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| <b>Name:</b><br><b>Enrolment No:</b>   |  |  |     |
| <p style="text-align: center;"><b>UPES</b><br/> <b>End Semester Examination, May 2025</b></p> <p> <b>Course: Software Reliability and Testing</b><br/> <b>Program: B. Tech CSE All</b><br/> <b>Course Code: CSEG 4014P</b> </p> <p style="text-align: right;"> <b>Semester : VIII</b><br/> <b>Time : 03 hrs.</b><br/> <b>Max. Marks: 100</b> </p> <p><b>Instructions: Calculator allowed</b></p> |  |  |     |
| <b>SECTION A</b><br><b>(5Qx4M=20Marks)</b>   |  |  |     |
| S. No.   |  | Marks  | CO  |
| Q 1  | Define software reliability mathematically.  | 4  | CO3 |
| Q 2  | Write down the importance of system reliability. Any example of system failure costed huge to either society or industry.  | 4  | CO2 |
| Q 3  | Discuss the general principles of testing and test metrics.  | 4  | CO4 |
| Q 4  | How the software availability coin with probability? Write down four probability distribution functions.   | 4  | CO3 |
| Q 5  | Discuss test case design and selection. Also, the scalability testing.   | 4  | CO1 |
| <b>SECTION B</b><br><b>(4Qx10M= 40 Marks)</b>  |  |  |     |
| Q 6  | Discuss agile methodology and its impact on testing. Write down the steps of agile methodology.  | 10   | CO4 |
| Q 7  | Discuss Normal distribution function and Rayleigh distribution function with supporting formula and graphs.  | 10   | CO3 |
| Q 8  | Discuss Software Reliability, Availability, and Maintainability mathematically. A component has a normal distribution of failure times with $\mu = 2000$ hours and $\sigma = 100$ hours. Find the reliability of the component and the hazard function at 1900 hours.  | 4+6=10   | CO3 |
| Q 9  | <p>Briefly describe CMMI under software quality measures with the support of a diagram and key process areas (KPAs).</p> <p style="text-align: center;">OR</p> <p>How it is impractical to test all data and paths, how it will impact the project management? Discuss proof of correctness of software.</p> | 10   | CO1 |
| <b>SECTION-C</b><br><b>(2Qx20M=40 Marks)</b>   |  |  |     |

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| Q 10 | Discuss the black box and white box testing approaches. Explain equivalence class partitioning, statement coverage, path coverage and boundary value analysis with suitable example.   | <b>20</b> | <b>CO2</b> |
| Q 11 | <p>Discuss software reliability models defined for the software industry and list four of them. Discuss Markov process and its importance in software reliability. Explain Goel-Okumoto (GO) model with supporting formulas.</p> <p style="text-align: center;">OR</p> <p>Discuss the purpose of Software Reliability Models. Discuss Jelinski and Moranda reliability model. It is given that the total number of faults are 100 and failure rate is 0.002failures/second. Find the hazard rate and probability density function after 10<sup>th</sup> failure which occurred at 10<sup>th</sup> seconds and 20<sup>th</sup> failure occurred at 200<sup>th</sup> second.</p> | <b>20</b> | <b>CO3</b> |