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Internal Assesment Test – II Scheme of Evaluation

Sub:	SOFTWARE ENGINEERING							Code:	15CS42
Date:	08 / 05 / 2017	Duration:	90 mins	Max Marks:	50	Sem:	4(A,B,C)	Branch:	CSE

Answer **FOUR** FULL questions selecting AT LEAST ONE question **from each part**

	Marks	OBE CO	OBE RBT

PART A

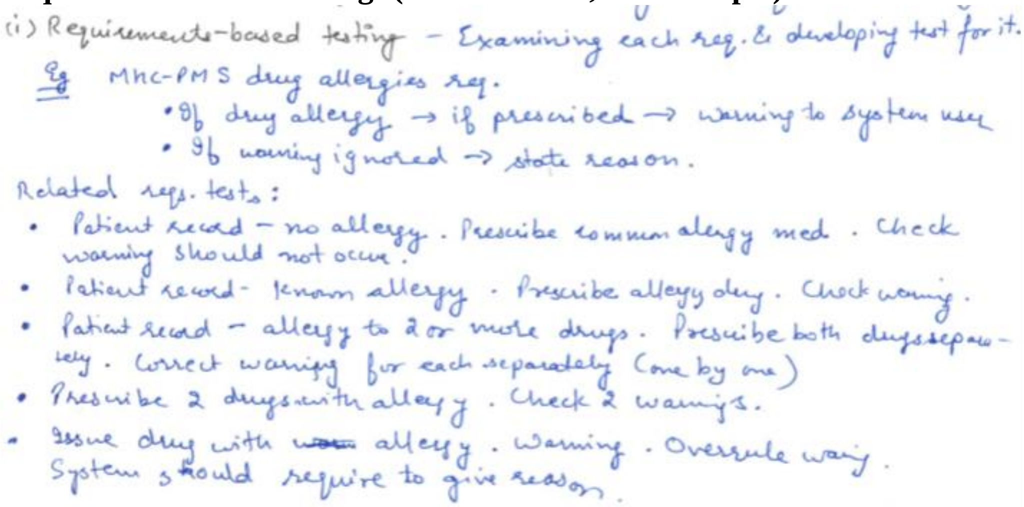
1 (a) A program specification states that the program accepts 4 to 10 inputs that are five-digit integers greater than or equal to 10,000. Show equivalence partitions and possible test input values. [5] CO5 L3

No. of inputs: (2.5M)
Less than 4: 3
Between 4 and 10: 4, (5 or 6 or 7 or 8 or 9), 10
Greater than 10: 11

Input values: (2.5M)
Less than 10000: 9999
Between 10000 and 99999: 10000, 50000 (or any other), 99999
Greater than 99999: 100000

(b) Explain Requirements-based testing with the help of an example. [5] CO5 L3

Requirements based testing: (1M definition, 4M example)



(i) Requirements-based testing – Examining each req. & developing test for it.

Eg MHC-PMS drug allergies req.

- If drug allergy → if prescribed → warning to system user
- If warning ignored → state reason.

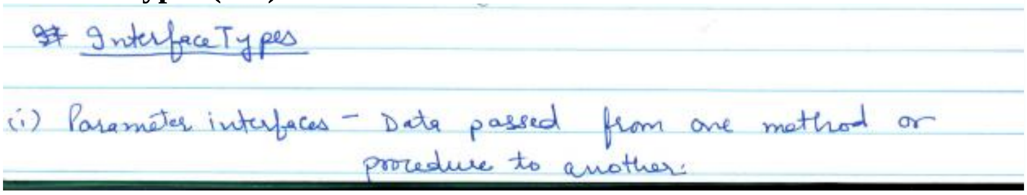
Related reqs. tests:

- Patient record – no allergy. Prescribe common alergy med. Check warning should not occur.
- Patient record - known allergy. Prescribe allergy drug. Check warning.
- Patient record – allergy to 2 or more drugs. Prescribe both drugs separately. Correct warning for each separately (one by one)
- Prescribe 2 drugs with allergy. Check 2 warnings.
- Issue drug with ~~[illegible]~~ allergy. Warning. Overrule warning. System should require to give reason.

OR

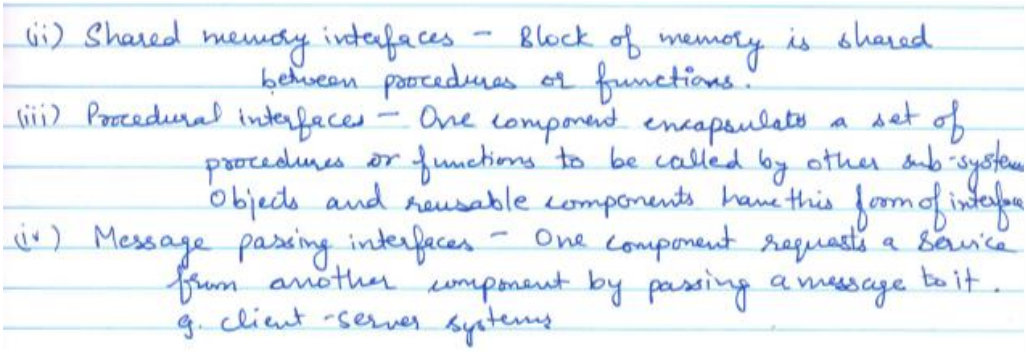
2 (a) Explain various interface types and interface errors. [8] CO5 L2

Interface types (4M)



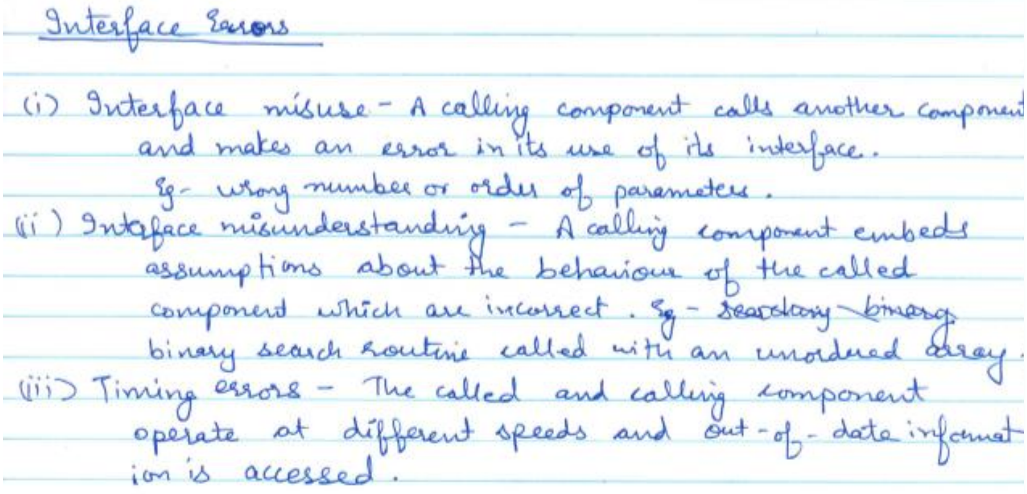
Interface Types

(i) Parameter interfaces – Data passed from one method or procedure to another.



(ii) Shared memory interfaces – Block of memory is shared between procedures or functions.
(iii) Procedural interfaces – One component encapsulates a set of procedures or functions to be called by other sub-systems. Objects and reusable components have this form of interface
(iv) Message passing interfaces – One component requests a service from another component by passing a message to it. eg. client -server systems

Interface Errors (4M)

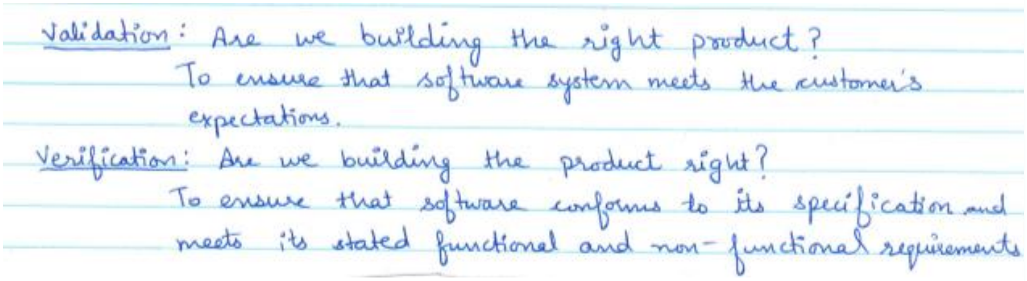


Interface Errors

(i) Interface misuse – A calling component calls another component and makes an error in its use of its interface. Eg- wrong number or order of parameters.
(ii) Interface misunderstanding – A calling component embeds assumptions about the behaviour of the called component which are incorrect. Eg- ~~searching~~ ~~binary~~ binary search routine called with an unordered array.
(iii) Timing errors – The called and calling component operate at different speeds and out-of-date information is accessed.

(b) Differentiate between verification and validation. [2] CO5 L1

Verification (1M) Validation (1M)

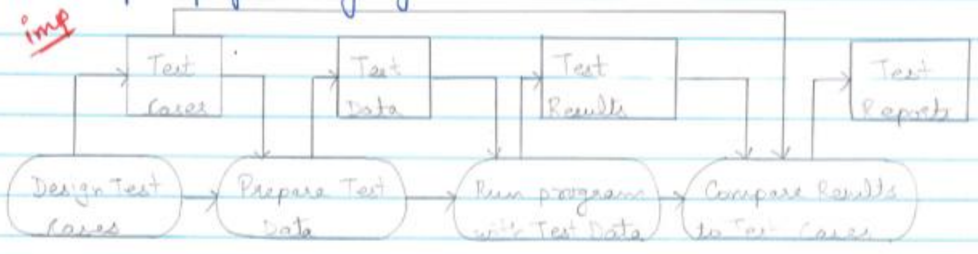


Validation: Are we building the right product?
To ensure that software system meets the customer's expectations.
Verification: Are we building the product right?
To ensure that software conforms to its specification and meets its stated functional and non-functional requirements

PART B

3 (a) Explain testing process with the help of a neat diagram [8] CO5 L2

Diagram (6M) Explanation of diagram (2M)



A model of Software Testing Process

(b) Define test-driven development. [2] CO5 L1

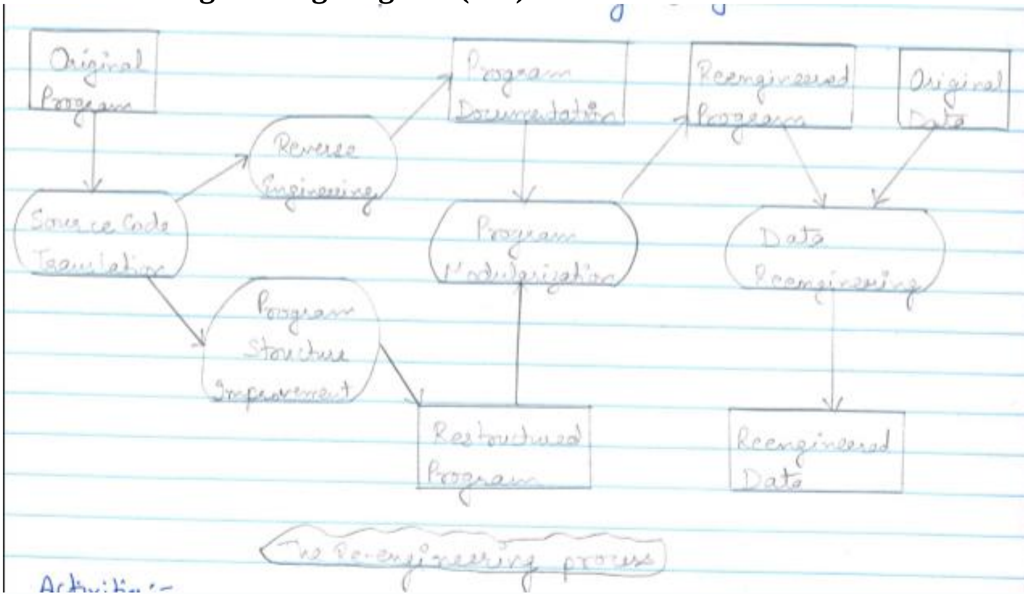
Definition (2M)

- Test-driven development (TDD) is an approach to program development in which you inter-leave testing and code development.
- Tests are written before code and 'passing' the tests is the critical driver of development.
- You develop code incrementally, along with a test for that increment. You don't move on to the next increment until the code that you have developed passes its test.

OR

4 (a) Explain software reengineering with the help of a neat diagram. [6] CO4 L2

Software Reengineering diagram (6M)



(b) Explain maintenance cost factors that result in high cost of maintenance. [4] CO5 L2

Maintenance cost factors (4x1M)

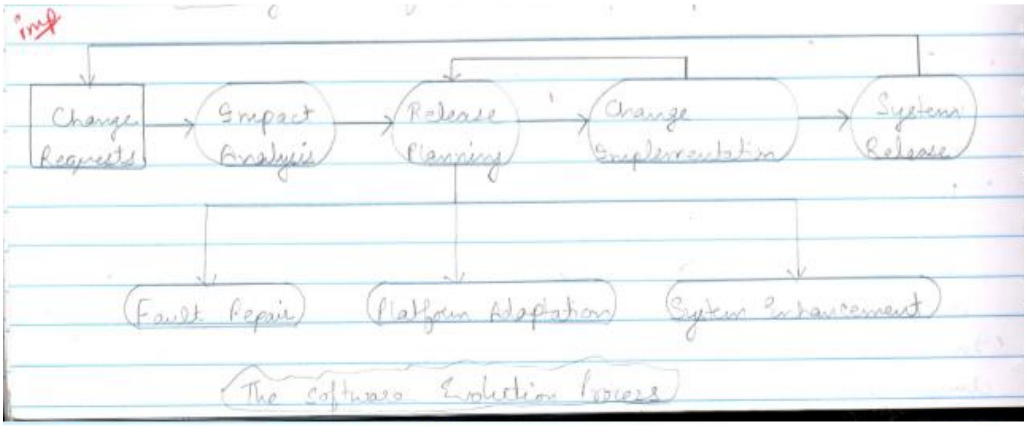
Maintenance cost factors

1. Team stability - Development team is broken after product is delivered to work on new projects. It becomes difficult for maintenance team to understand system which takes lots of time & effort. If both teams are same, cost will be less.
2. Contractual responsibility - Maintenance contract is different from development contract and may be given to a different organisation. So there is no incentive for development team to write s/w which is easy to change.
3. Staff skills - Maintenance staff are often inexperienced and have limited domain knowledge. Old systems may be written in obsolete language.
4. Program age and structure - As programs age, their structure is degraded and they become harder to understand and change.

PART C

5 (a) With the help of a neat diagram, explain software evolution process. [7] CO5 L2

Diagram (5M) Explanation (2M)



The cost and impact of proposed changes are assessed. If the proposed changes are accepted, a new release of the system is planned. During release planning, all proposed changes (fault repair, adaptation, and new functionality) are considered. A decision is then made on which changes to implement in the next version of the system. The changes are implemented and validated and a new version of the system is released. The process then iterates with a new set of changes proposed for the next release.

(b) Define three types of maintenance. [3] CO5 L2

Types of maintenance (3x1M)

Types of Maintenance

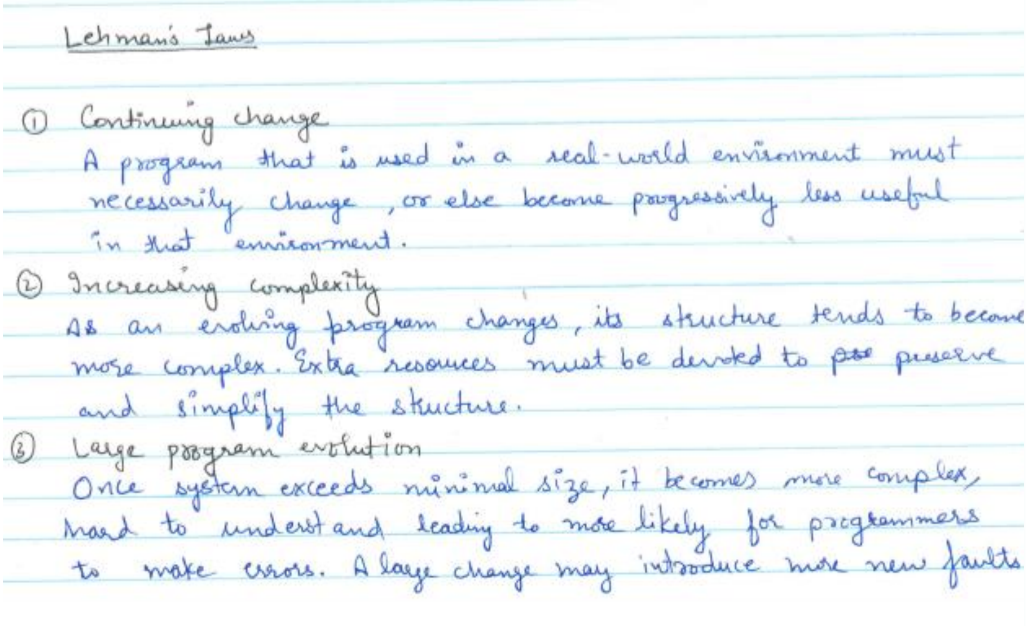
1. Corrective – Maintenance for fault repair.
   Coding errors are relatively cheap to correct, design errors are more expensive and requirements errors are the most expensive to correct.
2. Adaptive – Changing a system so that it operates in a different environment (computer, OS, etc.) from its initial implementation.
3. Perfective – Maintenance to add or modify the system's functionality. The scale of changes required to the software is often much greater than for other types of maintenance.

OR

6 (a) What is program evolution dynamics? Explain Lehman laws. [2+8] CO5 L2

Program evolution dynamics definition (2M) Lehman laws (8x1M)

Program Evolution dynamics is the study of the processes of system change.

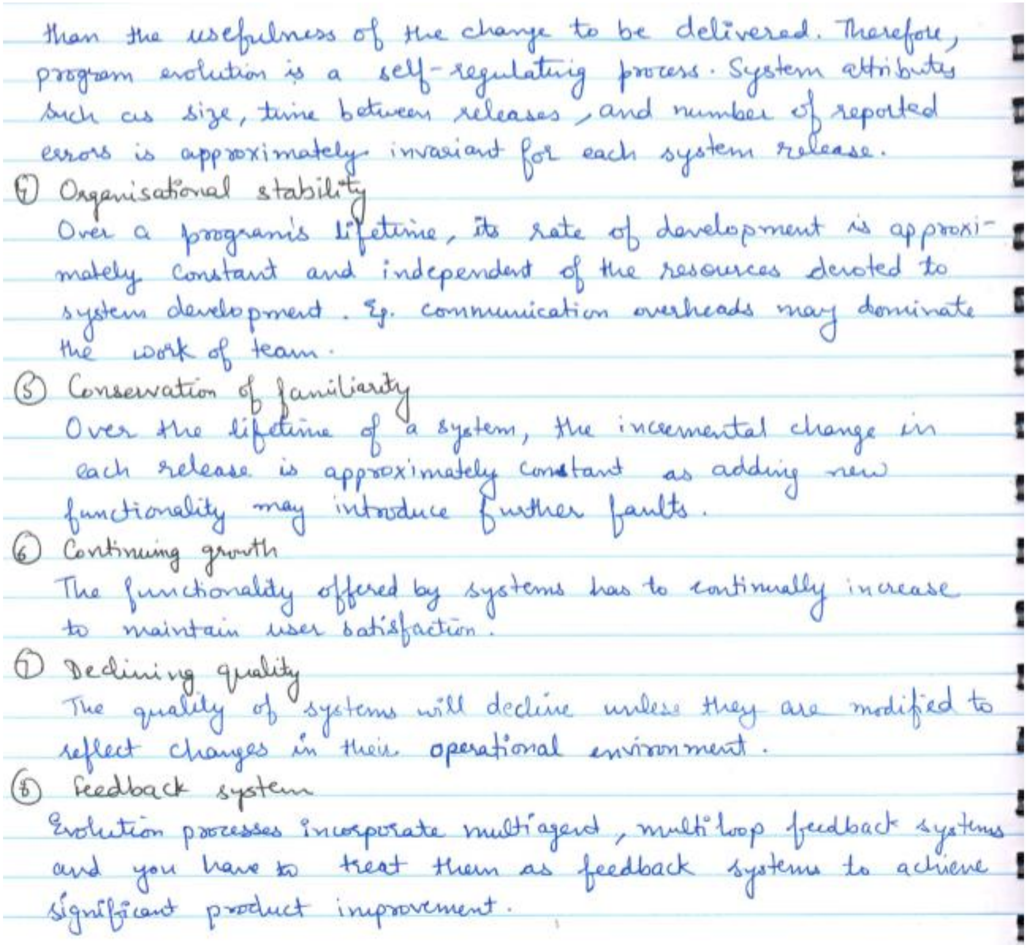


Lehman's Laws

① Continuing change
A program that is used in a real-world environment must necessarily change, or else become progressively less useful in that environment.

② Increasing complexity
As an evolving program changes, its structure tends to become more complex. Extra resources must be devoted to ~~pse~~ preserve and simplify the structure.

③ Large program evolution
Once system exceeds minimal size, it becomes more complex, hard to understand and leading to more likely for programmers to make errors. A large change may introduce more new faults



than the usefulness of the change to be delivered. Therefore, program evolution is a self-regulating process. System attributes such as size, time between releases, and number of reported errors is approximately invariant for each system release.

④ Organisational stability
Over a program's lifetime, its rate of development is approximately constant and independent of the resources devoted to system development. Eg. communication overheads may dominate the work of team.

⑤ Conservation of familiarity
Over the lifetime of a system, the incremental change in each release is approximately constant as adding new functionality may introduce further faults.

⑥ Continuing growth
The functionality offered by systems has to continually increase to maintain user satisfaction.

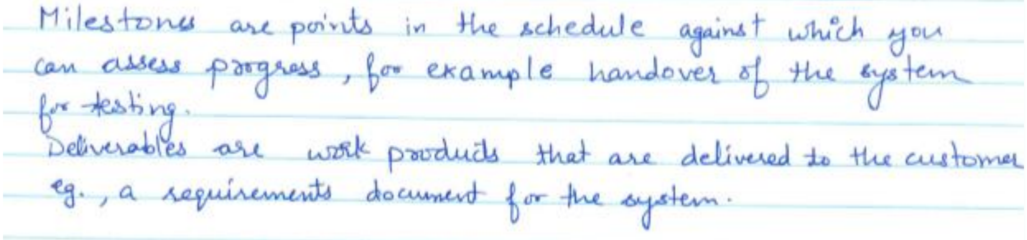
⑦ Declining quality
The quality of systems will decline unless they are modified to reflect changes in their operational environment.

⑧ Feedback system
Evolution processes incorporate multiagent, multiloop feedback systems and you have to treat them as feedback systems to achieve significant product improvement.

PART D

7 (a) Differentiate between milestones and deliverables. [2] CO5 L1

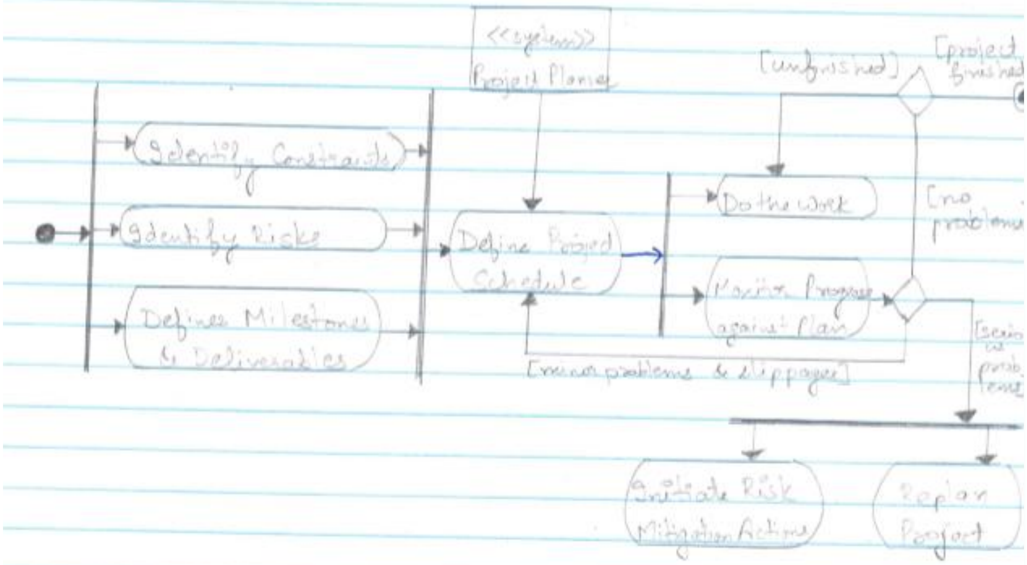
Milestones (1M) Deliverables (1M)



Milestones are points in the schedule against which you can assess progress, for example handover of the system for testing.
Deliverables are work products that are delivered to the customer eg., a requirements document for the system.

(b) Draw a neat diagram to explain project planning process. [8] CO4 L2

Diagram (6M) Explanation (2M)



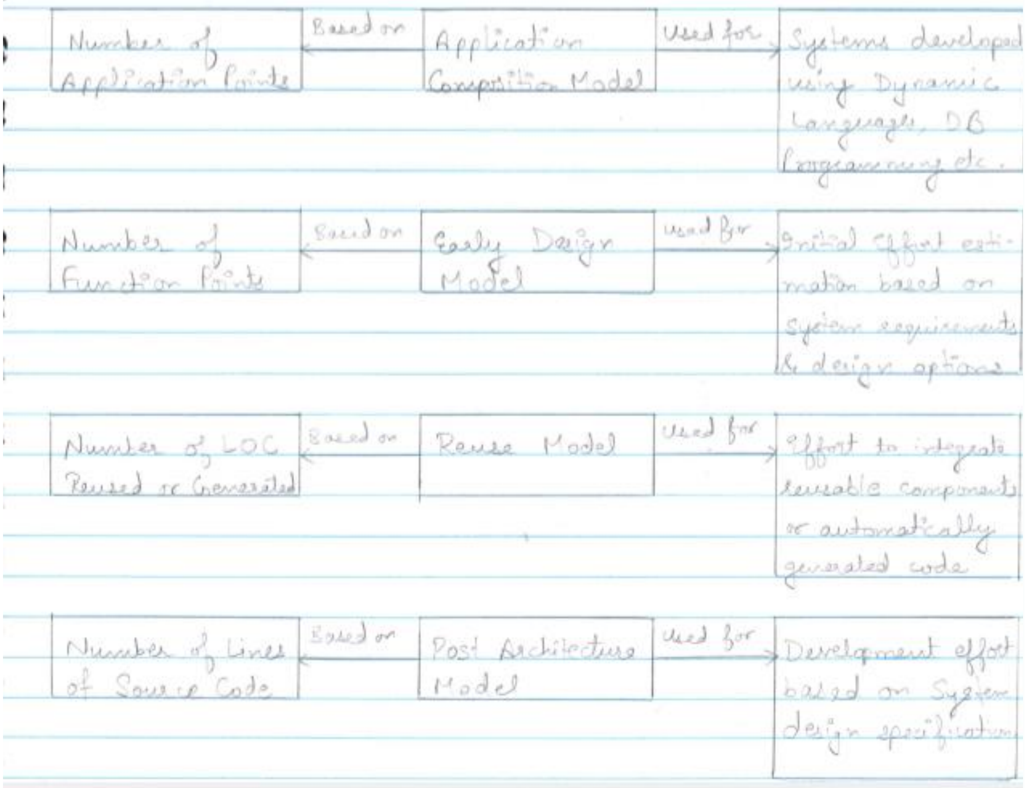
Activity Diagram. (The project planning process)

- Assess constraints (required delivery date, staff available, overall budget, available tools etc), identify risks, milestones and deliverables.
- Draw up estimated schedule and start activities.
- Monitor progress against plan and make modifications to project schedule based on minor problems and slippage.
- If no problems arise, keep doing work & monitoring progress until project is finished.
- If some serious problems arise, initiate the risk mitigation actions and replan the project.

(c) Explain COCOMO-II model with a neat diagram [10] CO4 L2

(Diagram 6M) Explanation (4M)

- This is an empirical model that was derived by collecting data from a large number of software project. The data were analyzed to discover the formulae that were the best fit to the observation
- It is well-documented and non-proprietary estimation model and takes into account more modern approaches to software development.



Number of Application Points	Based on	Application Composition Model	Used for	Systems developed using Dynamic Languages, DB Programming etc.
Number of Function Points	Based on	Early Design Model	Used for	Initial effort estimation based on System requirements & design options
Number of LOC Reused or Generated	Based on	Reuse Model	Used for	Effort to integrate reusable components or automatically generated code
Number of Lines of Source Code	Based on	Post Architecture Model	Used for	Development effort based on System design specification

① Application Composition Model -

If S/w composed of existing parts, reuse

Effort estimated from size → size estimated from Application points (reports, screens, modules & DB, Scripting code etc.)

$$PM = \frac{\left(NAP \times \left(1 - \frac{\%\,reuse}{100}\right)\right)}{PROD}$$

PM = Effort in Person-months

NAP - no. of App Points

PROD - Productivity

② Early Design Model -

- used when requirements are available but design has not started.

$$PM = A \times Size^{B} \times M$$

$$= 2.94 \times Size^{(1.1-1.24)} \times M$$

③ Reuse Model

- Used to compute effort of integrating reusable components.

Black-box reuse - code not modified (generated)

White-box reuse - code modified (understood & integrated)

④ Post-architecture level -

- when ~~a~~ system architecture is designed.

PM = A × Size^B × M

↓ ~~a~~ 17 multipliers instead of 7.

OR

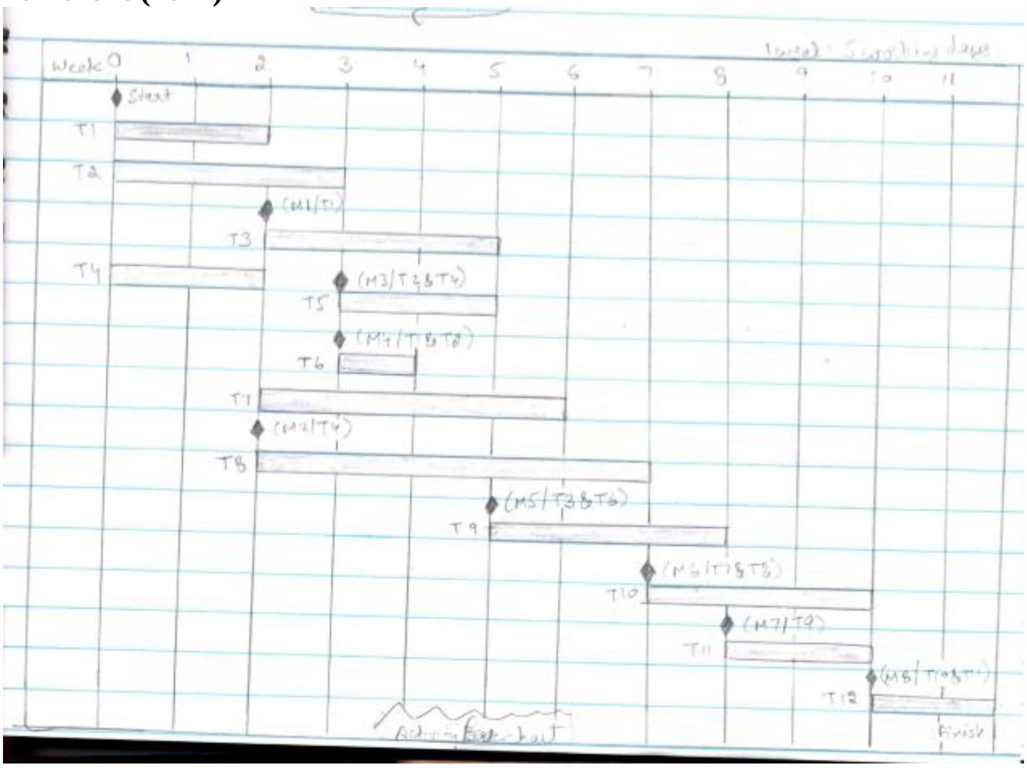
8 From the information given in the table, draw

(a) Bar chart/Gantt chart [10] CO4 L3

(b) Staff allocation chart [10] CO4 L3

Task	Effort (person-days)	Duration (days)	Dependencies
T1	15	10	-
T2	8	15	-
T3	20	15	T1 (M1)
T4	5	10	-
T5	5	10	T2, T4 (M3)
T6	10	5	T1, T2 (M4)
T7	25	20	T1 (M1)
T8	75	25	T4 (M2)
T9	10	15	T3, T6 (M5)
T10	20	15	T7, T8 (M6)
T11	10	10	T9 (M7)
T12	20	10	T10, T11 (M8)

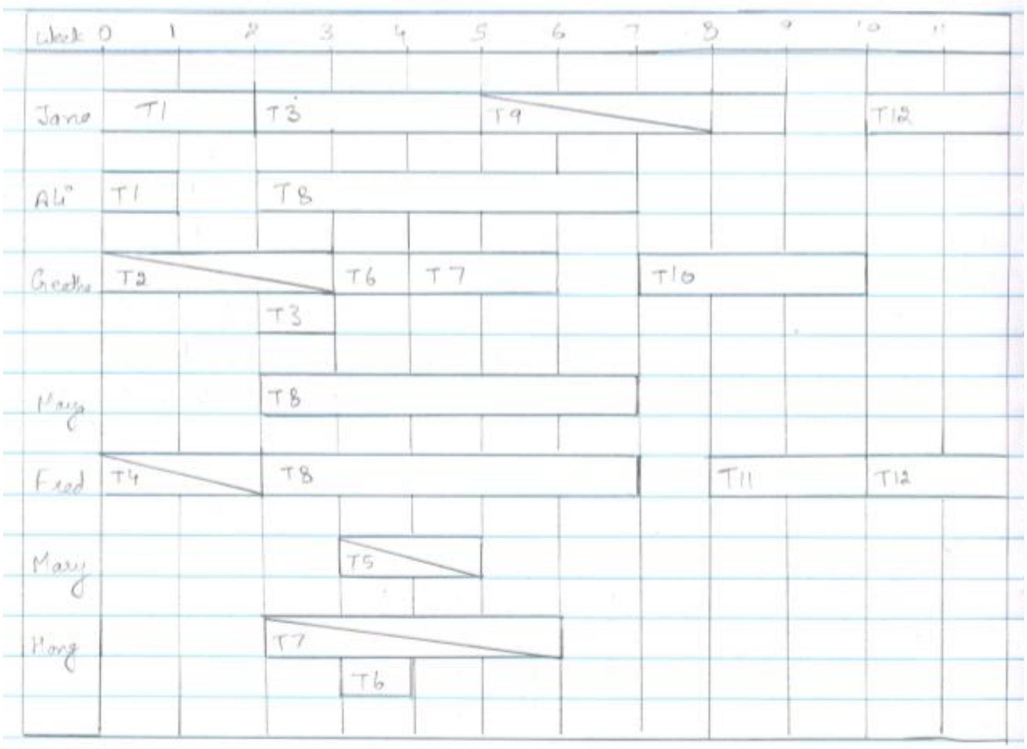
Bar chart (10M)



Staff allocation chart (10M) – It may be different for different students based on subjective selection

10

1 week = 5 working days \ = Part Time



Staff Allocation Chart