Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

VII SEMESTER B.TECH. (INFORMATION TECHNOLOGY/COMPUTER AND COMMUNICATION ENGINEERING) END SEMESTER EXAMINATIONS, DECEMBER 2021

SUBJECT: SOFTWARE RELIABILITY-PE: VII [ICT 4055]

REVISED CREDIT SYSTEM

(22/12/2021)

PART-B

TIME: 75mins **MAX. MARKS: 20**

Instructions to candidates

- Answer **ALL** questions.
- Missing data, if any, may be suitably assumed.

Q. No.	Questions	Marks
1A.	A prediction system A1 in which the mean time to next failure (based on the exponential model) will be the average of the 2 previously observed failure times. Apply this prediction system to the data given in Table Q.1A. Generate the predictions for i values from 1 to 10. Repeat the procedure for system A2 in which the mean time to next failure will be the average of the 3 previously observed failure times. Tabulate the results for i=1 to 10, as i, t_i, T_i, λ_i, u_i for both the systems. Which prediction system is preferred? Justify your answer.	5
	Table Q.1A Failure time Data	
	Failure no: 1 2 3 4 5 6 7 8 9 10 Execution time between successive failures in secs: 3 30 113 81 115 9 2 91 112 15	
1B.	Explain the significance of following object oriented system metrics with an example. i) Weighted methods per class ii) Response for a class iii) Coupling between object classes	3
1C.	Determine the following usability measures: i) 5 users perform a task using the same system. At the end of *the test* session, 3 users manage to achieve the goal of the task while the other 2 do not. Find the overall user effectiveness of the system. ii) Suppose there are 4 users who use the same product to attempt to perform the same task (1 task). 3 users manage to successfully complete it – taking 1, 2 and 3 seconds respectively. The fourth user takes 6 seconds and then gives up without completing the task. Find overall relative efficiency.	2

2A.	Write four basic assumptions of Goel-Okumoto basic execution Model. Data recorded show that there are 5 observations corresponding to times between testing: 12, 24, 36, 48, 60 (in months). The total expected defects in the code are 200. The defect reduction rate is considered to be 0.04. Explain in detail steps how Goel-Okumoto basic execution model can be used to find the no. of defects predicted at time t, the total number of residual errors and the reliability factor for all the 5 observations, showing the results in a tabular form.	5
2B.	What is the significance of goal question metric (GQM) paradigm used in software measurement? Construct a simple Goal Question Metric(GQM) tree corresponding to the producer's goal of improving the quality of the software.	3
2C.	What is the significance of McCabe's Cyclomatic complexity number in software reliability measurement? Consider the following code snippet, draw the control flow graph and find the cyclomatic complexity. 1: read x,y,z; 2: type = "scalene"; 3: if (x == y or x == z or y == z) type ="isosceles"; 4: if (x == y and x == z) type ="equilateral"; 5: if (x >= y+z or y >= x+z or z >= x+y) type ="not a triangle"; 6: if (x <= 0 or y <= 0 or z <= 0) type ="bad inputs"; 7: print type;	2