Bihar Engineering University, Patna
B.Tech. 5th Semester Examination, 2023

Course: B.Tech.　　　　　　　　　　　　　　　　　　　　　Time: 03 Hours
Code: 105504　　　　　Subject: Software Engineering　　　Full Marks: 70

Instructions:-
(i) The marks are indicated in the right-hand margin.
(ii) There are **NINE** questions in this paper.
(iii) Attempt **FIVE** questions in all.
(iv) Question No. 1 is compulsory.

Q.1 *Choose the correct answer of the following (Any seven question only):*　　**[2 x 7 = 14]**

(a) Estimation of software development effort for Organic software in COCOMO is?
　(i) $E = 2.4 \ (KLOC)^{1.05} PM$ 　　　　　(ii) $E = 3.4 \ (KLOC)^{1.06} PM$
　(iii) $E = 2.0 \ (KLOC)^{1.05} PM$ 　　　　(iv) $E = 2.4 \ (KLOC)^{1.07} PM$

(b) Cyclomatic complexity is equal to?
　(i) number of independent paths　　　　(ii) number of paths
　(iii) number of edges　　　　　　　　　(iv) number of nodes

(c) Validation is?
　(i) Checking the product with respect to customer's expectation
　(ii) Checking the product with respect to specifications
　(iii) Checking the product with respect to constraints of the project
　(iv) all of these

(d) Which of the following life cycle model deals with risk associated with software projects?
　(i) Prototype model　　　　　　　　　(ii) Spiral model
　(iii) Incremental model　　　　　　　　(iv) Waterfall model

(e) System testing performed by a set of friendly customers is called
　(i) Usability testing　　　　　　　　　(ii) Alpha testing
　(iii) Beta testing　　　　　　　　　　　(iv) smoke testing

(f) If data from one module is used to direct the order of execution in another, then the coupling is known as:
　(i) Stamp coupling　　　　　　　　　　(ii) Control coupling
　(iii) Data coupling　　　　　　　　　　(iv) Content coupling

(g) To allocate resources to activities we use
　(i) PERT chart　　(ii) Gantt chart　　(iii) Network diagram　　(iv) All of these

(h) A context diagram?
　(i) describes the context of a system
　(ii) is a DFD that gives an overview of a system
　(iii) is a detailed description of a system
　(iv) is the base of object oriented design

(i) In function point analysis, number of complexity adjustment factors is?
　(i) 10　　　　　　(ii) 20　　　　　　(iii) 14　　　　　　(iv) 12

(j) Functionality of software is tested by
　(i) white-box testing　　　　　　　　　(ii) glass-box testing
　(iii) black-box testing　　　　　　　　　(iv) none of these

Q.2 (a) What is COCOMO? What are the different categories of software development projects according to COCOMO? Why COCOMO is called heuristic estimation technique? **[7]**

(b) Suppose a system for office automation is to be designed. There are four major modules in the system: data entry, data update, query and report generation. The project falls in the organic category. The sizes of different modules are in the ratio 2:2:3:5. The total size of the project is 6 KLOC in the 1st year and 12 KLOC in the 2nd year. The ratings of cost drivers are as follows: **[7]**

Complexity	high	1.5
Experience	high	1.13
Storage	high	1.06
Programmer Capability	high	1.17

Obtain effort estimates for the entire project for different phases in two years.

Q.3 (a) Draw the context diagram and Level-1 DFD for Library Management System. **[4]**

(b) Define Unit testing, Integration testing and System testing. **[6]**

(c) Distinguish between software validation and software verification. **[4]**

Q.4 (a) What steps are required for SQA? What is the difference between fault, failure and error? **[5]**

(b) Differentiate between 'code walkthrough' and 'code inspection'. **[4]**

(c) What are the different types of team structure followed in software projects? Discuss them briefly. **[5]**

Q.5 (a) What are the different categories of users of the SRS document? What are their expectations from the SRS document? **[5]**

(b) Briefly explain the characteristics of a good SRS. Why is SRS document known as black box specification of a system? **[5]**

(c) What are the important activities that are carried out during feasibility study phase? **[4]**

Q.6 (a) What is meant by stub? What is a driver? In which testing are they required? Explain briefly. **[6]**

(b) Consider a software project with 5 activities T1 to T5. Duration of 5 activities in weeks are 3, 2, 3, 5 and 2 respectively. T2 and T4 can start when T1 is complete. T3 can start when T2 is complete. T5 can start when both T3 and T4 are complete. Draw activity network for the project. When is the latest start date of the activity T3? Which activities are on the critical path? Draw the Gantt chart also. **[8]**

Q.7 (a) Define cohesion and coupling. Explain various types of each of them. **[7]**

(b) How are boundary conditions tested in black box testing? Explain with examples. **[7]**

Q.8 (a) What is reliability? Define ROCOF, POFOD, MTTR and MTTF. **[8]**

(b) What is cyclomatic complexity? Write a C program to calculate GCD of two numbers and calculate the cyclomatic complexity of your program. **[6]**

Q.9 Write short notes on *any two* of the following: **[7x2=14]**
(a) Spiral Model
(b) McCalls quality triangle
(c) Software reuse
(d) Functional and non-functional requirements