Roll No. ☐☐☐☐☐☐☐☐☐☐☐   Total No. of Pages : 03

Total No. of Questions : 18

B.Tech. (Electronics & Electrical Engg.) /
(Electrical Engineering & Industrial Control) (2012 to 2017) /
(EE) / (Electrical & Electronics Engg.) (2012 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

Do all the questions :

1. Define order of convergence for non-linear equation.

2. Write Newton-cote's quadrature formula.

3. Define Eigen value and Eigen vector.

4. What is the difference between the Gauss-elimination and Gauss-Seidel methods?

5. If a random variable X takes the values 1, 2, 3 and 4 such that $2P(X = 1) = 3P(X = 2) = P(X = 3) = 5P(X = 4)$, find the probability function of X.

6. Define the condition number.

7. Write the Newton-Raphson formula for a function $f(x) = 0$.

8. Define sampling distribution.

9. Write the probability density function for t-distribution.

10. For two lines of regression $7x – 16y + 9 = 0$ and $5y – 4x – 3 = 0$, calculate the coefficient of correlation.

SECTION-B

11. Perform four iterations of the secant method to find the root of the equation $xe^x = \cos x$ correct to four decimal places.

12. Find the largest Eigen value and the corresponding Eigen vector of the matrix $\begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$ using Rayleigh's power method. Take $[1, 0, 0]^T$ as initial Eigen vector.

13. Using Newton's divided difference formula, find the missing value from the table :

x	1	2	4	5	6
y	12	15	5	--	9

14. Service calls come to a maintenance center, according to a Poisson process and, on the average, 2.7 calls come per minute. Find the probability that (a) no more than 4 calls come in any minute (b) fewer than 2 calls came in any minute ; (c) more than 10 calls come in a 5-minute period.

15. A continuous random variable X has the following probability density function : $f(x) = A + Bx$, $0 \leq x \leq 1$. If the mean of the distribution is $\dfrac{1}{2}$. Find the value of A and B.

SECTION-C

16. a) Apply Runge-Kutta fourth order method to find the approximate value of y for $x = 0.2$, given that $\dfrac{dy}{dx} = x + y$, and $y = 1$ where $x = 0$.

    b) Find by Taylor's series method, the values of y at $x = 0.1$ and $x = 0.2$ to five places of decimals from $\dfrac{dy}{dx} = x^2 y - 1$, $y(0) = 1$.

17. For the following data :

x	1	3	4	8	9	11	14
y	1	2	4	5	7	8	9

Obtain :

a) Regression coefficients of y on x and x on y

b) Mean of x and y

c) Coefficient of correlation between x and y.

18. a) A survey of 240 families with 4 children each revealed the following distribution :

No. of boys	4	3	2	1	0
No. of families	10	55	105	58	12

Is the result consistent with the hypothesis that male and female births are equally probable? Use chi-square value for 4 & 5 d.f. at 5% level of significance is 9.49 & 11.07 respectively.

b) The intelligence quotients (IQ) of 16 students from B.Tech. IInd year showed a mean of 107 and a standard deviation of 10, while the IQs of 14 students from B.Tech Ist year showed a mean of 112 and a standard deviation of 8. Is there a significant difference between the IQs of the two groups at significance levels of 0.05? Given that critical value at 28 degree of freedom with 5% level of significance is 2.05.

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.