

[This question paper contains 3 printed pages]

*Your Roll No*

**7251**

**J**

**M.Sc / II**

**OPERATIONAL RESEARCH**

Course XV to XVIII (iv)

(Software Reliability)

(Admissions of 2001 and onwards)

*Time 3 Hours*

*Maximum Marks 75*

*(Write your Roll No on the top immediately  
on receipt of this question paper )*

*Answer any five questions*

*All questions carry equal marks*

- 1 What do you understand by Software Development life cycle? Describe waterfall and spiral models of Software Development. Give their advantages and disadvantages also.
- 2 (a) Define Software Reliability. How is it different from Hardware Reliability ?  
(b) Define errors, faults and failures in a software. Indicate how software failures are different from hardware failures ?

[P T O]

- 3 (a) What is a Non-homogeneous Poisson Process (NHPP)? Derive expression for reliability and distribution of number of remaining faults, when the software failure process is based on NHPP?
- (b) What are Software Reliability Growth Models and why they are useful?
- 4 (a) What is imperfect debugging? Derive a Software Reliability Growth Model with the assumption that debugging process is imperfect
- (b) What are Discrete Software Reliability Growth Models? What is the utility of discrete modelling in software reliability?
- 5 What is release time problem in software reliability engineering?  
Derive optimal release time policy for an exponential SRGM under
  - (i) Cost criterion
  - (ii) Reliability criterion
  - (iii) Both Cost and Reliability criteria
- 6 (a) Show how resource allocation problem during module testing of a software can be formulated as a mathematical programming problem

- (b) What are parameter estimation and model validation techniques used in the subject of software reliability ?

Discuss briefly

7 Write short notes on

- (i) Independent and dependent faults in a software
- (ii) Software Reliability Growth Models (SRGM) with time lag between failure observation and fault removal
- (iii) A Flexible Software Reliability Growth Model