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B.Tech. (Electronics & Electrical Engg.) (2012 to 2017)/(EE) (2012 Onwards)/(Electrical & Electronics Engg.) (2011 Onwards) (Sem.-5) NUMERICAL AND STATISTICAL METHODS

Subject Code : BTEE-505

M.Code: 70558

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

- 1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- 2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- 3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Do all the questions :

- a. The area of cross-section of a rod is desired upto 0.2% error. How accurately should the diameter be measured?
- b. The mean of the binomial distribution is 20 and standard deviation is 4. Calculate n, p, q
- c. Point out the inconsistency, if any, in the following statement

"The regression equation of y on x is 2y + 3x = 4 and the correlation coefficient between x and y is 0.8".

- d. Write Newton-cote's quadrature formula.
- e. Find the eigen vector corresponding to the eigen value 1 of the matrix $\begin{vmatrix} 5 & 4 \\ 1 & 2 \end{vmatrix}$.
- f. If 2 percent of the books bound at a certain bindery have defective bindings. Determine the probability that five of 400 books bound by this bindery will have defective bindings.
- g. What is the difference between the Gauss-elimination and Gauss-Seidel methods.

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- h. Let X be the random variable such that P(X = -2) = P(X = -1), P(X = 2) = P(X=1)and P(X > 0) = P(X < 0) = P(X = 0). Obtain the probability mass function of X and its distribution functions.
- i. Discuss the order of the convergence of the Newton's method for nonlinear equation f(x) = 0.
- j. Write the normal equation for the curve y = a + bx, for n points by the method of least squares.

SECTION-B

- 2. Perform six iterations of the bisection method to find the root of the equation $\cos x = xe^x$ correct to four decimal places.
- 3. Solve the equations 27x + 6y z = 85, x + y + 54z = 110, 6x + 15y + 2z = 72 by Gauss-Seidel method.
- 4. Using Newton's divided difference formula, find the missing value from the table :

Χ	1	2	400	5	6
Y	12	15	5		9

5. The amount of time, in hours, that a computer functions before breaking down is a continuous random variable with probability density function given by :

$$f(x) = \begin{cases} \lambda e^{\frac{-x}{100}}; & x \ge 0\\ 0; & x < 0 \end{cases}$$

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What is the probability that a computer will function between 50 and 150 hours before breaking down?

6. A sample analysis of examination results of 500 students was made. It was found that 220 had failed, 170 had secured a third class, 90 was placed in second class and 20 got a first class. Are these figures commensurate with the general examination result which is in a ratio of 4:3:2:1 for the various categories respectively? The table value of chi-square for 3 d.f. at the 5% level of significance is 7.81.



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SECTION-C

- 7. a. Evaluate $\int_{0}^{6} \frac{dx}{1+x^2} dx$ by using Trapezoidal rule.
 - b. Apply Runge-Kutta fourth order method to find the approximate value of y for x = 0.2.

Given that $\frac{dy}{dx} = x + y$, and y = 1 where x = 0.

8. a. Find the coefficient of correlation and obtain the lines of regression from the given data

Χ	62	64	65	69	70	71	72	74
Y	126	125	139	145	165	152	180	208

b. Samples of sales in similar shops in two rooms are taken for a new product with the following results :

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A 57 5.3	5
B 61 4.8	7

Is there any evidence of difference in sales in the two towns? Use 5% level of significance for testing this difference between the mean of two samples.

Use $t_{10}(0.05) = 2.228$

9. The results of a survey on the sales of a product (Y) as a function of time period (X) are summarized as below :

N.	X		Y
Mean N	40		125
Standard deviation	2.5		16
Correlation coefficient (r)		0.85	

- a. Fit a regression line of Y on X and estimate the value of Y when X is 45.
- b. Fit a regression line of X on Y and estimate the value of X when Y is 135.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.

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