R16

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 $1/3^{rd}$ and $3/8^{th}$ 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,

$$f(x) = \begin{cases} 2/x^3 \ , \text{ if } 1 < x < \infty \\ 0, \quad \text{other wise} \end{cases} \text{. Find F(x).}$$

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 μ=76 and the variance σ^2= 256. What is the probability that mean of the sample will be between 75 and 78?
b) Assuming that σ = 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 4[th] 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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