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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech II Year II Semester Supplementary Examinations March 2021

PROBABILITY & STATISTICS, NUMERICAL METHODS

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 60

PART-A

(Answer all the Questions 5 x 2 = 10 Marks)

- 1 a If $P(A^c) = \frac{3}{8}$, $P(B^c) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{4}$ then find $P\left(\frac{A}{B}\right)$. 2M
- b A fair coin is tossed ten times. Find the Probability of getting four heads. 2M
- c Find the mean and median of the following values 26, 8, 6, 12, 15, 32. 2M
- d Write Simpson formulae Simpson's $\frac{1}{3}$ rule. 2M
- e Write the Taylor's series solution of $y' = -xy$, $y(0) = 1$ upto x^4 . 2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

- 2 a If E_1 & E_2 are independent events of a sample space S, then P.T i) E_1 & E_2 are independent ii) E_1 & E_2 are independent iii) E_1 & E_2 are independent. 5M
- b A random variable X has the following probability function
- | | | | | | | | | |
|------|---|---|----|----|----|-------|--------|------------|
| X | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| P(x) | 0 | K | 2K | 2K | 3K | K^2 | $2K^2$ | $7K^2 + K$ |
- 5M

Determine (i) K, (iii) if $P(X \leq K) > 1/2$, find the minimum value of K.**OR**

- 3 a If a random variable has a Probability density $f(x)$ as $f(x) = \begin{cases} 2e^{-2x}, & \text{for } x > 0 \\ 0, & \text{for } x \leq 0 \end{cases}$ 5M
- Find the Probabilities that it will take on a value (i) Between 1 & 3 (ii) Greater than 0.5.
- b Two marbles are drawn in succession from a box containing 10 red, 30 white, 20 blue, and 15 orange marbles, with replacement being made after each draw. Find the probability that i) Both are white ii) first is red and second is white. 5M

UNIT-II

- 4 a Derive mean and variance of Normal distribution. 6M
- b If 2% of light bulbs are defective. Find the probability that (i) At least one is defective (ii) $p(1 < x < 8)$ in a sample of 100. 4M

OR

- 5 a Out of 800 families with 5 children each, how many would you expect to have (i) 3 boys (ii) 5 girls (iii) either 2 or 3 boys? Assume equal probabilities for boys & girls. 5M
- b If the masses of 300 students are normally distributed with mean 68kgs and standard deviation 3kgs, how many students have masses (i) Greater than 72 kg (ii) Less than or equal to 64 kg (iii) Between 65 and 71 kg. 5M

UNIT-III

- 6 a If the two lines of regression are $4X-5Y+30=0$ and $20X-9Y-107=0$ which of these is the line of regression of X on Y. Find r and σ_y when $\sigma_x = 3$. 5M
- b Obtain the rank correlation coefficient for the following data :

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	45	81	60	68	48	50	70

OR

- 7 a Compute the first four central moments to the following data and also find Sheppard's correction, β_1 and β_2 6M

C-I	0-10	10-20	20-30	30-40	40-50	50-60	60-70
F	2	8	12	40	20	15	3

- b From the following regression equations, calculate \bar{X}, \bar{Y} and r $20X-9Y=107$, $4X-5Y= -33$ 4M

UNIT-IV

- 8 a Evaluate $\int_0^1 \frac{1}{1+x} dx$ by trapezoidal rule and Simpson's $\frac{1}{3}$ rule 5M
- b Using Newton-Raphson method find square root of 25. 5M

OR

- a Find a positive root of $x^3 - x - 1 = 0$ correct to two decimal places by Bisection method. 6M

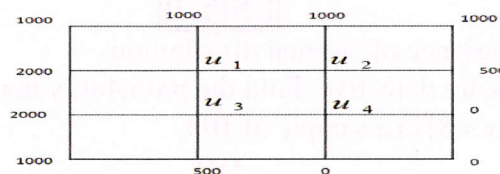
- 9 b Compute $\int_0^4 e^x dx$ by Simpson's $\frac{1}{3}$ rule with 10 sub divisions. 4M

UNIT-V

- 10 a Solve $y' = x+y$, given $y(1)=0$ find $y(1.1)$ and $y(1.2)$ by Taylor's series method. 5M
- b Use Euler's method to find $y(0.1)$ given $y' = (x^3 + xy^2)e^{-x}, y(0)=1$. 5M

OR

- 11 a Using R-K method of 4th order find $y(0.1), y(0.2)$ given that $\frac{dy}{dx} = 1 + xy, y(0)=2$. 5M
- b Evaluate the function $u(x, y)$ satisfying $\nabla^2 u = 0$ at the pivotal points given the boundary values as follows:



5M

END