

3057

B. Tech. 3rd Semester (ME)

Examination – March, 2021

MATHEMATICS - III (PDE, Probability & Statistics)

Paper : BSC-ME-203-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (a) Define first order PDE. 15
- (b) Define homogeneous and no-homogeneous linear PDE of second order.
- (c) Write Laplace equation in cylindrical polar coordinates.
- (d) Define density of normal distribution.
- (e) Define skewness.
- (f) Define correlation.

UNIT - I

2. (a) Solve $(x^2 - y^2 - z^2)p + 2xyq = 2xz$. 15
- (b) Solve $\frac{\partial^2 z}{\partial x^2} - 4 \frac{\partial^2 z}{\partial x \partial y} + 4 \frac{\partial^2 z}{\partial y^2} = e^{2x+y}$
3. Derive D'Alembert's solution of the wave equation. 15

UNIT - II

4. The ends A and B of a rod 20 cm long have the temperature at 30°C and 80°C until steady-state prevails. The temperature of the ends are changed to 40°C and 60°C respectively. Find the temperature distribution in the rod at time t . 15
5. A tightly stretched string of length l with fixed ends is initially in equilibrium position. It is set vibrating by giving each point a velocity $V_0 \sin^3 \frac{\pi x}{l}$. Find the displacement $y(x, t)$. 15

UNIT - III

6. Explain following terms in short : 15
- (a) Independent random variables.
- (b) Infinite sequences of Bernoulli trials.
- (c) Expectation of discrete random variables.
- (d) Variance of sum of discrete random variable.

7. Write detail note on continuous random variables and their properties. 15

UNIT – IV

8. Write detail note on various probability distributions. 15
9. Calculate the rank correlation coefficient from the following data showing ranks of 10 students in two subjects : 15

Maths : 3 8 9 2 7 10 4 6 1 5

Physics : 5 9 10 1 8 7 3 4 2 6
