

Code No: 132AC

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**B.Tech I Year II Semester Examinations, May - 2019****MATHEMATICS-III****(Common to CE, EEE, ME, ECE, CSE, EIE, IT, MCT, ETM, MMT, AE, MIE, PTM, CEE, MSNT)****Time: 3 hours****Max. Marks: 75****Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A**(25 Marks)**

- 1.a) Let X denotes the number of heads in a single toss of 4 fair coins. Determine $P(1 < X \leq 3)$ [2]
- b) Define moment generating function of a random variable. [3]
- c) Define central limit theorem. [2]
- d) A random sample of size 100 has a standard deviation of 5. What can you say about maximum error with 95% confidence? [3]
- e) Define Type I and Type II errors. [2]
- f) Explain one way classification of ANOVA. [3]
- g) Establish an iterative formula for computing \sqrt{N} by Newton Raphson method. [2]
- h) Construct normal equations for fit a straight line by method of least squares. [3]
- i) Write Simpsons $1/3^{\text{rd}}$ and $3/8^{\text{th}}$ rule formulas. [2]
- j) Given $y' = xy$ with $y(0) = 1$. Find $y(0.2)$ with $h = 0.1$ by Euler's method. [3]

PART-B**(50 Marks)**

- 2.a) A sample of 4 items is selected at random from a box containing 12 items of which 5 are defective. Find the expected number of defective items.
- b) In a normal distribution, 7% of the items are under 35 and 89% are under 63. Determine the mean and variance of the distribution. [5+5]

OR

- 3.a) Let the continuous random variable X have the probability density function,

$$f(x) = \begin{cases} 2/x^3, & \text{if } 1 < x < \infty \\ 0, & \text{other wise} \end{cases}$$
 Find F(x).
- b) A discrete random variable X has the mean 6 and variance 2. If it is assumed that the distribution is Binomial find the probability that $5 \leq x \leq 7$. [5+5]
- 4.a) A random sample of size 100 is taken from an infinite population having mean $\mu=76$ and the variance $\sigma^2= 256$. What is the probability that mean of the sample will be between 75 and 78?
- b) Assuming that $\sigma = 20.0$, how large a random sample be taken to assert with probability 0.95 that the sample mean will not differ from the true mean by more than 3.0 points? [5+5]

OR

- 5.a) A normal population has a mean of 0.1 and standard deviation of 2.1. Find the probability that mean of a sample of size 900 will be negative.
- b) Find 95% confidence limits for the mean of a normality distributed population from which the following sample was taken 15, 17, 10, 18, 16, 9, 7, 11, 13, 14. [5+5]

- 6.a) In a random sample of 60 workers, the average time taken by them to get to work is 33.8 minutes with a standard deviation of 6.1 minutes. Can we reject the null hypothesis $\mu = 32.6$ minutes in favour of alternative null hypothesis $\mu > 32.6$ at $\alpha = 0.025$ level of significance.

- b) The mean life of a sample of 10 electric bulbs was found to be 1456 hours with S.D. of 423 hours. A second sample of 17 bulbs chosen from a different batch showed a mean life of 1280 hours with S.D. of 398 hours. Is there a significant difference between the means of two batches? [5+5]

OR

7. The following are the number of typing mistakes made in four successive weeks by four typists working for a publishing company.

| | | | | |
|------------|----|----|----|----|
| Typist I | 13 | 16 | 12 | 14 |
| Typist II | 14 | 16 | 11 | 19 |
| Typist III | 13 | 18 | 16 | 14 |
| Typist IV | 18 | 10 | 14 | 15 |

Using ANOVA, test at 0.05 level of significance whether the difference among the four sample means can be attributed to chance. [10]

- 8.a) Find a real root of $xe^x - \cos x = 0$ using Newton-Raphson method.
- b) Fit a least square parabola curve to the following data: [5+5]

| | | | | | | | |
|---|-----|-----|-----|-----|-----|-----|-----|
| x | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| y | 1.4 | 2.8 | 2.4 | 2.9 | 3.6 | 4.0 | 4.1 |

OR

- 9.a) Find the root of the equation $2x - \log x = 7$ which lies between 3.5 and 4 by regula-falsi method.

- b) Solve the following system of equations by Gauss-Seidel method
 $8x_1 + x_2 - x_3 = 8$, $2x_1 + x_2 + 9x_3 = 12$, $x_1 - 7x_2 + 2x_3 = -4$ [5+5]

10. Find $y(0.1)$ and $y(0.2)$ using 4th order Runge - Kutta method given that $y' = xy + y^2$, $y(0) = 1$. [10]

OR

11. Solve the equation $y' = x + y^2$ subject to the condition $y(0) = 1$ by Picard's method. [10]

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