(Please write your Exam Roll No.) Exam Roll No. 40818003406

END TERM EXAMINATION

THIRD SEMESTER [B.TECH] NOVEMBER - DECEMBER 2017

Paper Code: ETMA-203 **Subject: Numerical Analysis and Statistical Techniques**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt any five questions including Q no.1 which is compulsory. Select one question from each unit.

Q1 (a) Define a random variable. Give an example for discrete and continuous random variable each. (4)

(b) What do you understand by unbiased estimate of a parameter? Out of sample mean and sample variance, which are unbiased estimate of population parameter? (4)

(c) What do you understand by rate of convergence of Newton-Raphson's method, discuss. (4)

(d) Explain Picard's method to solve differential equations. (3)

UNIT-I

Q2 (a) At a nuclear plant test are performed to check the corrosion inside the pipes. The test has probability 0.7 of detecting corrosion when it is present, but it has a probability 0.2 of falsely indicating internal corrosion. Suppose the probability that any section of pipe has interval corrosion is 0.1. Find the probability that section of pipe has interval corrosion, given that the test is negative. (8)

(b) Define moment generating function and find the moment generating function for Binomial Distribution. (7)

Q3 (a) Suppose that, on average, 1 person in 1000 makes a numerical error in preparing his or her income tax return. If 10,000 returns are selected at random and examined, find the probability that 6 of them contain an error. (8)

(b) Fit a straight line to the data using method of least square (7)

x:	1	2	3	4	6	8
y:	2.4	3.1	3.5	4.2	5.0	6.0

UNIT-II

Q4 (a) Obtain the equation of the line of regression of y on x for the following data; (8)

x:	23	27	28	28	29	30	31	33	35	36
y:	18	20	22	27	21	29	27	29	28	29

(b) A sleep inducing tablet when administered to 50 patient was found to be effective on 37 patient. Test the hypothesis at 5% level of significance that the tablet was effective in at least 80% cases. (7)

Q5 (a) A manufacturer claims that his measuring instrument as a variability measured by S.D. $\sigma=2$. During a test the measurement recorded are 4.1, 5.2 and 10.2. Construct a 90% confidence interval to estimate the true population variance. (8)

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(b) A process of producing synthetic diamonds is viable only if the average weight of the diamond is greater than 0.5 karat. The weight of the six diamond generated are 0.46, 0.61, 0.52, 0.48, 0.57, and 0.54 karat. Test the viability of the process at 5% level of significance. **(7)**

UNIT-III

Q6 (a) Solve the following system of equations by **Gauss-Seidel** method. **(8)**

$20x + y - 2z = 17, \quad 3x + 20y - z = -18, \quad 2x - 3y + 20z = 25$

(b) The area A of a circle of diameter d is given for the following values; **(7)**

d:	80	85	90	95	100
A:	5026	5674	6362	7088	7854

Find approximate values for the areas of the circle diameter 82.

Q7 (a) Find the real root of the equation $\cos x + 1 = 3x$ correct to three decimal places by **Newton-Raphson** method. **(8)**

(b) The following values of the function f(x) for the values of x are given: **(7)** f(1)=4, f(2)=5, f(7)=5, f(8)=4, find the value of f(6).

UNIT-IV

Q8 (a) Find the value of π by evaluating $\int_0^1 \frac{1}{1+x^2} dx$ using **Simpson's one-third rule** in 10 intervals. **(8)**

(b) The function $y = \sin x$ is tabulated in the scheme below. Find the value of $\cos x$ at $x = 1$. **(7)**

x:	0.7	0.8	0.9	1.0	1.1	1.2	1.3
y:	0.644	0.717	0.783	0.841	0.891	0.932	0.964

Q9 (a) Apply ***Euler's modified method*** to find y(0.3) taking step size 0.1 by solving the d.e. **(8)**

$\frac{dy}{dx} = x + 2y, \quad$ given $y(0) = 1.$

(b) Solving the *d.e.* $\frac{dy}{dx} = x + y$, given that y(1)=1, find y(0.2) taking h=0.1, using ***Runge – Kutta fourth order*** method. **(7)**

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