Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐   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
Paper ID : [A2364]

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) A class consists of 6 girls and 10 boys. If a committee of 3 is chosen at random from the class, find the probability that 3 boys are selected.

   b) A fair coin is tossed 6 times. Find the probability of getting exactly 2 heads.

   c) A population consists of four numbers 2, 3, 4, 5. Find the population mean and the population standard deviation.

   d) Find P $(- t_{0.025} < t < t_{0.05})$.

   e) Find the relative error if 2/3 is approximated by 0.667.

   f) State Newton- Gregory Backward difference interpolation formula.

   g) State Simpson's 3/8 rule.

   h) Find the mean and mode of the set 8, 4, 7, 84, 9, 19, 5, 9.

   i) Define a random variable.

   j. Give two properties of a Normal distribution.

SECTION-B

2. Find a positive root of $x^4 - x = 10$ using Newton-Raphson's method.

3. Compute $f'(x)$ and $f''(x)$ at $x = 25$ from the following table:

x	15	17	19	21	23	25
$f(x) = \sqrt{x}$	3.873	4.123	4.359	4.583	4.796	5.0

   Compare with the exact values.

4. Using Taylor series expansion evaluate the integral of $y' - 2y = 3e^x$, $y(0) = 0$ at $x = 0.1, 0.2$.

5. Determine the probability that there are 3 defective items in a sample of 100 items if 2% of the items made in the factory are defective.

6. Calculate the probability that $\bar{X}$ will be between 75 and 78 if a random sample of size 100 is taken from an infinite population having the mean $\mu = 76$ and variance $\sigma^2 = 256$

SECTION-C

7. Determine the largest eigen value and the corresponding eigen vector of the matrix

$$A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$$

8. Apply Gauss-Jordan method to solve the equations $x + y + z = 9$; $2x - 3y + 4z = 13$; $3x + 4y + 5z = 40$.

9. Given the values of $u(x, y)$ on the boundary of the square of figure below, evaluate the function $u(x, y)$ satisfying the Laplace equation at the pivotal points of this figure by Gauss-Seidal method.
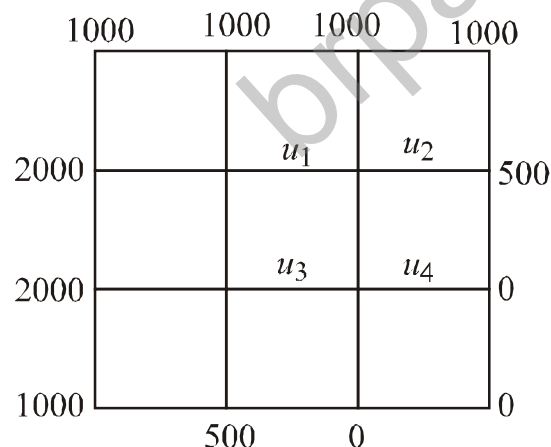

Fig.