Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (Electrical Engineering & Industrial Control) (2012 Onwards)
B.Tech.(Electrical & Electronics/Electronics & Electrical/EE) (2011 Onwards)
(Sem.–5)

NUMERICAL AND STATISTICAL METHODS

Subject Code : BTEE-505
Paper ID : [A2111]

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

Q1. a) Define absolute error and give bound on the absolute error of a floating point number in case of rounding and chopping.

b) Define Order of convergence and give order of convergence of Newton-Raphson method.

c) Obtain the approximate value of $y(1.1)$ for the initial value problem $y' = -2xy^2$, $y(1) = 1$ with step size $h = 0.1$ by using Taylor series second order method.

d) Evaluate the following integral $\int_0^3 \frac{1}{3x+4}\,dx$ using Simpson's $\frac{3}{8}$ th rule with three sub intervals.

e) Find the polynomial $f(x)$ by using Lagrange's formula for the following data :

x	0	1	2	5
$f(x)$	2	3	12	47

f) A Random variable has the following probability distribution :

x	0	1	2	3	4	5	6	7
$p(x)$	0	K	$2K$	$2K$	$3K$	K^2	$2K^2$	$7K^2+K$

Find K.

g) If X is random variable then prove that $V(aX + b) = a^2V(X)$, where $V(X)$ is variance of X.

h) Under what conditions Poisson distribution is limiting case of Binomial distribution?

i) Show that mean of Uniform distribution over interval (a, b) is $\frac{a+b}{2}$

j) Give two properties of regression coefficients.

SECTION-B

Q2. Use Newton's iterative formula; establish the iterative formula $x_{n+1} = x_n[2 - Nx_n]$ to calculate the reciprocal of N. Hence find the value of $\frac{1}{37}$ upto four places of decimal.

Q3. Determine the largest eigenvalue and the corresponding eigenvector of the matrix correct to three decimal places using the power method.

$$\begin{bmatrix} 4 & 1 & 0 \\ 1 & 20 & 1 \\ 0 & 1 & 4 \end{bmatrix}$$

Q4. Apply Gauss elimination method to solve the following system of equations

$x + 4y - z = -5;\ x + y - 6z = -12;\ 3x - y - z - 4.$

Q5. Using Newton's divided difference formula, find the missing value from the table

X	1	2	4	5	6
$f(x)$	14	15	5	.....	9

Q6. The heights of 10 makes of given locality are 70, 67, 62, 68, 61, 68, 70, 64, 64, 66 inches, It is reasonable to believe that the average height is > 64 inches? Test at 5% significance level assuming that for 9 degree of freedom $P(t > 1.83) = 0.05$.

SECTION-C

Q7. Use Runge Kutta method of fourth order to approximate y(0.2) taking step size h = 0.1 for the initial value problem $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$, $y(0) = 1$.

Q8. A shipment of 20 similar computers to a retail outlet contains 3 that are defective. If a school makes a random purchase of 2 of these computers, find the probability distribution, mean and variance for the no. of defectives.

Q9. By using the method of least squares, fit a curve of the form $y = a + bx$ to the following data :

x	1	2	4	6
y	2	6	12	18