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Code No: 2900/AICTE

FACULTY OF ENGINEERING

B.E. (AICTE/ECE/M/P/AE) III – Semester Examinations, December 2019

Subject: Mathematics - III

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

Note: Answer all questions from Part-A and any five questions from Part-B.

PART – A (20 Marks)

1. Form the partial differential equation by eliminating the arbitrary constant a and c from $(x-a)^2+(y-b)^2+z^2=c^2$. 2
2. Solve $\frac{x^2 z}{x} p + xzq = y^2$. 2
3. Solve $\frac{\partial u}{\partial x} = 4\frac{\partial u}{\partial y}$, given that $u(0, y) = 8e^{-3y}$. 2
4. Classify the second order linear partial differential equation $A\frac{\partial^2 z}{\partial x^2} + 2B\frac{\partial^2 z}{\partial x y} + C\frac{\partial^2 z}{\partial y^2} + D\frac{\partial u}{\partial x} + E\frac{\partial u}{\partial y} + Fu(x, y) = f(x, y)$. 2
5. Define uniform distribution. Find its variance. 2
6. Define moments, skewness and Kurtosis. 2
7. Derive the normal equations for the curve $y = ax + \frac{b}{x^2}$ using principle of Least squares. 2
8. Show that the correlation coefficient is the geometric mean between the two regression coefficients. 2
9. Write the properties of t-distribution. 2
10. Define Chi-square (χ^2)-test. 2

PART – B (50 Marks)

11. (a) Solve $q^2 = z^2 p^2 (1 - p^2)$. 5

    (b) Solve $2xz - px^2 - 2qxy + pq = 0$. 5

12. Solve the differential equation $\frac{\partial u}{\partial t} = a^2 \frac{\partial^2 u}{\partial x^2}$ subject to the following conditions

    i) u is not infinite for $t \to \infty$.

    ii) $\frac{\partial u}{\partial x} = 0$ for $x = 0$ and $x = l$

    iii) $u = lx - x^2$ for $t = 0$ between $x = 0$ and $x = l$. 10

13. (a) Fit a Poisson distribution to the set of observations. 5

x	0	1	2	3	4
f	122	60	15	2	1

(b) In a test of 2000 electrical bulbs, it was formal that the life of a particular make was normally distributed with an average life of 2040 hrs and S.D of 60 hrs. Estimate the 2

number of bulbs likely to burn for
a) more than 2150 hrs
b) less than 1950 hrs
c) more than 1920 hrs but less than 2160 hrs 5

14 (a) Fit the curve $y = ae^{bx}$ to the following data 5

x	77	100	185	239	285
y	2.4	3.4	7	11.1	19.6

(b) Find the correlation coefficient and the regression lines y on x and x on y for the data 5

x	1	2	3	4	5
y	2	5	3	6	7

15 (a) Fit a Poisson distribution to the following data and test for its goodness of fit at level of significance 0.05 5

x	0	1	2	3	4
y	419	352	154	56	19

(b) The lifetime of electric bulbs for a random sample of 10 from a large consignment gave the following data 5

Item	1	2	3	4	5	6	7	8	9	10
Life in hrs	4.2	4.6	3.9	4.1	5.2	3.8	3.9	4.3	4.4	5.6

Can we accept the hypothesis that the average lifetime of bulb is 4000hrs

16 (a) An unbiased coin is thrown n times. It is desired that the relative frequency of the appearance of heads should be between 0.49 and 0.51. Find the smallest value of n that will ensure this result with 90% confidence 5

(b) A lightly stretched string with fixed end points $x = 0$ and $x = 1$ is initially in a position given by $y = y_0 \sin^3\left(\frac{\pi x}{l}\right)$. If it is released from rest from this position, find the displacement $y(x,t)$ 5

17 (a) Solve $p^2 + q^2 = x + y$. 5

(b) Obtain the rank correlation coefficient for the following data 5

x	68	64	75	50	64	80	75	40	55	64
y	62	58	68	45	81	60	68	48	50	70

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