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B.Tech.(ME) (2011 Onwards) (Sem.–6)

STATISTICAL AND NUMERICAL METHODS IN ENGINEERING

Subject Code : BTME-604

M.Code : 71188

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. Write briefly :

a) The mean of 5 observations is 7. Later on it was found that two observations 4 and 8 were wrongly taken instead of 5 and 9. Find the correct mean.

b) Define Conditional Probability.

c) Find the mean and the standard deviation of the number of heads in 100 tosses of a fair coin.

d) Define level of Significance.

e) If $u = 2\upsilon^6 - 5\upsilon$, find the percentage error in u at $v = 1$ if error in v is 0.05.

f) Show that the following rearrangement of the equation :

$x^3 + 6x^2 + 10x - 20 = 0$ does not yield a convergent sequence of successive approximations by iteration method near $x = 1$, $x = \frac{(20 - 6x^2 - x^3)}{10}$.

g) Prove $\Delta = E - 1$.

h) Write Simpson's $1/3^{rd}$ formula for numerical integration.

i) Define Pivoting and type of Pivoting.

j) Show that Euler's formula is R-K method of first order.

SECTION-B

2. It is known from the past experience that the average number of industrial accidents in a factory per month in a plant is 4. Find the probability that during a particular month, there will be lower than 4 accidents. Use Poisson Distribution (Given e^{-4}) = 0.0183.

3. Evaluate $\sqrt{12}$ to four decimal places by Newton's iterative method.

4. Find y (10) from the following table :

X	5	6	9	11
Y	12	13	14	16

5. The table given below reveals the velocity 'v' of a body during the time 't' specified. Find its acceleration at $t = 1.1$

T	1.0	1.1	1.2	1.3	1.4
V	43.1	47.7	52.1	56.4	60.8

6. Solve the following system of equations using Gauss Elimination Method.

$x + y + z = 7$

$3x + 3y + 4z = 24$

$2x + y + 3z = 16$

SECTION-C

7. In a test given to two groups of students the marks obtained are as follows :

First group	18	20	36	50	49	36	34	49	41
Second group	29	28	26	35	30	44	46		

Examine the significance of difference between the mean marks secured by students of the above two groups. (The value of t at 5% level for $4df = 2.14$).

8. Find the smallest Eigen value of the matrix

$$A = \begin{bmatrix} 1 & 2 & -2 & 4 \\ 2 & 12 & 3 & 5 \\ 3 & 13 & 0 & 7 \\ 2 & 11 & 2 & 2 \end{bmatrix}$$ using Power Method.

9. Use Milne's method to solve $y = 1 + y^2$ with:

$y(0) = 0$, $y(0.2) = 0.2027$, $y(0.4) = 0.4228$, $y(0.6) = 0.6841$ obtain $y(0.8)$, $y(1)$ and $y(-0.2)$.

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.