No. of Printed Pages : 3 **RST–006**

Ph. D. IN STATISTICS

(PHDSTAT)

Term-End Examination

December, 2025

RST-006 : RELIABILITY THEORY AND MODELLING

Time : 3 Hours *Maximum Marks : 100*

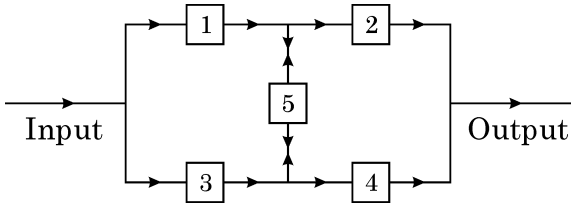
Note : *Attempt any* ***five*** *questions. Use of scientific calculator (non-programmable) is allowed. Symbols have their usual meanings.*

1. (a) Define Laplace and Laplace-Stieltjes transforms. 6

   (b) Evaluate $L\left(\frac{1-\cos 2t}{t}\right)$. 14

2. State and prove convolution theorem of Laplace transform. 20

3. Evaluate reliability of the system shown in figure given as follows for a mission of 2000 hours. It is given that each component has reliability of 0.96 for a mission of 2000 hours, and the components are independent. 20



4. Describe supplement variable technique to solve reliability model. 20

5. Explain reliability evaluation of the following : 6+6+8

   (a) Parallel system

   (b) Series system

   (c) K-out-of-n system

6. Seventy compressors are observed at 5-month intervals with the following number of failures :

   3, 7, 8, 9, 13, 18 and 12.

Estimate R(t), $f(t)$ and $\lambda(t)$ and determine the sample mean time to failure and sample standard deviation. 20

7. Solve the following equation by transform method : 20

$$\frac{d^2y}{dx^2} + 4\frac{dy}{dt} + 3y = e^{-t}$$

where $y(0) = y'(0) = 1$.

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