EVALUATION

Answer all the questions

10\*1=10M

- 1
- a) **What is WBS?**  
Work breakdown structure, as the name suggests, is breaking the project systematically into successive levels. But work breakdown structure is not limited to disintegration or breaking down; it also develops linkages between various tasks or activities.
- b) **Define project.**  
A project is a temporary and one-time exercise which varies in duration. It is undertaken to address a specific need in an organisation, which may be to create a product or service or to change a business process.
- c) **What is network analysis used for?**  
Graphic representation of a project's operations is called a network. It is the combination of activities and events which are required to reach the end objective of a project.
- d) **Define Project Crashing.**  
Crashing in project management is a tactic employed by project managers and stakeholders to address new challenges as they occur. Project crashing preserves or speeds up the scope and deadline of a project by assigning additional resources where they're needed most
- e) **Dummy Activity.**  
Dummy activity is a hypothetical activity which requires zero time and zero resources for completion. Dummy arrow represents an activity with zero duration.
- f) **What is slack in PERT?**  
Slack is defined as the difference between the latest allowable time and the earliest expected time of an event
- g) **What is resource leveling?**  
Resource leveling is a resource management technique that can help teams better accommodate resource constraints and predict project timelines. It helps avoid poor project planning that often leads to last-minute delays, overworked team members, and cost overruns.
- h) **What do you mean by performance measurement?**  
Performance measurement is the process used to assess the efficiency and effectiveness of projects, programs and initiatives. It is a systematic approach to collecting, analyzing and evaluating how "on track" a project/program is to achieve its desired outcomes, goals and objectives.
- i) **What is organizational structure and culture?**  
Organizational structure refers to the norms, rules, policies formed by the company to achieve the objectives. Organizational Culture includes the value, behaviour and attitudes of the employees. Both of these are equally important for the success of the organization.
- j) **What are the elements of a maturity model?**  
1) common language, 2) common processes, 3) singular methodology, 4), bench marking, 5) continuous improvement.

2 **Discuss the classification of projects on various bases** **10M**

By size (cost, duration, team, business value, number of departments affected, and so on)

By type (new, maintenance, upgrade, strategic, tactical, operational)

By application (software development, new product development, equipment installation, and so on)

By complexity and uncertainty

Every Project is different from one another. Projects can be classified based on several different points. The classification of projects in project management varies according to a number of different factors such as complexity, source of capital, its content, those involved and its purpose.

Projects can be classified based on the following factors.

According to complexity:

☐ Easy: A project is classified as easy when the relationships between tasks are basic and detailed planning or organizations are not required. A small work team and a few external stakeholders and collaborators are common in this case. The tasks of the projects can be undertaken by a small team.

☐ Complicated: The project network is broad and complicated. There are many task inter dependencies. With these projects, simplification where possible is everything. The task of executing this type of project requires proper planning. Cloud-based apps such as Sinnaps will immensely help to simplify complicated projects by automatically calculating the project's best work path and updating any changes introduced through its use of different types of project management tools. Here, the importance of project management and how an effective tool could help you!

According to the source of capital:

☐ Public: Financing comes from Governmental institutions.

☐ Private: Financing comes from businesses or private incentives.

☐ Mixed: Financing comes from a mixed source of both public and private funding.

According to Project content:

☐ Construction: These are projects that have anything to do with the construction of civil or architectural work. Predictive methods are used along with agile techniques which will be explained later on. Furthermore, construction is an engineering project and the process of planning its execution must be painstakingly done to achieve the desired outcome.

☐ IT: Any project that has to do with software development, IT system, etc. The types of project management information systems vary across the board, but in today's world are very common.

- ☐ Business: These projects are involved with the development of a business idea, management of a work team, cost management, etc., and they usually follow a commercial strategy.
- ☐ Service or product production: These are projects that involve the development of an innovative product or service, design of a new product, etc. They are often used in the R & D department.

According to those involved:

- ☐ Departmental: When a certain department or area of an organization is involved.
- ☐ Internal: When a whole company itself is involved in the project's development.
- ☐ Matriarchal: When there is a combination of departments involved.
- ☐ External: When a company outsources external project manager or teams to execute the project. This is common in digital transformations, process improvements and strategy changes, for example.

According to its objective:

- ☐ Production: Oriented at the production of a product or service taking into consideration a certain determined objective to be met by an organization.
- ☐ Social: Oriented at the improvement of the quality of life of people. This can be in the form of rendering corporate social responsibility (CSR) to the people.
- ☐ Educational: Oriented at the education of others. This is always done to make them better.
- ☐ Community: Oriented at people too, however with their involvement.
- ☐ Research: Oriented at innovation and the gaining of knowledge to enhance the operational efficiency of an organization.

### 3 a) Explain the importance of project management.

**10M**

A project is generally initiated by a perceived need in an organization. Being a one off undertaking, it will have a start and an end, constraints of budgets, time and resources and involves a purpose built team. Project teams are made up of many different team members, for example, end users/customers (of a product or service), representatives from Information Technology (IT), a project leader, business analysts, trainers, the project sponsor and other stakeholders.

Project management is the discipline of managing all the different resources and aspects of the project in such a way that the resources will deliver all the output that is required to complete the project within the defined scope, time, and cost constraints. These are agreed upon in the project initiation stage and by the time the project begins all stakeholders and team members will have a clear understanding and acceptance of the process, methodology and expected outcomes.

A good project manager utilizes a formal process that can be audited and used as a blue print for the project, and this is achieved by employing a project management methodology.

Purpose of project management

A project has a lifecycle, underpinned by a plan, which is the path and sequence through the various activities defined to produce its products. Project management is a controlled implementation of the project plan under the direction of the organization's senior management. Traditionally, a successful project is one that has delivered its products or services according to the project plan, meeting overall business objectives. Project success is now seen more and more in terms of delivering projected business benefits or the capability required for benefits delivery within the business.

A properly managed project will usually have:

- ✓ ☐ senior level sponsorship from within the organization
- ✓ ☐ strong leadership, accountability and governance arrangements
- ✓ ☐ a dedicated project manager
- ✓ ☐ a project plan and adequate resources to implement the plan
- ✓ ☐ clear processes for the management of risks, issues, stakeholders, communications and benefits
- ✓ ☐ effective project assurance arrangements
- ✓ ☐ well defined reporting structures and a clearly understood project scope

Some of the key documents usually associated with a properly managed project are:

- ✓ ☐ a business case justifying the investment and proposed changes
- ✓ ☐ a project initiation document setting out the project objectives and the means for achieving them
- ✓ ☐ a project plan setting out the main products or services and all associated resources and activities
- ✓ ☐ standards for reporting progress and highlighting issues
- ✓ ☐ registers for recording risks and issues and managing their escalation
- ✓ ☐ end project and lessons learned reports
- ✓ ☐ a post project review report, independent of the project, reporting estimates against eventual outturns including the extent to which projected benefits have been realized
- ✓ ☐ Project management guidance

- b) How to Develop a Project Management Plan.

10M

An executive summary/project vision – comprising a brief description of the project and clearly demonstrating the aims and objectives (e.g. SMART targets) of the project.

A description of the target audience and the desired learning outcomes. Think about the USP (Unique Selling Point) of your project to the target audience.

Details about the content and context of the project – is it a new project, or does it build on previous experience? Will it utilize an existing platform?

Key roles and responsibilities – details of individuals involved in the design and delivery of the project and the tasks assigned to them. Who is ultimately responsible for the project and final decisions e.g. the principal funding applicant. This is extremely important for any project, but even more so when a project is a collaboration between different organizations. (You should also establish who is accountable within each partner organization).

Keys tasks and deliverables required to achieve the objectives of the project (key tasks broken down into sub-tasks if required).

Resources necessary to achieve the aims of the project, (real, virtual, people, organizations etc.)

Project timeline and key milestones – all tasks put into a sensible order with sufficient timescales. Start and end dates should be clearly identified. Gantt charts are a useful planning tool for this)

Budget and Costing – a budget showing a breakdown of all the project costs linked to key tasks and Deliverables- e.g. salaries, consultancy fees, communication with stakeholders, materials & consumables, venue/access charges, events, equipment, travel & subs, consumables, evaluation etc. This should also include any funding that has been secured ‘in kind’ e.g. room hire that has been waived. This will demonstrate the true cost of the project.

Contingency plans – allow time and budget for ‘contingencies’ and detail how any project issues and changes to the scope of the project will be managed. Risks to the project should be continuously assessed and mitigated for as far as possible.

Communication strategy/mechanisms – how will communications with all stakeholders be managed? Including methods of and frequency of communication. This should also include plans for marketing and promotion, dissemination and sharing any learning.

Monitoring and evaluation strategy – what are the intended impact(s) and outcomes, and how will you measure success?

Record keeping/document management system –The person(s) responsible for record keeping and managing all the project documents (i.e. funding proposal, detailed project plan, interim reports, stakeholder communications, processes for change, health and safety documents etc) needs to be agreed at the start of the project. (This is often the Project Manager).

Legacy – what is the intended legacy of the project e.g. working towards a sustainable activity
- 4

A project schedule has the following characteristics as shown in Table below:

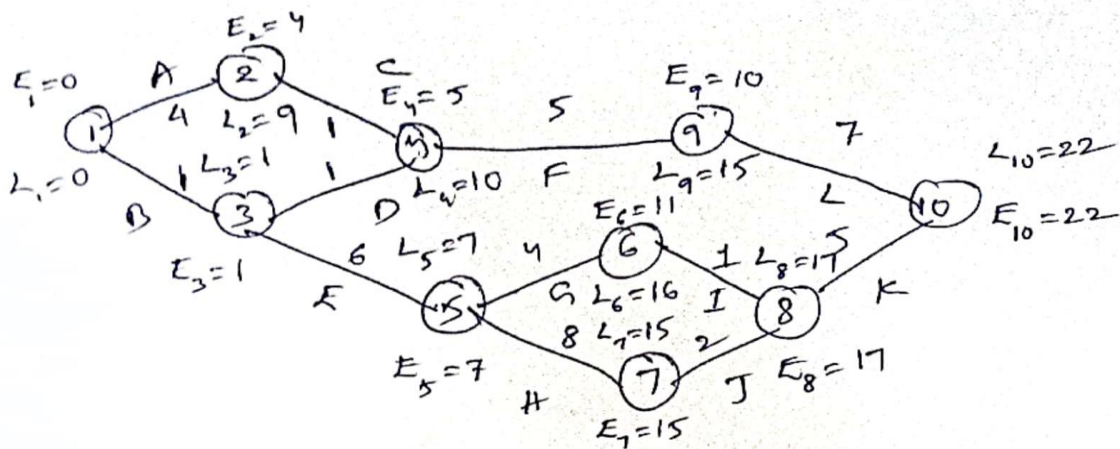
CO2 L3 10M

a) Construct Project network.

b) Compute earliest time, latest time and Total Float for each activity.

c) Find the critical path.

Activity	Name	Time (Days)	Activity	Name	Time (Days)
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4-9	F	5	9-10	L	7



Activity	Duration	Earliest time		Latest time		Total float $L_i - E_i$
		$E_i$	$E_j$	$L_i$	$L_j$	
A	4	0	4	5	9	5
B	1	0	1	0	1	0
C	1	4	5	9	10	5
D	1	4	2	9	10	8
E	6	1	7	1	7	0
F	5	5	10	10	15	5
G	4	7	11	12	16	5
H	8	7	15	7	15	0
I	1	11	12	16	17	5
J	2	15	17	15	17	0
K	5	17	22	17	22	0
L	7	10	17	15	22	5

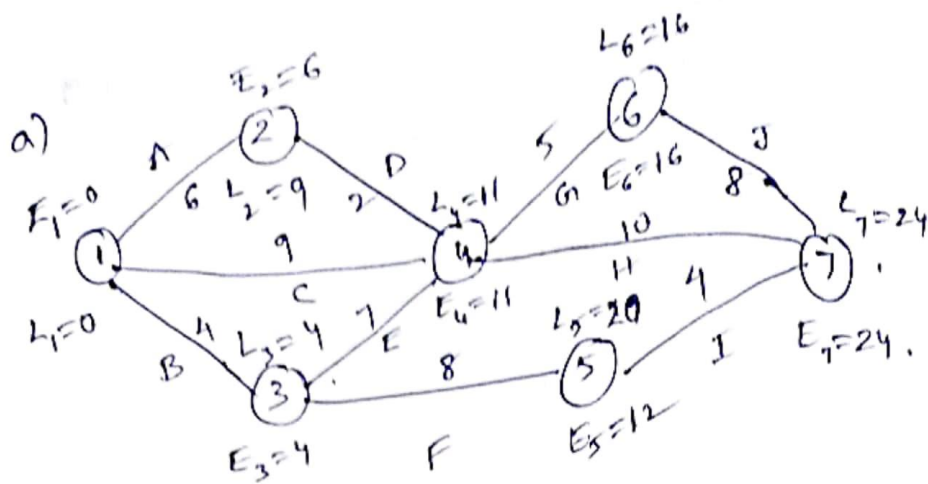
critical path: B - E - H - J - K

TIME = 22 days.

- 5 An R & D project has a list of tasks to be performed whose time estimates are given in the Table as follows.a) Draw the project network.b) Find the critical path.c) Find the probability that the project is completed in 19 days.(d) If the probability is less than 20%, then find the number of days required to complete the project

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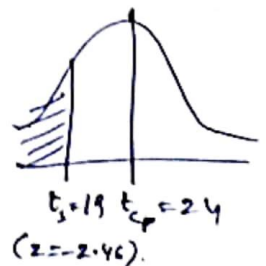
Activity	$t_e$	$\sigma^2$	$E_i$	$E_j$	$L_i$	$L_j$	TF
A	6	4/9	0	6	3	9	3
B	4	16/9	0	4	0	4	0
C	9	25/9	0	9	2	11	2
D	2	1/9	6	8	9	11	3
E	7	1/9	4	11	4	11	0
F	8	16/9	4	12	12	20	8
G	5	4/9	11	16	11	16	0
H	10	16/9	11	21	14	24	3
I	4	4/9	12	16	20	24	8
J	8	16/9	16	24	16	24	0

b) critical path: B-E-G-J ; TIME  $t_{cp} = 24$

$$\sigma_{cp}^2 = \frac{16}{9} + \frac{1}{9} + \frac{4}{9} + \frac{16}{9} = \frac{37}{9}$$

$$Z = \frac{t_s - t_{cp}}{\sigma_{cp}} = \frac{19 - 24}{\sqrt{\frac{37}{9}}} = \frac{-5}{2.03} = -2.46$$

c) Req'd probability =  $1 - 0.9931 = 0.0069 = 0.69\%$



d)  $Z_{0.85} = \frac{t_s - 24}{2.03}$

Z value corresponding to 20% probability is 0.85  
 $(-0.85)(2.03) + 24 = t_s$  ;  $t_s = 22.27 \approx 22$  days.

## 6 a) **Discuss different Cost Estimation Techniques.**

The following list includes common tools and techniques used in project cost estimation:

- **Expert Judgment** – use of knowledge gained from past project management experience. Expert judgment, in conjunction with objective estimation techniques, provides valuable information about the organizational environment and information from prior comparable projects.
- **Analogous Estimating** – use of the metrics from a previous, similar project as the basis of estimation for the current project. Analogous estimating takes the actual cost of previous, similar projects as a baseline and then adjusts for known differences (such as size, complexity, scope, duration, etc.).
- **Parametric Estimating** – use of a statistical relationship between historical data and other variables (for example, lines of code in software development) to calculate an estimate for activity parameters, such as scope, cost, budget, and duration. Used correctly, this technique can produce high levels of accuracy.
- **Bottom-Up Estimating** – estimating all individual work packages/activities with the greatest level of detail, summarizing higher-level estimates with the combination of the individual estimates. The accuracy of bottom-up estimating is optimized when individual work packages/activities are defined in detail.
- **Three-Point Estimates** – use of three estimates to determine a range for an activity's cost: the best-case estimate, the most likely estimate, and the worst-case estimate.
- **Reserve Analysis** – determination of contingency reserves to account for cost uncertainty.
- **Project Management Estimating Software** – use of project management cost estimating software applications, computerized spreadsheets, simulation, and statistical tools. Such tools can allow for rapid consideration of multiple cost estimate alternatives.
- **Vendor Bid Analysis** – determination of what the project should cost based on a review of vendor bids/proposals. This technique may be used in conjunction with other cost estimation techniques to ensure that cost estimates are comprehensive.

## b) **How do you measure project performance and progress?**

Performance measurement is the practice of analyzing project progress and understanding what it means within the context of the overall project plan and goals.

Performance measurement enables project professionals to compare task or project progress against trends and benchmarks, such as past performance and expected progress. The practice of performance variance analysis allows them to pinpoint which areas of the project are behind or ahead and where their focus is needed.

The most common way to conduct performance measurement is through Earned Value Management (EVM). EVM compares cost and schedule progress against project baselines, budgets, and expected future outcomes.

There are a number of formulas involved in EVM analysis. These include:

**Earned Value (EV):** % complete (from progress measurement) x BAC (budget at completion) or the sum of PV of all completed tasks to date.

**Planned Value (PV):** The authorized budget assigned to scheduled work (usually at the control account level).

**Cost Variance (CV):** This is  $EV - AC$ . AC stands for actual cost.

**Schedule Variance (SV):** Calculated as  $EV - PV$ .

**Schedule Performance Index (SPI):**  $EV/PV$ .

**Cost Performance Index (CPI):**  $EV/AC$ .

**Variance at Completion (VAC):**  $BAC (Budget at Completion) - EAC (Estimate at completion)$ .

**Estimate to Completion (ETC):** Calculated as  $EAC - AC$  or by creating a new bottom-up estimate of all work remaining.

**Estimate at Completion (EAC):** This value can be calculated many ways, including:

$AC$  (actual costs to date) + Bottom-up ETC (new estimates for costs remaining).

$BAC / \text{Cumulative CPI}$ , to forecast based on efficiency so far.

$AC + (BAC - EV)$ , to calculate actual costs so far plus the remaining value of work to be completed.

$AC + (BAC - EV / (\text{Cumulative CPI} * \text{Cumulative SPI}))$ , to find actual to date plus the remaining budget adjusted for project efficiency rates so far.

Using simulation software to predict when a project will complete and how much it will cost based on performance so far and predictions about whether performance may improve, drop, or stay on-trend.

**To Complete Performance Index (TCPI):** TCPI is used to calculate the cost performance that must be achieved to hit the cost target. Using EAC the formula is  $(BAC - EV) / (EAC - AC)$ .

**Project Progress Report Format**

- Progress since last report
- Current status of project

1. Schedule
2. Cost
3. Scope



- Cumulative trends
  - Problems and issues since last report
    1. Actions and resolution of earlier problems
    2. New variances and problems identified
  - Corrective action planned
- The Project Control Process

- Control
  - The process of comparing actual performance against plan to identify deviations, evaluate courses of action, and take appropriate corrective action.

- Project Control Steps
  1. Setting a baseline plan.
  2. Measuring progress and performance.
  3. Comparing plan against actual.
  4. Taking action.
- Tools
  - Tracking and baseline Gantt charts
  - Control charts

7 a) **What are the types of resource scheduling methods? What are the benefits of resource scheduling?**

There are 2 types of resource scheduling methods

1. Time constrained projects must be completed by an imposed date.
  - Require use of leveling techniques that focus on balancing or smoothing resource demands.
  - Use positive slack (delaying noncritical activities) to manage resource utilization over the duration of the project.
- Peak resource demands are reduced.
- Resources over the life of the project are reduced.
- Fluctuation in resource demand is minimized.
2. Resource constrained project
  - Resources are limited in quantity or availability.
  - Activities are scheduled using heuristics (rules-of-thumb) that focus on:
    1. Minimum slack
    2. Smallest (least) duration
    3. Lowest activity identification number
  - The parallel method is used to apply heuristics
  - An iterative process starting at the first time period of the project and scheduling period-by-period the start of any activities using the three priority rules.

**benefits of resource scheduling**

Improve efficiency and cost of the project.

Prevent timeline delays.

Prevent overloading people with too much work.

Assign tasks and monitor projects from start to finish.

Schedule labor based on skills and availability.

b) **What are the problem solving techniques in management?**

The 5 Whys Technique

To imagine how this works, think of a toddler with a curious mind.

Don't put that bag in your mouth

Why?

'Coz it is bad for you

Why?

'Coz it is made of plastic

Why?

'Coz plastic makes it easy to carry things

Why?

'Coz plastic doesn't degrade

Why?

'Coz it is unnatural and oh well, an environmental hazard

And there, you have it! A 3 year old's way to the root cause of pollution.

The 5 Why method was the brainchild of Sakichi Toyoda, the founder of why you can Innova your family all together to your weekend destination. He was a proponent of getting down to the manufacturing floor and here out the story from the people directly, at the scene of the action. The speciality of this method is that it doesn't need sophisticated data collection means, experimentation or statistical tools. It is the raw deductive ability of asking the questions and only moving on to the next, once a factual response is received. The drill down could take 5 Whys or more but it could be a quick way to spot the cause of the problem. If not, more rigorous methods are needed.

Appreciation

This one aims to ask So what instead of Why. Think of the 5 Why technique as inspired by a toddler, with this one by any snarky teenager. After identifying the problem, you can investigate its implications and begin to understand what solution you will need to focus on.

For instance, you have to attend a show and you are running late.

So what?

If I take the shorter, more popular, route, the traffic might be too heavy.

So what?

So I might need to think about an alternative route. But it may be about a mile longer.

So what?

What if there is traffic on that road too and I lose out on time and distance?

So what?

Maybe I should divide it into two trips and take the train for the busiest route.

It is a way to assess all the aspects, you can think of, to reach a feasible solution.

#### Cause and Effect Analysis

This is a visual tool to map out your problem, its influencing factors and their individual cause and effects. Also known as Ishikawa diagrams, after Kaoru Ishikawa, a pioneer in quality control management, it lets you define a problem with a straight line and then branch out the possible factors involved in the problem, on either side. The image looks like the carcass of a fish, thus giving it its more popular name, Fishbone diagrams. Having recognized the factors, you can then further branch into the various causes that could influence each individual factor.

It is not always easy to recognize the factors that can influence the birth of a problem. But once you are aware of the actual problem, say a manufacturing issue, you can begin to look at all that can contribute to it. The clients, the people involved in the process, the process itself, or the environmental limitations beyond everyone's control. With all the factors chalked out, you can have a way more structural issue to analyze. Much better than blindly beating about the bush.

#### Root Cause Analysis

Having defined your problem and identified its symptoms, the next knee-jerk reaction could be to apply a band aid solution. But that doesn't assure the lack of a problem reprisal. If you want to remove the possibility of a recurrence of the problem, you should aim to nip the root cause in its bud. And that's where root cause analysis shows up like a champ. There are some basic steps in this analysis.

This is where you define the problem and its symptoms. And if you have been an alert pupil, you should already have done that.

The second step is to collect data for a significant period, showing the beginning and effect of the problem.

Creating a timeline lets you get a definite picture of what could be the issue.

Laying down the factors as in what all could be contributing to the problem.

Finding the cause of each of those contributing factors, thus leading to the original culprit.

Fixing the cause and then investigating whether it is likely to occur again.

Take for example the simple case of your phone getting discharged rather too quickly. The problem has an easy solution – find a power outlet and plug it in. But that doesn't, of course, keep it from losing juice in a haste. So the proper way to deal with the problem should be to collect the data – like how the battery used to last for 12 hrs, until the middle of February. Since then it is draining in 4 hrs. The possible cause could be,

- ✓ You dropped your phone and now it is slowly becoming a lemon.
- ✓ Your battery is leaking out and repeated charging is just its life support.
- ✓ The other event that fits the timeline is that you downloaded an app, on Valentine's day, to play you love songs every hour.

On investigating the factors that could be contributing to the problem, you didn't find any other sign of poor phone performance. Nor did exchanging the battery with a known healthy phone make a difference. Perhaps it was the mushy app after all. A little probing did reveal its appetite for power usage. So there, you have it. Remove the app and your root cause is solved. It is highly unlikely to recur unless you get the love fever again!

### 8 a) **Discuss about how you design a project structure.**

Project structure design is an early phase of the project life cycle where ideas, processes, resources, and deliverables are planned out. A project structure design comes before a project plan as it's a broad overview whereas a project plan includes more detailed information.

There are seven steps involved when creating a structure of project, including defining goals and using a visual aid to communicate objectives.

#### Step 1. Define project goals

In the first step, define your project goals. To begin, lead an initial ideation meeting where you document the general project timeline and deliverables.

To start, consider the needs of the project and stakeholders. What is it you're trying to solve? Begin writing a short description of the project and who is involved.

Once you've outlined the basic goals of the project, determine the more concrete objectives in detail.

#### Step 2. Determine outcomes

Next, narrow down the outcomes of the project. These are usually more detailed than the initial goal planning phase and include the specific tasks you will complete during the project.

For example, imagine you're working on a project to add a new landing page to your website. One of your outcomes may be to add an email signup form.

Document the outcomes and major deliverables needed alongside the project goals to begin building a timeframe. It's a good idea to reference popular project management methodologies to decide which one fits the needs of your project.

#### Step 3. Identify risks and constraints

Once you've identified the outcomes, consider your project risks and constraints. Evaluate the aspects of your project that could lead to risk in order to prevent wasted resources down the line.

In order to identify risks and constraints, determine the resource management tools, funds, and timeframe needed. Work to resolve these constraints before the project begins by following up with relevant stakeholders and project teams.

#### Step 4. Refine your project strategy with a visual aid

A project strategy is a visual roadmap of your project. This helps communicate purpose to team members. Create

your strategy by choosing a visual aid that you can share with stakeholders.

There are many types of visual aids you can choose from, some of which include:

**Flowchart:** A flowchart is a visual representation of the steps and decisions needed to perform a process. Flowcharts are particularly helpful ways to visualize step-by-step approaches and effectively organize project deliverables.

**Gantt chart:** A Gantt chart is a horizontal bar chart used to illustrate a timeline of a project. The bars in a Gantt chart represent the steps in the project and the length of the bars represent the amount of time they will take to be completed.

**Work breakdown structure (WBS):** A WBS is the breakdown of all tasks within a given project. Project managers use work breakdown structures to help teams visualize deliverables while keeping objectives top of mind.

**Mind map:** A mind map is a hierarchy diagram used to visualize projects and tasks. It allows project managers to link deliverables around a central concept or idea such as a specific team goal.

**PERT chart:** A PERT chart or diagram is a tool used to schedule, organize, and map out tasks. It can be helpful for complex projects and estimating the time needed to complete tasks.

Since each visual tool differs slightly, the aid you choose is up to your team preferences. While a work breakdown structure that details dependencies works well for large teams, a flowchart works well for smaller teams with less complex projects.

#### Step 5. Estimate your budget

Next, estimate your project budget to begin resource allocation. Your budget will incorporate the project's profitability, resources available, and outsourced work needed. It may also be a set number determined by leadership that you'll need to work around when it comes to being able to execute each deliverable.

Your budget may need to be approved or revised based on leadership signoff. Once finalized, you can begin assigning beneficiaries, design documents, and tasks for your project.

#### Step 6. Create a contingency plan

To begin assigning tasks, create a contingency plan. A contingency plan is a backup plan for the risks and constraints outlined earlier in the process. Having an organized plan when issues arise helps to resolve them in real time and streamline efficiency.

To create one, organize your risks using a Gantt chart or timeline tool and determine a plan for each risk. For example, if one of your risks involves materials not arriving in time, your contingency plan may be to source materials from elsewhere or start on a different part of the project while waiting for materials.

Once you've outlined a plan for each risk, you're ready to begin executing your project.

**Pro tip:** Use Asana to view lists, timelines, and Gantt charts to better visualize your project plan.

#### Step 7. Document your milestones

For the final step, document your team's milestones. This is done to ensure work is being completed on time and to easily identify inconsistencies as they arise.

You can do this using project management software where stakeholders can access the information and progress. It's a good idea to manage these milestones until the end of the project to ensure tasks are completed on time.

### b) **What do you mean by managing a project team?**

Project management techniques and methodologies are important to ensure clarity and focus when establishing your project. However, it's how well the people at the centre of the project work together, that can have the biggest impact on its overall success.

Here are 10 tips for managing project teams, to improve team effectiveness:

#### 1. Establish a balanced team

Identify project team members with both the right technical expertise as well as a broad spectrum of communication and thinking styles. This balance can be identified through past questionnaires that potential project team members may have taken,

#### 2. Ensure clarity and 'buy in' to the project objectives

Regardless of the seniority or experience level of the project team members, each person needs to be totally clear and committed to achieving the project objectives. Providing the team with an opportunity to raise concerns or issues early on in the project either publicly or in private with you should avoid any negative effects associated with lack of commitment. Any 'vibes' or negative behaviours should be explored immediately to ensure the issue can be resolved. Getting your team involved at the early stages of the project planning will assist greatly.

#### 3. Ensure line management support

When selecting project team members from different departments it is critical to gain their line managers support and commitment to the project and the time the project member will need to allocate to project meetings, research and agreed actions.

#### 4. Establish a team code

At the first project team meeting draw on the group to identify the behaviours that will help the project team.

This can be done simply by capturing 'expectations of the project leader' and 'expectations of each team member'; onto flip-chart paper. These can then be typed up and circulated to the team and used as a reminder at the start of each meeting. Any variances of these behaviours can then be constructively challenged referring back to the team code.

#### 5. Recognize the stages of team development

Research shows that all teams go through different stages of development to reach peak performance, and however skilled and experienced each team member is, the group dynamics will vary for each new team.

#### 6. Use a facilitator for critical meetings

A neutral facilitator to help the project team get under way or progress at a critical stage such as idea generation or decision-making can help the project team immensely.

#### 7. Use all internal and external networks

With the project team, establish early on in the project who else could help you with your project objectives e.g. to conduct research, view best practice, seek opinions and learn from past experiences.

#### 8. Communicate with key stakeholders

At the same time as you identify who can help you, consider who are your key influences for this project i.e. project sponsor, project owner, key stakeholders, and plan your communication strategy to ensure you have their full commitment and support throughout the project.

#### 9. Plan how to celebrate the project team success

Helping the team visualize success at the offset of the project whilst the objectives are still being defined, clarified or conveyed, will increase your success rate and make the project team members feel valued from the beginning and therefore more likely to respond well to future challenges that may lay ahead.

#### 10. Review the team learning on a regular basis

Timely, regular reviews scheduled into your project plan will ensure that the project team work in the most effective manner and will help develop the team spirit and ultimately their commitment to the project.

Selecting some of the simple questions below as part of the learning review could help you and the project team:

What success have we achieved so far?

How well have we worked together so far?

How could we work more effectively during the rest of the project?

How could we improve our team working during the rest of the project?

What further support is needed to ensure this project is successful?

What contributions have particularly helped/hindered the project move forward successfully?

### 9 **What are the five levels of maturity model? What are the benefits of project management maturity models?**

Maturity models have their origin in the field of total quality management (TQM). They drive strategically linked continuous improvement and so require a thorough understanding of an organization's current position and where it aims to be in the future

The PMMM takes these standards to the next level of development

by defining a separate model for the process and practice of project management. The models parallels the CMM as it is described below . PMMM helps organizations address fundamental aspects of managing projects, improve the likelihood of a quality result and successful outcome and reduce the likelihood of risks impacting projects adversely (OGC, 2006). Reaching an excellence in project management can be achieved by project management maturity model (PMMM) which is comprised of five levels, as shown in Figure 1.

Each of the five levels represents a different degree of maturity in project management

x Level 1-Common Language (Initial Process): In this level, the organization recognizes the importance of project management and the need for a good understanding of the basic knowledge on project management and the accompanying language or terminology. In the first level, project definition and awareness are important.

x Level 2-Common Processes (Repeatable Process): In this level, the organization recognizes that common processes need to be defined and developed such that successes on the project can be repeated on other projects. Also the recognition of the application and support of the project management principles to other methodologies employed by the company is included. In this level, the key process areas are business case development, project establishment, project planning, monitoring and control, stakeholder management and communications, requirements management, risk management, configuration management, management of suppliers and external parties.

x Level 3-Singular Methodology (Defined Process): In this level, the organization recognizes the synergistic effect of combining all corporate methodologies into a singular methodology, the center of which is project management. The synergistic effects also make process control easier with a single methodology than with multiple methodologies. This level provides these key areas; benefits management, transition, information management, organizational focus, process definition, training, skills and competency development, integrated management and reporting, life cycle control, inter-group co-ordination and networking, quality assurance, centre of Excellence (COE) role deployment.

x Level 4-Benchmarking (Managed Process): This level contains the recognition that process improvement is necessary to maintain a competitive advantage. Benchmarking must be performed on a continuous basis. The company must decide whom to benchmark and what to benchmark. Within this level, management metrics, quality management, organizational cultural growth and capacity management are the key process areas.

x Level 5- Continuous Improvement (Optimized Process): In this level, the organization evaluates the information obtained through benchmarking and must then decide whether or not this information will enhance the singular methodology. The key process areas are proactive problem management, technology management and continuous process improvement in this level.

Level 5				
Continuous Improvement	Level 4			
	Benchmarking	Level 3		
Process Improvement		Singular Methodology	Level 2	
	Process Control		Common Processes	Level 1
		Process Definition		Common Language
			Basic Knowledge	

Figure. 1: The five levels of project management maturity

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