**Group A**

**Long Answer Questions (Attempt any two) (2x10=20)**

* **What is software project management? How software project differs from other projects?**

**Answer:**

**Software = Program + related documentation**

**Project = A project is a combination of interrelated activities to achieve a specific objective within a schedule, budget, and quality. It involves the coordination of group activity, wherein the manager plans, organizes, staffs, directs, and controls to achieve an objective, with constraints on time, cost, and performance of the end product.**

**Management: It is an optimal way to accomplish tasks and achieve goals, using Planning, organizing), Staffing, Directing, Co-ordinating, Reporting, and Budgeting (POSDCORB) functions or processes.**

**Project management: Combination of project and management. Project Management ensures software development done according to organization’s constraints: policies, goals, and requirements.**

**Software Project Management: Software Project Management (SPM) → It is a process of managing, allocating and timing resources to develop computer software that meets requirements.**

**SPM Tasks are:**

* + - * **Problem Identification**
      * **Problem Definition**
      * **Project Planning (How we do it)**
      * **Project Organization (Arrange activity/instructions to staff)**
      * **Resource Allocation**
      * **Project Scheduling (How to link activities/Control Activities)**
      * **Tracking, Reporting and Controlling (How to communicate the stake holder, Check project and process, Control activities, always come up with new ideas)**
      * **Project Termination**

**Effective Project Management**

**4 P**

* + **People**
  + **Product** 
    - * **Before a software project is planned, the product objectives and scope should be established, technical and management constraints should be identified.**
  + **Process** 
    - * **Here the important thing is to select an appropriate process model to develop the software.**
  + **Project**

**Software Projects vs other Type of Projects**

* + **Invisibility (With software, progress is not immediately visible)**
  + **Complexity (Software products contain more complexity than other engineered artefacts)**
  + **Conformity (Software developers have to conform to the requirements of human clients)**
  + **Flexibility (Software systems are particularly subject to change)**
  + **Software projects require logic and logical works.**
  + **The complexity of a software project is unknown at the beginning.**
  + **The progress is not visible unless one of the project modules is completed at least.**
  + **Software projects are more flexible than other projects.**
  + **The resources required and the cost is also low when compared to the other types of projects.**
  + **The progress report will not be visible if any of the modules is finished at least.**
* **Differentiate between strategic Assessment and technical assessment. Explain the steps involved in cost benefit analysis?**

**Answer:**

Strategic Assessment (SA) and Technical Assessment (TA) are project evaluation technique. Project evaluation is a step-by-step process of collecting, recording and organizing information about project results, short-term outputs (immediate result of activities or project deliverables) and long-term outputs (change in behavior, practice or policy resulting from the result)

*Strategic Assessment:* It is first criteria for project evaluation. It is doing for evaluating and managing the projects. It deals with: what to do? For whom we do it? How do we excel? Evaluating the project under SA depend on:

* How it contributes program goal
* It is viability (Capability of developing or useful)
* Timing
* Resourcing

For successful strategic assessment, there should be a strategic plan which defines:

* Organization objectives
* Providing contexts for defining programmes
* Providing Contexts for defining programmes goal
* Providing context for accessing individual project

Issues and questions that consider during SA are: Objectives, Plan, Organisation , structure, MIS, Personnel, and Image.

*Technical Assessment (TA*)

It is 2nd criteria for evaluating the project. TA of proposed system evaluates functionality against available hardware and software. Its limitation based on nature of solutions produced by strategic information system plan and cost of solution.

*Economic Assessment (EA)*

It is caried out on the basis of cost-benefit analysis. It is done by comparing the expected costs of development and operation of the system with its benefit. It is based on whether the estimated costs are executed by the estimated income and other benefits.

*Cost Benefit Analysis (CBA)*

Benefits Management: To carry out this, you must:

* Define expected benefits
* Analyse balance between costs and benefits
* Plan how benefits will be achieved
* Allocate responsibilities for their achievements
* Monitor achievements of benefits

You need:

* + to identify all costs which could be:
* development costs, setup costs, operational costs
* identify value of the benefits
* check benefits are greater than costs

*CBA/Cost Benefit Evaluation Technique (CBET)*

|  |  |
| --- | --- |
| Year | Cash-flow |
| 0 | -100,000 |
| 1 | 10,000 |
| 2 | 10,000 |
| 3 | 10,000 |
| 4 | 20,000 |
| 5 | 100,000 |
| Net Profit | 50,000 |

'Year 0' represents all the cost before system is operation

'Cash-flow' is value of income less outgoing

'Net profit' value of all the cash-flows for life time of the application

*Pay back period*: This is the time it takes to starts generating surplus of income over outgoings. What would it be below?

|  |  |  |
| --- | --- | --- |
| Year | Cash-flow | Accumulated |
| 0 | -100,000 | -100,000 |
| 1 | 10,000 | -90,000 |
| 2 | 10,000 | -80,000 |
| 3 | 10,000 | -70,000 |
| 4 | 20,000 | -50,000 |
| 5 | 100,000 | 50,000 |

*Return on Investment (ROI)*

ROI= Average annual profit/Total investment x 100

Average annual profit = 50,000/5 =10,000

ROI=10,000/100,000 x100 =10%

*Net Present Value (NPV)*

If I gave you Rs100 today and you put it in saving account and get interest on it.

If the interest rate 10% how much I have to invest now to get Rs 100 in a year's time

The figure is net present value of Rs 100 in years' time

*Discount factor*

Discount factor=1/(1+r)t

**r** is the interest rate (i.e.,10% is 0.1)

**t** is the number of years

In the case of 10% rate and one year

Discount factor=1/ (1+0.10) =0.9091

In the case of 10% rate and two years

Discount factor=1/ (1+0.10) 2=0.8294

Applying Discount factors

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Cash-flow | Discount factors | Discounted Cash-flow |
| 0 | -100,000 | 1.0000 | -100,000 |
| 1 | 10,000 | 0.9091 | 9,091 |
| 2 | 10,000 | 0.8294 | 8,294 |
| 3 | 10,000 | 0.7513 | 7,513 |
| 4 | 20,000 | 0.6830 | 13,660 |
| 5 | 100,000 | 0.6209 | 62,090 |
|  | NPV | | 618 |

Internal Rate of Return (IRR)

* IRR is the discount rate that would produce an NPV of zero (0) for the project
* Can be used to compare different investment opportunities
* There is Microsoft Excel function which can be used to calculate
* Explain the risk type and also explain in details how will you managing risks?

Answer:

*Overview*

Risks are potential problems that might affect the successful completion of a software project. Risks involve uncertainty and potential losses. Risk analysis and management are intended to help a software team understand and manage uncertainty during the development process.The important thing is to remember that things can go wrong and to make plans to minimize their impact when they do.The work product is called a Risk Mitigation, Monitoring, and Management Plan (RMMM).

*A framework for dealing with risk*

The planning for risk includes these steps:

* Risk identification – what risks might there be?
* Risk analysis and prioritization – which are the most serious risks?
* Risk planning – what are we going to do about them?
* Risk monitoring – what is the current state of the risk?

***Risk Check List***

* Product size (PS)—risks associated with the overall size of the software to be built or modified.
* Business impact (BU)—risks associated with constraints imposed by management or the marketplace.
* Customer characteristics (CU)—risks associated with the sophistication of the customer and the developer's ability to communicate with the customer in a timely manner.
* Process definition (PR)—risks associated with the degree to which the software process has been defined and is followed by the development organization.
* Development environment (DE) —risks associated with the availability and quality of the tools to be used to build the product.
* Technology to be built (TE)—risks associated with the complexity of the system to be built and the "newness" of the technology that is packaged by the system.
* Staff size and experience (ST)—risks associated with the overall technical and project experience of the software engineers who will do the work.

***Risk Due to Product Size***

* estimated size of the product in line of code (LOC) or function point (FP)?
* estimated size of product in number of programs,files, transactions?
* percentage deviation in size of product fromaverage for previous products?
* size of database created or used by the product?
* number of users of the product?
* number of projected changes to the requirements for the product? Before delivery? After delivery?
* amount of reused software?
* Attributes that affect risk:

***Risk Due to Business Impact***

Attributes that affect risk:

* + effect of this product on company revenue?
  + visibility of this product by senior management?• reasonableness of delivery deadline?• number of customers who will use this product
  + interoperability constraints• sophistication of end users?
  + amount and quality of product documentation thatmust be produced and delivered to the customer?
  + governmental constraints• costs associated with late delivery?
  + costs associated with a defective product?

***Risks Due to the Customer***

Questions that must be answered:

• Have you worked with the customer in the past?

* + Does the customer have a solid idea of requirements?
  + Has the customer agreed to spend time with you?
  + Is the customer willing to participate in reviews?
  + Is the customer technically sophisticated?
  + Is the customer willing to let your people do theirjob—that is, will the customer resist looking over yourshoulder during technically detailed work?
  + Does the customer understand the softwareengineering process?

***Risks Due to Process Maturity***

Questions that must be answered:

* + Have you established a common process framework?
  + Is it followed by project teams?
  + Do you have management support for software engineering
  + Do you have a proactive approach to SQA?
  + Do you conduct formal technical reviews?
  + Are CASE tools used for analysis, design andtesting?
  + Are the tools integrated with one another?
  + Have document formats been established?

***Technology Risks***

Questions that must be answered:

* Is the technology new to your organization?
* Are new algorithms, I/O technology required?
* Is new or unproven hardware involved?
* Does the application interface with new software?
* Is a specialized user interface required?
* Is the application radically different?
* Are you using new software engineering methods?
* Are you using unconventional software developmentmethods, such as formal methods, AI-based approaches,artificial neural networks?
* Are there significant performance constraints?
* Is there doubt the functionality requested is "do-able?"

*Risk* = some adverse circumstance that may happen and affect negatively the project, the product, and/or the business

Categories of risk:

* + Project risks
  + Product risks
  + Business risks

*Risk management* means anticipating risks and preparing plans to reduce their effect

Risk Management

Examples of risks in the software process



**The risk management activities**



**Short questions**

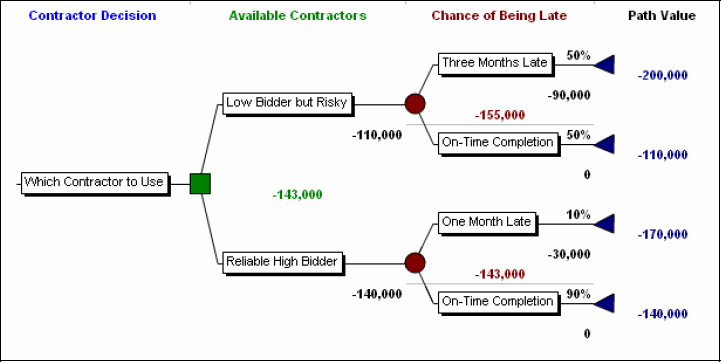
1. **List out the activities used in SPM.**

Activities used in SPM are:

* + - * Problem Identification
      * Problem Definition
      * Project Planning (How we do it)
      * Project Organization (Arrange activity/instructions to staff)
      * Resource Allocation
      * Project Scheduling (How to link activities/Control Activities)
      * Tracking, Reporting and Controlling (How to communicate the stake holder, Check project and process, Control activities, always come up with new ideas)
      * Project Termination

1. **Explain the use of decision tree in Risk Evaluation**

Decision trees allow project managers to distinguish between decisions where we have control and chance events that may or may not happen. It takes account of the costs and rewards of decision options as well as the probabilities and impacts of associated risks. Structured analysis using “rolling forward” and “folding back” allows the best decision option to be taken based on calculation of Expected Monetary Value, although this may be influenced by the risk appetite of the organization. The decision tree technique offers a powerful way of describing, understanding and analyzing uncertainty, and can be a valuable part of the toolkit for any project manager who needs to make decisions where the outcome is uncertain.



1. **Briefly explain about risk planning and controlling.**

* *Risk planning* means preparing a strategy to deal with each of the risks identified
* Classes of strategies:
  + Avoidance strategies: the probability of the risk will be diminished
  + Minimization strategies: the effect of the risk will be reduced
  + Contingency strategies: plans for the worst-case scenarios
* *Risk monitoring*:
  + Frequently re-assess the risks
    - Changes in risk probability?
    - Changes in risk gravity?
  + Take into consideration risk factors
  + Discuss key risks at each management project progress meeting
  + Examples of risk management strategies





1. **Explain the process of collecting the data.**

Interview

Questionnaire

Observation

Literature review

Case study

Focus group discussion

Photography

Video

Surveys

Recording

1. **How can you select right person for the job? Explain.**

* Job Title/ Post
* Job description
* Required qualification/ Training/Skills and experience
* TOR
* Prepare selection criteria (written /oral exam)
* Publish notice for recruitment
* Conduct selection process
* Select candidate
* Appoint selected candidate

1. **Define software quality and its importance**

Good software should deliver the required functionality and performance to the user and should be maintainable, dependable and usable.

Essential attributes of quality software are:

**Maintainability**: Software should be written in such a way so that it can evolve to meet the changing needs of customers. This is a critical attribute because software change is an inevitable requirement of a changing business environment.

**Dependability and security:** Software dependability includes a range of characteristics including reliability, security and safety. Dependable software should not cause physical or economic damage in the event of system failure. Malicious users should not be able to access or damage the system.

**Efficiency:** Software should not make wasteful use of system resources such as memory and processor cycles. Efficiency therefore includes responsiveness, processing time, memory utilisation, etc.

**Acceptability:** Software must be acceptable to the type of users for which it is designed. This means that it must be understandable, usable and compatible with other systems that they use.

1. **Explain about SCM tasks and tools.**

SCM tasks:

The tasks of SCM are: Configuration Identification, Change control, Version control, configuration auditing and reporting

The goals of SCM are generally:

**Configuration identification** - Identifying configurations, configuration items and baselines.

**Configuration control** - Implementing a controlled change process. This is usually achieved by setting up a change control board whose primary function is to approve or reject all change requests that are sent against any baseline.

**Configuration status accounting** - Recording and reporting all the necessary information on the status of the development process.

**Configuration auditing** - Ensuring that configurations contain all their intended parts and are sound with respect to their specifying documents, including requirements, architectural specifications and user manuals.

**Build management** - Managing the process and tools used for builds.

**Process management** - Ensuring adherence to the organization's development process.

**Environment management** - Managing the software and hardware that host the system.

**Teamwork** - Facilitate team interactions related to the process.

Defect tracking - Making sure every defect has traceability back to the source.

1. **Explain the software configuration management and its roles.**

*See attached paper*

1. **Explain the visualizing progress in details with example.**

A manager needs some way of presenting that data to greatest effect. Some methods of presenting picture are,

**Gantt chart** – tracking project progress. It is the simple and the oldest form of representing the progress of the project. It consists of activity bar that indicates the scheduled activity dates and the duration along with the activity floats.

**Slip chart** – visual indication of activities that are not progressing to schedule. Alternative view of Gantt chart by providing a visual indication of those activities which are not on schedule. The more bend in the greater the variation in the project plan. If the slip line deviates more towards the non achievement of project objectives then it has to be reconsidered. Additional slip lines can be included at regular intervals.

**Ball charts** – way of showing or not targets have been met or not. It is represented in the form of circles that indicate the start and the end point completion of activities. Circles of the ball chart mostly contain only two dates the original and the revised one. An activity is denoted by a red circle and green color denotes that the activity is ahead of its schedule. Slippage in the project completion date but it is overcome by the timeline charts

**TimeLine:** The timeline is a method of recording and displaying the way in which targets have changed throughout the duration of the project.

1. **Write short notes on:**

**a. SPM software  
b. Critical Path**

a. SPM Software:

**The 7 Best Project Management Software Tools of 2021**

* **Best for Getting Started:** Trello
* **Best for Speedy Setup:** Wrike
* **Best for Collaboration:** Basecamp
* **Best Value:** Zoho Projects
* **Best Features:** LiquidPlanner
* **Best for Big Projects:** Microsoft Project
* **Best for Powerful Simplicity:** Teamwork Projects

b**.** Critical Path

The critical path method is a technique that allows you to identify tasks that are necessary for project completion. The critical path in project management is the longest sequence of activities that must be finished on time to complete the entire project.

