Code No: 132AC

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year II Semester Examinations, April - 2018
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) A continuous Random variable has the p.d.f $f(x) = \begin{bmatrix} K(x^2 - 1), & -1 < x < 3 \\ 0, & \text{else where} \end{bmatrix}$ find K. [2]

b) The mean and variance of a binomial distribution are 2 and 8 / 5. Find n. [3]

c) Define Null hypothesis. [2]

d) What is the maximum error one can expect to make with probability 0.9, when using mean of a random sample of size $n = 64$ to estimate the mean of a population with $\sigma^2 = 2.56$? [3]

e) Define type 1 and type 2 errors. [2]

f) A random sample of 100 apples were taken and out of which 15 were found to be bad. What can we say with 95% confidence about the maximum error of proportions? [3]

g) Find the two values between which the root of $3x - 1 = \cos x$ lies. [2]

h) Write the normal equations to fit $y = a + bx + cx^2$. [3]

i) Write the formula to evaluate $\int\limits_a^b y \, dx$ by Trapezoidal rule. [2]

j) Given that $\dfrac{dy}{dx} = x^2 - y$, $y(0) = 1$. Find $y^{(1)}(x)$ by Picard's method. [3]

PART-B

(50 Marks)

2.a) If rain falls on 12 days in every thirty days. Find the probability that:
i) The rain will fall 3 days   ii) At least one day

b) Given that the mean heights of students in a class is 158 cms with standard deviation of 20 cms. Find how many students heights lie between 150 cms and 170 cms if there are 100 students in the class. [5+5]

OR

3. If X is a continuous random variable whose probability density function is given by

$$f(x) = \begin{cases} \dfrac{1}{2}x^2 e^{-x} & , x > 0 \\ 0 & \end{cases}$$

Find the moment generating function and hence find
   a) Mean   b) variance   c) The 3rd moment of X.   [10]

4. Two independent samples of 8 and 7 times respectively has the following values.

Sample I	11	11	13	11	15	9	12	14
Sample II	9	11	10	13	9	8	10	-

Is the difference between the means of sample significant?   [10]

OR

5. From the following data find whether is any significant liking in the habit of taking soft drinks among the categories of employees.   [10]

Soft drinks	Employee			Total
	Clerks	Teachers	Officers	
Pepsi	10	25	65	100
Thumps up	15	30	65	110
Bovanto	50	60	30	140
Total	75	115	160	350

6. A simple sample of heights of 6400 Englishmen has a mean of 67.85 inches and S.D. 2.56 inches, while a simple sample of heights of 1,600 Australians has a mean of 68.55 inches and a S.D of 2.52 inches. Do the data indicate that Australians are on the average, taller than Englishmen?   [10]

OR

7. The owner of a machine shop must decide which of two snack vending machines to install in his shop. If each machine is tested 250 times, the first machine fails to work 13 times and the second machine fails to work 7 times test at the 0.05 level of significance whether the difference between the corresponding sample proportions is significant.   [10]

8. Solve the system of equations using Gauss Seidal method
   $x + 5y + 2z = 7$, $7x - y + z = 2$, $x + 2y + 5z = 9$ [10]

OR

9.a) Find a root of the equation $f(x) = x + \log x - 2$ using Newton Raphson method.

  b) Obtain an approximate linear least square fit for the data given   [5+5]

x	1	2	3	4	6	8
y	2.4	3.1	3.5	4.2	5	6

10. Find y(0.1) and y(0.2) using Taylor's series method given that $y' = y^2 + x$ and y(0)=1, h = 0.1.   [10]

OR

11. Find y(0.1) and y(0.2) using Runge Kutta fourth order formula given that $\dfrac{dy}{dx} = x + x^2 y$ and y (0) = 1.   [10]

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