Code No: 132AC **R16**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year II Semester Examinations, May/June - 2017
MATHEMATICS-III
(Common to CE, EEE, ME, ECE, CSE, EIE, IT, MCT, MMT, MIE, 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) If the probability density function of a random variable is given by $f(x)=\begin{cases} k(1-x^2), & 0<x<1 \\ 0, & otherwise \end{cases}$, find k. [2]

b) Define geometric distribution and find its mean. [3]

c) State central limit theorem. [2]

d) If $n=100,\ \sigma=5$, find the maximum error with 95% confidence limits. [3]

e) Write about type I error and type II error. [2]

f) State the test statistic for an ANOVA test. [3]

g) Find the Newton-Raphson iterative formula to find the reciprocal of a number $N,\ N>0$. [2]

h) Derive normal equations to fit the straight line $y=ax+b$. [3]

i) In Trapezoidal rule, if the interval of $\int_1^{10} f(x)\,dx$ is divided into 9 equal sub intervals, find *h*. [2]

j) Find the approximate value of $y(0.2)$ for the initial value problem $y'=x+y,\ y(0)=1$ by Euler's method with step size h=0.1. [3]

PART-B

(50 Marks)

2.a) A random variable X has the following distribution:

x:	0	1	2	3	4
P(x):	K	2k	2k	K^2	$5k^2$

Determine i) the distribution function of *X* and ii) variance of *X*.

b) Define moment generating function and state its properties. [5+5]

OR

3.a) Two dice are thrown 5 times. Find the probability of getting 7 as sum i) at least once and ii) exactly two times.

b) Find the mean and standard deviation of a normal distribution in which 7% of items are under 35 and 89% are under 63. [5+5]

4. A population consists of five numbers 3, 6, 9, 15, 27. Consider all possible samples of size 3 that can be drawn without replacement from this population. Find a) the population mean b) the population standard deviation c) the mean of the sampling distribution of means and d) the standard deviation of the sampling distribution of means. [10]

OR

5.a) Define χ^2 - distribution and write its properties.

b) A random sample of size 81 is taken whose variance is 20.25 and mean is 32. Construct 98% confidence interval. [5+5]

6.a) Explain the terms i) one-tailed and ii) two-tailed tests.

b) The sizes and means of two independent random samples are 400, 225; 3.5 and 3.0 respectively. Can we conclude that the samples are drawn from the same population with standard deviation 1.5? [5+5]

OR

7. The following table shows the data obtained for two samples selected at random from two populations that are independent and normally distributed with equal variances.

Sample A	Sample B
15	10
16	9
12	12
9	17
12	15
19	8
17	9

Using one-way ANOVA procedure, test at 5% significance level whether the means of the populations from which these samples are drawn are equal. [10]

8.a) Find a root of the equation $xe^x = 1$ using the method of false position correct to two decimal places.

b) Find the smallest positive root of $x^3 + x - 1 = 0$ by iteration method. [5+5]

OR

9.a) Perform three iterations of Gauss-Jacobi method to solve the system of equations $2x - y = 3, -x + 2y - z = -4, -y + 2z = 3$.

b) Fit the parabola $y = a + bx + cx^2$ to the following data: [5+5]

x:	0	1	2	3	4
y:	1	0	3	10	21

10.a) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ using Simpson's $\frac{3}{8}$ th rule.

b) Use Taylor series method to solve $y' = 2y + 3e^x$, $y(0) = 0$ at $x = 0.1$. Compare with exact solution. [5+5]

OR

11. Explain Picard's method of successive approximations to solve the initial value problem $y' = f(x, y)$, $y(x_0) = y_0$. Hence obtain the solution of $y' = x - y^2$, $y(0) = 1$ and Compute $y(0.1)$ correct to three decimal places. [10]

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