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Code No.D-2342/N/AICTE

FACULTY OF ENGINEEERING

B.E. (AICTE) III – Semester (Main) (New) Examination, March / April 2022
(Common for CIVIL, MECH, PROD, AE)

Subject: Mathematics - III (PDE, P&S)

Time: 3 Hours **Max. Marks: 70**

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each Questions carries 14 Marks.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may be suitably assumed.

1 (a) Form the partial differential equation from $z = f\left(\frac{y}{x}\right)$ by eliminating the arbitrary function f.

(b) Classify the partial differential equation $u_{xx} + 2u_{xy} + 4u_{yy} = 0$.

(c) Find the moment generating function of uniform distribution.

(d) Write normal equations to fit a parabola $y = a + bx + cx^2$.

(e) Write any two applications of Chi-square test.

(f) Solve $px + qy = z$.

(g) Find the means of the variables when the lines of regression are $5y - 8x + 17 = 0$ and $2y - 5x + 14 = 0$.

2 (a) Solve $(z^2 - 2yz - y^2)p + (xy + xz)q = xy - xz$.

(b) Solve $px + qy = pq$ by Charpit's method.

3 A string of length 100cm is tightly stretched between $x = 0$ and $x = 100$ and is displaced from its equilibrium position by imparting to each of its points an initial velocity $f(x) = \begin{cases} x, & 0 \leq x \leq 50 \\ 100 - x, & 50 \leq x \leq 100 \end{cases}$. Determine the displacement at any subsequent time.

4 (a) In a normal distribution exactly 7% of the items are under 38 and 90% are under 65. Find the mean and standard deviation of the distribution.

(b) Find the variance of a Poisson distribution.

5 (a) Find the correlation coefficient and the equation of line of regression of x on y for the following data.

x	1	2	3	4	5
y	2	5	3	8	7

(b) In a big city 325 men out of 600 men were found to be smokers. Does this information support the conclusion that the majority of men in this city are smokers?

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6 (a) A sample of 26 bulbs gives a mean life of 990 hours with a Standard deviation of 20 hours. The manufacturer claims that the mean life of bulbs is 1000 hours. Is the sample not upto the standard? (Given $t_{0.05}(25) = 1.708$).

(b) The nicotine contents in milligrams in two samples of tobacco were found to be as follows:

Sample A	24	27	26	21	25	–
Sample B	27	30	28	31	22	36

Can it be said that two samples came from same population variances.(Given $F_{0.05}(5,4) = 6.26$)

7 (a) Fit a Poisson distribution for the following data and calculate the expected frequencies.

x	0	1	2	3	4	5
$f(x)$	42	33	14	6	4	1

(b) Fit a straight line $y = a + bx$ to the following data.

x	1	2	3	4	6	8
y	2.4	3	3.6	4	5	6

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