Roll No. $\square$ Total No. of Pages : 02
Total No. of Questions : 09
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 $u=2 v^{6}-5 v$, 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 :
$x^{3}+6 x^{2}+10 x-20=0$ does not yield a convergent sequence of successive approximations by iteration method near $x=1, x=\frac{\left(20-6 x^{2}-x^{3}\right)}{10}$.
g) Prove $\Delta=\mathrm{E}-1$.
h) Write Simpson's $1 / 3^{\text {rd }}$ 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 $\left(\right.$ Given $\left.e^{-4}\right)=0.0183$.
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.
$x+y+z=7$
$3 x+3 y+4 z=24$
$2 x+y+3 z=16$

## 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 $4 d . f=2.14$ ).
8. Find the smallest Eigen value of the matrix
$A=\left[\begin{array}{lllr}1 & 2 & -2 & 4 \\ 2 & 12 & 3 & 5 \\ 3 & 13 & 0 & 7 \\ 2 & 11 & 2 & 2\end{array}\right]$ 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.

