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 $(x^2 - y^2 - z^2)p + 2xy q = 2xz$.

   (b) Solve $\dfrac{\partial^2 z}{\partial x^2} - 4\dfrac{\partial^2 z}{\partial x \partial y} + 4\dfrac{\partial^2 z}{\partial y^2} = e^{2x+y}$ 15

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 $V_0 \sin^3 \dfrac{\pi x}{l}$. 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 |

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