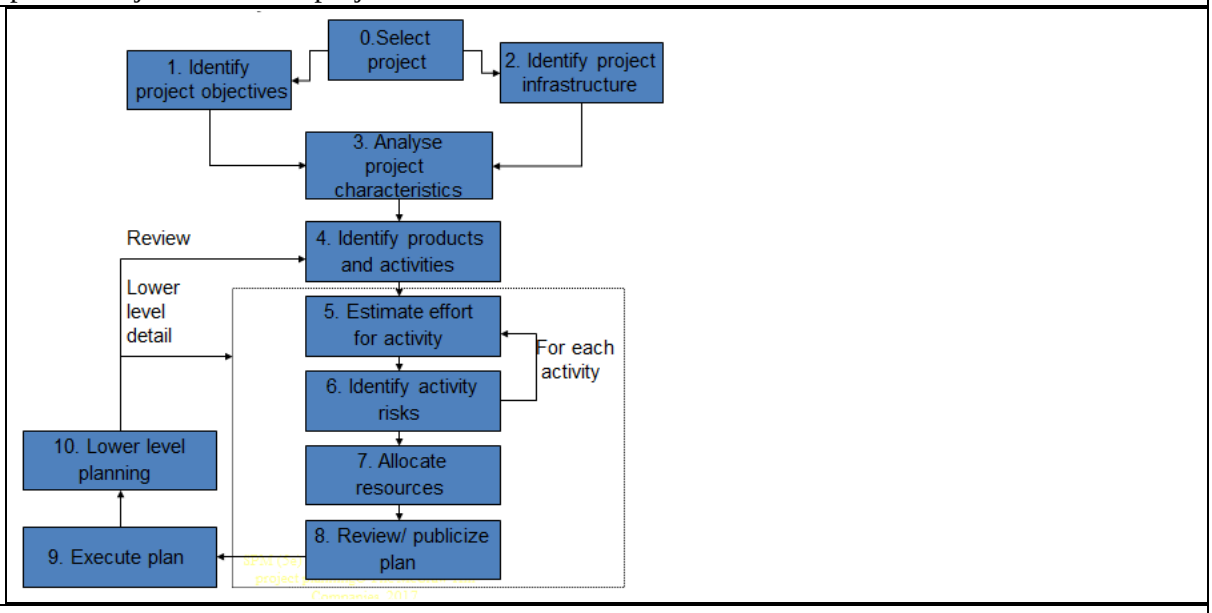
	(2½ Hours)	
	[Total Marks: 75]	
N. B.:	(1) **All** questions are **compulsory**.	
	(2) Make **suitable assumptions** wherever necessary and **state the assumptions** made.	
	(3) Answers to the **same question** must be **written together**.	
	(4) Numbers to the **right** indicate **marks**.	
	(5) Draw **neat labeled diagrams** wherever **necessary**.	
	(6) Use of **Non-programmable** calculators is **allowed**.	
1.	**Attempt *any three* of the following:**	**15**
a.	What is a project? What are its characteristics?	
Ans:	**Project definitions:**	
	"A specific plan or design"	
	"A planned undertaking"	
	"A large undertaking e.g. a public works scheme"	
	Key points above are planning and size of task	
	Here are some definitions of 'project'.	
	'Unique process, consisting of a set of coordinated and controlled activities	
	with start and finish dates, undertaken to achieve an objective conforming to	
	specific requirements, including constraints of time, cost and resources.	
	• An endeavor with specific objectives:	
	– Usually consists of multiple tasks	
	– With defined precedence relationships	
	– With a specific time period for completion	
	• Non-Software Examples:	
	– A wedding	
	– An MBA degree	
	– A house construction project	
	– A political election campaign	
	Characteristics of projects	
	A task is more 'project-like' if it is:	
	• Non-routine	
	• Planned	
	• Aiming at a specific target	
	• Carried out for a customer	
	• Carried out by a temporary work group	
	• Involving several specialisms	
	• Made up of several different phases	
	• Constrained by time and resources	
	• Large and/or complex	
b.	State and Explain phases of Project Management Life Cycle.	
Ans:	Phases of Project Management Life Cycle:	
	Project Initiation:	
	• During the project initiation phase it is crucial for the champions of the project to develop a thorough understanding of the important characteristics of the project.	

	• In his W5HH principle, Barry Boehm summarized the questions that need to be asked and answered in order to have an understanding of these project characteristics.	
	W5HH Principle:	
	• A series of questions that lead to a definition of key project characteristics:	
	– Why is the software being built?	
	– What will be done?	
	– When will it be done?	
	– Who is responsible for a function?	
	– Where are they organizationally located?	
	– How will the job be done technically and managerially?	
	– How much of each resource is needed?	
	Project Planning:	
	Various plans are made:	
	– Project plan: Assign project resources and time frames to the tasks.	
	– Resource plan: List the resources, manpower and equipment that required to execute the project.	
	– Financial plan: plan for manpower, equipment and other costs.	
	– Quality plan: Plan of quality targets and control.	
	– Risk plan: Identification of the potential risks, their prioritization and a plan for the actions that would be taken to contain the different risks.	
	Project Execution:	
	• Tasks are executed as per the project plan	
	• Monitoring and control processes are executed to ensure that the tasks are executed as per plan	
	• Corrective actions are initiated whenever any deviations from the plan are noticed.	
	Project Closure:	
	• Involves completing the release of all the required deliverables to the customer along with the	
	• necessary documentation.	
	• Subsequently, all the project resources are released and supply agreements with the vendors are terminated and all the pending payments are completed.	
	• Finally, a post-implementation review is undertaken to analyze the project performance and to list the lessons learnt for use in future projects.	
c.	What do you mean by Project portfolio management? What are its elements?	
Ans:	Project portfolio management:	
	The concerns of project portfolio management include:	
	• Evaluating proposals for projects	
	• Assessing the risk involved with projects	
	• Deciding how to share resources between projects	
	• Taking account of dependencies between projects	
	• Removing duplication between projects	
	• Checking for gaps	
	There are three elements to PPM:	
	1. Project portfolio definition	
	– Create a central record of all projects within an organization	
	– Must decide whether to have ALL projects in the repository or, say, only ICT projects	
	– Note difference between new product development (NPD) projects and renewal projects e.g. for process improvement	
	2. Project portfolio management	
	Actual costing and performance of projects can be recorded and assessed.	

	3. Project portfolio optimization	
	Information gathered above can be used achieve better balance of projects e.g. some that are risky but potentially very valuable balanced by less risky but less valuable projects. You may want to allow some work to be done outside the portfolio e.g. quick fixes.	
d.	How do you perform Cost benefit analysis (CBA)?	
Ans:	Cost benefit Analysis:	
	• Consider each possible outcome and estimate the probability of its occurring and the corresponding value of the outcome.	
	• Find the cash flow forecast for each risk with an associated probability of occurring.	
	• The value of the project is then obtained by summing the cost or benefit for each possible outcome weighted by its corresponding probability.	
	A cost-benefit analysis is the process of comparing the projected or estimated costs and benefits (or opportunities) associated with a project decision to determine whether it makes sense from a business perspective.	
	Generally speaking, cost-benefit analysis involves tallying up all costs of a project or decision and subtracting that amount from the total projected benefits of the project or decision. (Sometimes, this value is represented as a ratio.)	
	If the projected benefits outweigh the costs, you could argue that the decision is a good one to make. If, on the other hand, the costs outweigh the benefits, then a company may want to rethink the decision or project.	
	There are enormous economic benefits to running these kinds of analyses before making significant organizational decisions. By doing analyses, you can parse out critical information, such as your organization's value chain or a project's ROI.	
	Cost-benefit analysis is a form of data-driven decision-making most often utilized in business, both at established companies and startups. The basic principles and framework can be applied to virtually any decision-making process, whether business-related or otherwise.	
e.	Draw the diagram of Step Wise approach to planning software projects and Explain Step 1: establish project scope and objectives in detail.	
Ans:	Identify project objectives: It is important that at the outset the main stakeholders are all aware of the precise objectives of the project.	



	Step 1: establish project scope and objectives:
	1.1 Identify objectives and measures of effectiveness
	1.2 – 'how do we know if we have succeeded?'
	• 1.2 Establish a project authority
	– 'who is the boss?'

• 1.3 Identify all stakeholders in the project and their interests

– 'who will be affected/involved in the project?'

• 1.4 Modify objectives in the light of stakeholder analysis

– 'do we need to do things to win over stakeholders?'

• 1.5 Establish methods of communication with all parties.

f. Consider the project cash flow estimates for four projects as shown in the table; Negative levels represent expenditure and positive values income. Rank the four projects in order of financial desirability and make a note of your reasons for ranking them in that way. Conclusion should be based on Net profit, and ROI (Return on Investment)

Year	Project 1	Project 2	Project 3	Project 4
0	-100000	-100000	-1000000	-120000
1	20000	20000	300000	30000
2	30000	30000	300000	30000
3	10000	20000	300000	30000
4	20000	20000	300000	30000
5	20000	30000	300000	50000
Net Profit				
ROI				

Ans:

Year	Project 1	Project 2	Project 3	Project 4
0	-100000	-100000	-1000000	-120000
1	20000	20000	300000	30000
2	30000	30000	300000	30000
3	10000	20000	300000	30000
4	20000	20000	300000	30000
5	20000	30000	300000	50000
Net profit	0	20000	500000	50000
ROI	0	20	50	41.6667

2. Attempt *any three* of the following: **15**

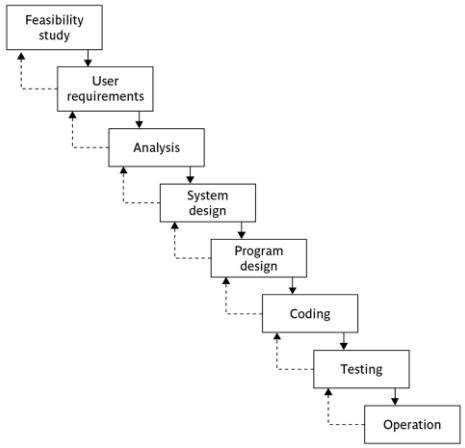
a. What is Atern/Dynamic Systems Development Method? What are its eight core principles?

Ans: A fuller explanation can be found in the DSDM Atern Pocket Book published by the Atern/DSDM Consortium. SSADM is Structured Systems Analysis and Design Method a very heavy-weight and bureaucratic methodolo3gy that was promoted by the UK government DFD = Data Flow Diagram, LDS = Logical Data Structure, effectively an Entity-Relationship Diagram

Atern/Dynamic system development method (DSDM) is UK-based consortium arguably DSDM can be seen as replacement for SSADM. DSDM is more a project management approach than a development approach. An update of DSDM has been badged as 'Atern'

Eight core Atern/DSDM principles

1. Focus on business need
2. Delivery on time – use of time-boxing
3. Collaborate
4. Never compromise quality
5. Deliver iteratively
6. Build incrementally

	7. Communicate continuously	
	8. Demonstrate control	
b.	What are the Capers Jones Estimating Rules of Thumb?	
Ans:	Capers Jones Estimating Rules of Thumb	
	Empirical rules: Formulated based on observations	
	No scientific basis	
	Because of their simplicity,	
	These rules are handy to use for making off-hand estimates. Give an insight into many aspects of a project for which no formal methodologies exist yet.	
	Capers Jones' Rules:	
	Rule 1: SLOC-function point equivalence:	
	One function point = 125 SLOC for C programs.	
	Rule 2: Project duration estimation:	
	Function points raised to the power 0.4 predicts the approximate development time in calendar months.	
	Rule 3: Rate of requirements creep:	
	User requirements creep in at an average rate of 2% per month from the design through coding phases.	
	Rule 4: Defect removal efficiency:	
	Each software review, inspection, or test step will find and remove 30% of the bugs that are present.	
	Rule 5: Project manpower estimation:	
	The size of the software (in function points) divided by 150 predicts the approximate number of personnel required for developing the application.	
	Rule 6: Number of personnel for maintenance	
	Function points divided by 500 predicts the approximate number of personnel required for regular maintenance activities.	
	Rule 7: Software development effort estimation:	
	The approximate number of staff months of effort required to develop a software is given by the software development time multiplied with the number of personnel required.	
c.	Explain Water fall Model with the help of diagram.	
Ans:	This is the 'classical model of system development that is also know as the one shot or once through model. This model shows the waterfall model phases and need to work extra at an earlier stage.	
		
d.	Explain Scrum. What do you understand by the term 'ceremonies' in a Scrum project?	
Ans:	Scrum- It is one of the "agile processes" Self-organizing teams	
	- Product progresses in a series of month-long "sprints"	
	- Requirements are captured as items in a list of "product backlog"	
	Scrum Ceremonies	

	a. Sprint Planning Meeting
	b. Sprint
	c. Daily Scrum
	d. Sprint Review Meeting
	a. Sprint Planning
	In this meeting, the product owner and the team members decide which Backlog Items the Team will work on in the next sprint
	Scrum Master should ensure that the Team agrees to realistic goals.
	b. Sprint
	Fundamental process flow of Scrum
	A month-long iteration, during which an incremental product functionality completed
	NO outside influence can interfere with the Scrum team during the Sprint
	Each Sprint begins with the Daily Scrum Meeting
	c. Daily Scrum
	Held daily:
	a. Short meeting
	b. Lasts for about 15mins only
	c. Main objective is to answer three questions:
	d. What did you do yesterday?
	e. What will you do today?
	f. What obstacles are in your way?
	g. Sprint Review Meeting
	d. Sprint review meeting
	Team presents what it accomplished during the sprint
	a. Typically takes the form of a demo of new features or underlying architecture
	Informal meeting:
	b. The preparation time should not exceed about 2-hours
e.	Discuss the common problem faced during effort estimation.
Ans:	1 Some problems with estimating
	• Subjective nature of much of estimating
	• It may be difficult to produce evidence to support your precise target
	• Political pressures
	• Managers may wish to reduce estimated costs in order to win support for acceptance of a project proposal
	• Changing technologies
	• these bring uncertainties, especially in the early days when there is a ‘learning curve’
	• Projects differ
	• Experience on one project may not be applicable to another
	The answer to the problem of over-optimistic estimates might seem to be to pad out all estimates, but this itself can lead to problems. You might miss out to the competition who could underbid you, if you were tendering for work. Generous estimates also tend to lead to reductions in productivity. On the other hand, having aggressive targets in order to increase productivity could lead to poorer product quality.
	Parkinson’s law: ‘Work expands to fill the time available’ that is, given an easy target staff will work less hard.
	Brooks Law: The effort of implementing a project will go up disoproportionately with the number of staff assigned to the project. As the project team grows in size, so will the effort that has to go into

management, coordinaton and communication. This has given rise, in extreme cases to the notion of Brooks Law: putting more people on a late job makes it later'. If there is an over estimate of the effort required, this could lead to more staff being allocated than needed and managerial overheads being increased.

Weinberg's Zeroth Law of reliability: 'a software project that does not have to meet a reliability requirement can meet any other requirement'

f. Write a short note on Albrecht Function Point/IFPUG.

Ans:

5.10 Albrecht/IFPUG function points

Albrecht worked at IBM and needed a way of measuring the relative productivity of different programming languages. Needed some way of measuring the size of an application without counting lines of code. Identified five types of component or functionality in an information system Counted occurrences of each type of functionality in order to get an indication of the size of an information system

Five function types/Major components

1. Logical interface file (LIF) types – equates roughly to a data store in systems analysis terms. Created and accessed by the target system
2. External interface file types (EIF) – where data is retrieved from a data store which is actually maintained by a different application.
3. External input (EI) types – input transactions which update internal computer files
4. External output (EO) types – transactions which extract and display data from internal computer files. Generally involves creating reports.
5. External inquiry (EQ) types – user initiated transactions which provide information but do not update computer files. Normally the user inputs some data that guides the system to the information the user needs.

Albrecht complexity multipliers

The complexity of each instance of each 'user type' is assessed and a rating applied. Originally this assessment was largely intuitive, but later versions, developed by IFPUG (the International FP User Group) have rules governing how complexity is rated.

External user types	Low complexity	Medium complexity	High complexity
EI	3	4	6
EO	4	5	7
EQ	3	4	6
LIF	7	10	15
EIF	5	7	10

Examples

Payroll application has:

1. Transaction to input, amend and delete employee details – an EI that is rated of medium complexity

2. A transaction that calculates pay details from timesheet data that is input – an EI of high complexity
3. A transaction of medium complexity that prints out pay-to-date details for each employee – EO
4. A file of payroll details for each employee – assessed as of medium complexity LIF
5. A personnel file maintained by another system is accessed for name and address details – a simple EIF

What would be the FP counts for these?

- FP counts

1.	Medium EI	4 FPs
2.	High complexity EI	6 FPs
3.	Medium complexity EO	5 FPs
4.	Medium complexity LIF	10 FPs
5.	Simple EIF	5 FPs
	Total	**30 FPs**

If previous projects delivered 5 FPs a day, implementing the above should take 30/5 = 6 days

3.	Attempt any three of the following:	**15**
a.	Differentiate between PERT (Program Evaluation Review Techniques) and CPM (Critical Path Method).	

Ans:

PERT	CPM
It is that technique of project management which is used to manage uncertain (i.e., time is not known) activities of any project.	It is that technique of project management which is used to manage only certain (i.e., time is known) activities of any project.
It is event oriented technique which means that network is constructed on the basis of event.	It is activity oriented technique which means that network is constructed on the basis of activities.
It is a probability model.	It is a deterministic model.
It majorly focuses on time as meeting time target or estimation of percent completion is more important.	It majorly focuses on Time-cost trade off as minimizing cost is more important.
It is appropriate for high precision time estimation.	It is appropriate for reasonable time estimation.
It has Non-repetitive nature of job.	It has repetitive nature of job.

There is no chance of crashing as there is no certainty of time.	There may be crashing because of certain time boundation.
It doesn't use any dummy activities.	It uses dummy activities for representing sequence of activities.
It is suitable for projects which required research and development.	It is suitable for construction projects.

b. Define Risk Management. Explain the different Categories of risk.

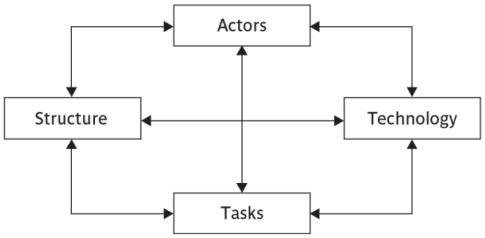
Ans: 'the chance of exposure to the adverse consequences of future events' PRINCE2

'an uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives' PM-BOK

• Risks relate to possible future problems, not current ones

• They involve a possible cause and its effect(s) e.g. developer leaves > task delayed

Categories of risk:



This is based on Lyytinen's sociotechnical model of risk

• Actors relate to all those involved in the project including both developers, users and managers e.g. a risk could be that high staff turnover leads to information of importance to the project being lost

• Technology – both that used to implement the project and that embedded in the project deliverables – risk could be that the technologies selected are not in fact appropriate.

• Structure – this includes management procedures, risk here is that a group who need to carry out a particular project task are not informed of this need because they are not part of the project communication network

• Tasks – the work to be carried out. A typical risk is that the amount of effort needed to carry out the task is underestimated.

A risk could be well belong to more than one of the four areas – for example, estimates being wrong could be influenced by problems with actors (e.g. lack of experience with a technical domain) or the structure (over optimism of managers keen to win work).

c. State and describe the Burman's priority list in project management.

Ans: Prioritizing activities:

Where more than one activity is competing for the same limited resource at the same time then those activities need to be prioritized.

There are two main ways of doing this:

• Total float priority – those with the smallest float have the highest priority

• Ordered list priority – this takes account of the duration of the activity as well as the float.

Burman's priority list:

Give priority to:

• Shortest critical activities

• Other critical activities

• Shortest non-critical activities

• Non-critical activities with least float

• Non-critical activities

d. What are the different Boehm's top 10 development risks?

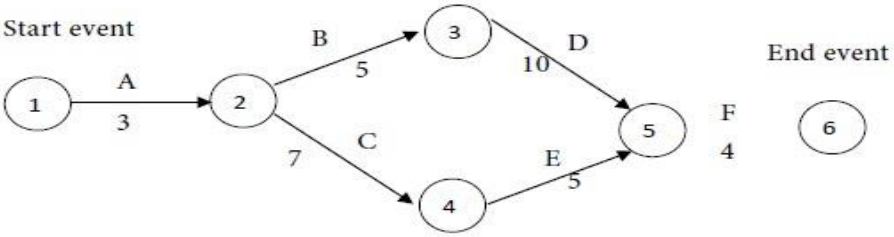
Ans: **Boehm's top 10 development risks:** Barry Boehm surveyed software engineering project leaders to find out the main risks that they had experienced with their projects. For each risk, some risk reduction techniques has been suggested.

Risk	***Risk reduction techniques***
Personnel shortfalls	Staffing with top talent; job matching; teambuilding; training and career development; early scheduling of key personnel
Unrealistic time and cost estimates	Multiple estimation techniques; design to cost; incremental development; recording and analysis of past projects; standardization of methods
Developing the wrong software functions	Improved software evaluation; formal specification methods; user surveys; prototyping; early user manuals
Developing the wrong user interface	Prototyping; task analysis; user involvement
Gold plating	Requirements scrubbing, prototyping, design to cost
Late changes to requirements	Change control, incremental development
Shortfalls in externally supplied components	Benchmarking, inspections, formal specifications, contractual agreements, quality controls
Shortfalls in externally performed tasks	Quality assurance procedures, competitive design etc
Real time performance problems	Simulation, prototyping, tuning

e. Draw CPM and Determine the critical path, the critical activities and the project completion time. for the following activities

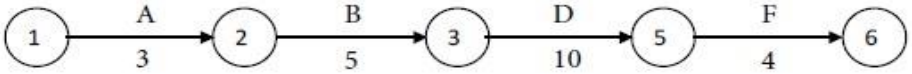
Activity	Predecessor Activity	Duration (Weeks)
A	-	3
B	A	5
C	A	7
D	B	10
E	C	5
F	D,E	4

Ans: First let us construct the network diagram for the given project. We mark the time estimates along the arrows representing the activities. We obtain the following diagram:



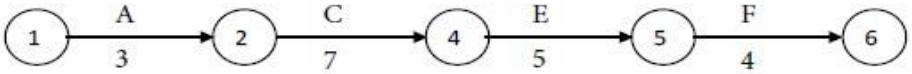
Consider the paths, beginning with the start node and stopping with the end node. There are two such paths for the given project. They are as follows:

Path I



with a time of 3 + 5 + 10 + 4 = 22 weeks.

Path II



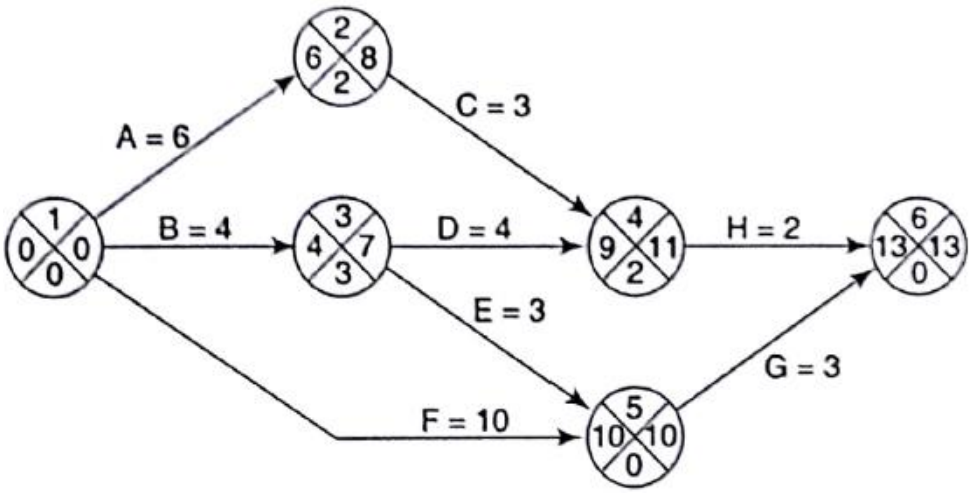
with a time of 3 + 7 + 5 + 4 = 19 weeks.

Compare the times for the two paths. Maximum of {22,19} = 22. We see that path I has the maximum time of 22 weeks. Therefore, path I is the critical path. The critical activities are A, B, D and F. The project completion time is 22 weeks.

f. Draw CPM network using precedence network conventions for the project in table. Also show activities forward and backward pass.

Activity	Duration	Precedents
A	6	-
B	4	-
C	3	A
D	4	B
E	4	B
F	10	-
G	3	E,F
H	2	C,D

Ans:



4.	**Attempt *<u>any three</u>* of the following:**	**15**
a	Define the any two terms and explain with example: i) Scheduling Variance ii) Cost Variance iii) Earned Value iv) Time Variance	
Ans:	**Schedule Variance:** The schedule variance is measured in cost as EV-PV and indicates the deree to which the value completed work differes from that planned. Say, for example that work with a PV of 40000 should have been completed by now. In fact, some of that work has not been done so that EV is only 35000. The SV would therefore is 35000 – 40000 = 5000. A negative SV means the project is behind schedule.	
	Time variance (TV) – difference between time when specified EV should have been reached and time it actually did reach.	
	For example, say an EV of £19000 was supposed to have been reached on 1st April and it was actually reached on 1st July then TV = - 3 months	
	Earned value chart with revised forecasts	
	Earned value (EV) or Budgeted cost of work performed (BCWP) – total of PVs for the work completed at this time	
	Earned value – an example	
	Tasks	
	o Specify module 5 days	
	o Code module 8 days	
	o Test module 6 days	
	At the beginning of day 20, PV = 19 days	
	If everything but testing completed EV = 13 days	
	Cost variance (CV}:	
	This is calculated as EV — AC and indicates the difference between the earned value or budgeted cost and the actual cost of completed work. Say that when the SV above was calculated as — £5,000, £55,000 had actually been spent to get the EV. The CV in this case would have been £35,000 — £55,000 or original cost estimates. A negative CV means that the project is over cost.	
b	What is Fixed price Contract? Explain the advantages and disadvantages of fixed price contracts.	
Ans:	Fixed price contracts: Contracts prices are fixed before starting of the project and it remained unchanged throughout the project development.	
	Advantages to customer	
	• known expenditure	
	• supplier motivated to be cost-effective	
	Disadvantages	
	• supplier will increase price to meet contingencies	

	• difficult to modify requirements	
	• cost of changes likely to be higher	
	• threat to system quality	
	Even though the supplier will have to add a margin to the price to deal with contingencies, the cost could still be less than doing the work in-house as the supplier may be able to exploit economies of scale and the expertise that they have from having done similar projects in the past.	
	When competing for work, there will be pressure on the suppliers to reduce prices. Once a contract has been won and signed, the contractor is in a stronger negotiating position when it comes to negotiating the price of additional work as the customer is now locked in.	
c	Explain general recruitment process.	
Ans:	General recruitment process:	
	Recruitment must be stress on Project leaders have little choice about the people who will make up their team.	
	A general approach is as follows:	
	1. Create a job specification Advice is often needed as there could be legal implications in an official document. However, formally or informally, the requirements of the job, including the types of task to be carried out, should be documented and agreed.	
	2. Create a job holder profile The Job specification is used to construct a profile of the person needed to carry out the job. The qualities, qualifications, education and experience required would be listed.	
	3. Obtain applicants Typically, an advertisement would be placed, either within the organization or outside in the trade or local press. The job holder profile would be examined carefully to identify the medium most likely to reach the largest number of potential applicants at least cost. For example, if a specialist is needed it would make sense to advertise in the relevant specialist journal.	
	4. The other principle is to give enough information in the advertisement to allow an element of self-elimination. By giving the salary, location, job scope and any essential qualifications, the applicants will be limited to the more realistic candidates.	
	5. Examine CVs These should be read carefully and compared to the job holder profile nothing is more annoying for all concerned than when people have CVs which indicate clearly that they are not eligible for the job and yet are called for interview.	
	6. Interviews, etc. Selection techniques includes work. Any method must test specific A standard form which the examination of samples of previous. Viewers as a greater number reduces the possibility of cent in consistent and fair	
	7. Other Procedures References will need to be taken up where necessary, and a medical examination might be needed.	
d	Discuss the factors of job satisfaction given by Oldham-Hackman. Also state the methods of improving motivation.	
Ans:	The Oldham-Hackman Job Characteristics Model	
	Managers should group together the elements of tasks to be carried out so that they form meaningful and satisfying assignments. Oldham and Hackman Suggest that the satisfaction that a job gives is based on five factors.	
	The first three factors make the job ‘meaningful’ to the person who is doing it: Identified the following characteristics of a job which make it more ‘meaningful’	
	1. Skill variety	
	2. Task identity	
	3. Task significance	
	Two other factors contributed to satisfaction:	
	1. Autonomy	
	2. Feedback	
	Methods to improve job satisfaction	
	• Set specific goals	

	• Provide feedback on the progress towards meeting those goals	
	• Consider job redesign	
	• Job enlargement	
	• Job enrichment	
e	What is Stress? Explain stress management.	
Ans:	**Stress** is a feeling of emotional or physical tension. It can come from pressure of work at work place. This event or thought that makes you feel frustrated, angry, or nervous. Stress is your body's reaction to a challenge or demand. In short bursts, stress can be positive, such as when it helps you avoid danger or meet a deadline.	
	Stress Management	
	• Imagery,	
	• relaxation, and	
	• meditation	
	An example of a simple relaxation technique can be rolling the head from side to side	
	• Cognitive behavioural approaches	
	Include self-monitoring of stress intensity, thought record-keeping and rewriting, time management, assertiveness training and increased social interactions.	
	• Systemic approach	
	Altering the factors which contribute to stress	
f	Describe the Ethical and Professional concern.	
	Ethical and professional concerns	
	Ethics relates to the moral obligation to respect the rights and interests of others – goes beyond strictly legal responsibilities	
	Three groups of responsibilities:	
	• Responsibilities that everyone has	
	• Responsibilities that people in organizations have	
	• Responsibilities relating to your profession or calling	
	• Organizational ethics	
	There are some who argue that ethical organizational ethics are limited:	
	Stockholder theory (e.g. Milton Friedman). An employee's duty is to the owners of the business (which often means the stakeholders) above all others – although legal requirements must be met.	
	Competitive relationships between businesses. Competition may cause you to do things that could have a negative impact on the owners or employees of competitive businesses	
	•Exercise	
	Identify some of the possible objections and criticisms that can be made of the stockholder business ethics model described above.	
	•Professional ethics	
	•Professionals have knowledge about the technical domain that the general public does not	
	•Ethical duty of the expert to warn lay people of the risks involved in a particular course of action	
	•Many professions, or would be professions, have codes of conduct for their members	
5.	**Attempt *<u>any three</u>* of the following:**	**15**
a.	What are the different types of Team Structure?	
Ans:	**Team Structure:**	
	• We consider only three team structures:	
	– Democratic,	
	– Chief programmer,	
	– Mixed team	

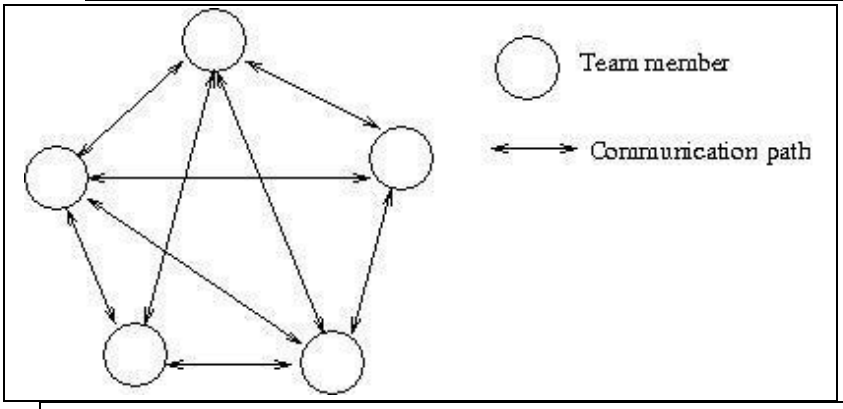
Chief programmer teams:

Appointment of key programmers, **Chief Programmers**, with responsibilities for defining requirements, designing, writing and test software code

Assisted by a support team: **co-pilot** – shared coding, **editor** who made typed in new or changed code, **program clerk** who wrote and maintained documentation and **tester**

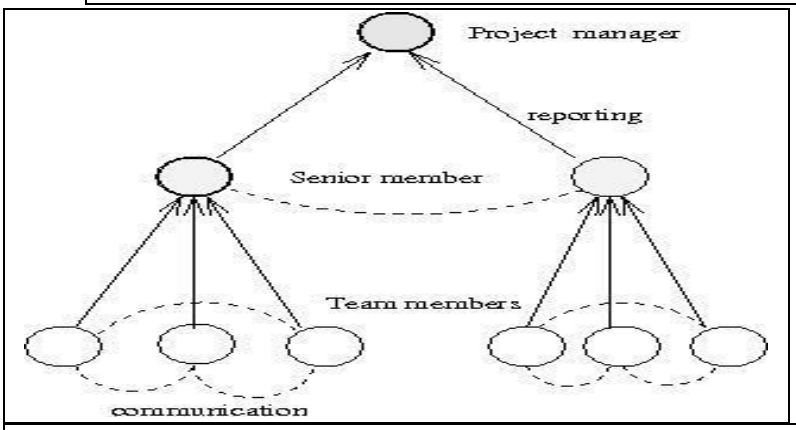
Problem – finding staff capable of the chief programmer role **Democratic Team:**

- Does not enforce any formal team hierarchy.
- Decisions are taken based on discussions,
  - any member is free to discuss with any other member
- Since a lot of debate and discussions among the team members takes place, – for large team sizes significant overhead is incurred



Mixed Control Team Structure: A mixed-control team organization attempts to combine the benefits of centralized and decentralized control, while minimizing or avoiding their disadvantages. ... The mixed-control organization is an example of the use of a hierarchy to master the complexity of software development as well as organizational structure.

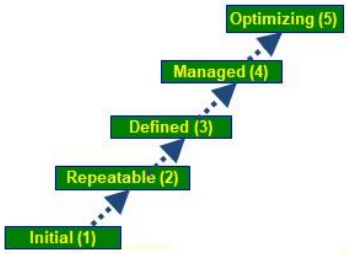
- Incorporates both hierarchical reporting and democratic set up.



b. What is CMM (Capability Maturity Model)? What are the various levels of CMM?

Ans: **What is CMM?** Capability Maturity Model is used as a benchmark to measure the maturity of an organization's software process. CMM was developed at the Software engineering institute in the late 80's. It was developed as a result of a study financed by the U.S Air Force as a way to evaluate the work of subcontractors. Later based on the CMM-SW model created in 1991 to assess the maturity of software development, multiple other models are integrated with CMM-I. It

- Describes an evolutionary improvement path for software organizations from an ad hoc immature process :
  - To a mature, disciplined one.
- Provides guidance on:
  - How to control the process
  - How to evolve the process
- Five maturity levels:
  - Stages are ordered so that improvements at one stage provide foundations for the next.
- Based on the pioneering work of Philip Crosby.



CMM Level 1 (Initial):

- Organization operates Without any formalized process or project plans
- An organization at this level is characterized by Ad hoc and chaotic activities.
- Software development processes are not defined,
- Different developers follow their own process
- The success of projects depend on individual efforts and heroics.

Level 2 (Repeatable):

- Basic project management practices are followed – Size and cost estimation techniques:
  - Function point analysis, COCOMO, etc.
  - Tracking cost, schedule, and functionality.
- Development process is ad hoc:
  - Not formally defined
  - Also not documented.

Level 3 (Defined):

- All management and development activities:
  - Defined and documented.
  - Common organization-wide understanding of activities, roles, and responsibilities.
- The process though defined:
  - Process and product qualities are not measured.

Level 4 (Managed):

- Quantitative quality goals for products are set.
- Software process and product quality are measured:
  - The measured values are used to control the product quality.

- Results of measurement used to evaluate project performance: – Rather than improve process.
- Detailed measures of the software process and product quality are collected.
- Both the software process and products are quantitatively understood and controlled.

Level 5 (Optimizing):

- Statistics collected from process and product measurements are analyzed:
  - Continuous process improvement based on the measurements.
- Known types of defects are prevented from recurring by tuning the process
- Lessons learned from specific projects incorporated into the process

c. What is ISO standard? What are the sub-characteristics of Functionality and Reliability of ISO 9126 software qualities?

Ans: A development life cycle (like ISO 12207) indicates the sequence of processes that will produce the software deliverable and the intermediate products that will pass between the processes. The *deliverables* are the products that are handed over to the client at the end of the project, typically the executable code.

Intermediate products are things that are produced during the project, but which are not (usually) handed to the client at the end. Typically they are things that are produced by one sub-process (e.g. a requirements document created by the requirements elicitation and analysis processes) and used by others (e.g. a design process which produces a design that fulfils the requirements).

These sub-processes will fit into the overall framework of a *development cycle.*

Some software quality models focus on evaluating the quality of software products, others on the processes by which the products are created.

Sub-characteristics of Functionality:

- Suitability
- Accuracy
- Interoperability – ability of software to interact with other software components • Functionality compliance – degree to which software adheres to application- related standards or legal requirements e.g audit
- Security – control of access to the system

Sub-characteristics of Reliability

- Maturity – frequency of failure due to faults - the more the software has been used, the more faults will have been removed
- Fault-tolerance
- Recoverability – note that this is distinguished from 'security' - • Reliability compliance – complies with standards relating to reliability

d. What are the five basic stages of Team Development?

Ans: **Five basic stages of development:**

1. Forming: The members of the group get to know one another and try to set up some ground rules about behavior.

2. Storming – Conflicts arise as various members of the group try to exert leadership and the group's methods of working are established.
3. Norming – Conflicts are largely settled and a feeling of group identity emerges.
4. Performing – The emphasis is now on the tasks at hand.
5. Adjourning – The group disbands.

One way of attempting to accelerate this process is through team-building exercises

e. What are Testing? Explain Test plan and Test management.

Ans: **Testing**: Testing is the process of evaluating a system or its component(s) with the intent to find whether it satisfies the specified requirements or not. In simple words, testing is executing a system in order to identify any gaps, errors, or missing requirements in contrary to the actual requirements. It depends on the process and the associated stakeholders of the project(s). In the IT industry, large companies have a team with responsibilities to evaluate the developed software in context of the given requirements. Moreover, developers also conduct testing which is called Unit Testing.

Test plans:

- Specify test environment
  - In many cases, especially with software that controls equipment, a special test system will need to be set up • Usage profile
  - failures in operational system more likely in the more heavily used components
  - Faults in less used parts can lie hidden for a long time
  - Testing heavily used components more thoroughly tends to reduce number of operational failures

Test Management: Test management most commonly refers to the activity of managing a testing process. A test management tool is software used to manage tests (automated or manual) that have been previously specified by a test procedure. It is often associated with automation software.

The tester executes test cases and may as a result find discrepancies between actual results and expected results – **issues Issue resolution –** could be:

- a mistake by tester
- a fault – needs correction
- a fault – may decide not to correct: **off-specification**
- a change – software works as specified, but specification wrong: submit to change control

f. What do you mean by Premature Termination? What are the reasons for projects premature termination?

Ans: **Premature Termination:** Project termination is one of the most serious decisions a project management team and its control board have to take. It causes frustration for those stakeholders who sincerely believed - and in most cases still believe – that the project could produce the results they expected, or still expect. The project manager and his or her team members, very important stakeholders of the project as well, will feel that they personally failed. They also will be scared of negative consequences for their careers; their motivation and consequently, productivity will decrease significantly.

- There are many reasons as to why a project may have to be prematurely terminated:
  - *Lack of resources*

– *Changed business need of the customer*
– *perceived benefits accruing from the project no longer remain valid*
– *Changes to the regulatory policies*
– *Key technologies used in the project becoming obsolete during project execution*
– *Risks have become unacceptably high*

***