

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Summer 2018 - 19 Examination

Semester: 4
Subject Code: 03191251
Subject Name: Numerical Analysis & Statistical Methods

Date: 08/05/2019
Time: 02:00pm to 4:30pm
Total Marks: 60

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions : (All are compulsory) (Each of one mark) (15)

1. The coefficient of correlation $r =$ _____.
 (a) $\pm \sqrt{b_{yx} + b_{xy}}$ (b) $\pm \sqrt{b_{yx} * b_{xy}}$ (c) $\pm \sqrt{b_{yx} - b_{xy}}$ (d) $b_{yx} * b_{xy}$
2. If $n = 22$; $p = 3/5$, For the binomial distribution mean, μ , is _____.
 (a) $\mu = 13.5$ (b) $\mu = 13.2$ (c) $\mu = 12.7$ (d) $\mu = 13.9$
3. The Mean and Variance of Poisson distribution is _____.
 (a) Same (b) Distinct (c) Zero (d) None of these
4. Which of the following is also called an Interval Halving method?
 (a) Bisection method (b) Secant method (c) Regula-Falsi method (d) Newton-Raphson method
5. Newton's first divided difference $[x_0, x_1] =$ _____.
 (a) $y_1 - y_0$ (b) $\frac{y_1 - y_0}{x_0 - x_1}$ (c) $\frac{y_1 - y_0}{x_1 - x_0}$ (d) none of these
6. The arithmetic mean is 12 and the number of observations is 20 then the sum of all the values are _____.
7. If A and B are two independent events and $P(A) = \frac{1}{3}$, $P(B) = \frac{3}{5}$ then $P(A \cap B) =$ _____.
8. What is the probability of an impossible event?
9. Write down the sample space for a family which is selected at random from a group of families having two children.
10. The Normal distribution is a _____ shaped curve.
11. The convergence rate of Secant method is _____.
12. The value of $(1 + \Delta)(1 - \nabla) =$ _____.
13. In Newton's backward interpolation formula value of $p =$ _____.
14. In Simpson's $1/3^{\text{rd}}$ rule, the number of intervals (n) should be multiple of _____.
15. In Euler's method, Formula for $y_{n+1} =$ _____.

Q.2 Answer the following questions: (Attempt any three) (15)

A) Determine the two Regression coefficients b_{xy} and b_{yx} for the following data:

X	2	5	6	3	4
Y	9	6	8	5	4

B) By the method of Least Squares, find the straight line that best fits the following data:

X	0	1	2	3	4
Y	1	1.8	3.3	4.5	6.3

C) Apply Runge – Kutta fourth order method, to find an approximate value of y when $x = 0.2$ given

that $\frac{dy}{dx} = x + y$, $y(0) = 1$. Take $h=0.2$

- D) Find the solution to the following system of equations up to 4 iterations using the Gauss-Seidel method.

$$12x_1 + 3x_2 - 5x_3 = 1$$

$$x_1 + 5x_2 + 3x_3 = 28$$

$$3x_1 + 7x_2 + 13x_3 = 76 \quad ; \text{ Use } x_1 = 1, x_2 = 0 \text{ and } x_3 = 1 \text{ as the initial guess.}$$

- Q.3A) (i) Find Standard Deviation of 2,4,5,6,8,17. (03)

- (ii) Find the median of the following: (04)

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70
f_i	4	8	12	20	24	15	7

- B) (i) 100 electric bulbs are found to be defective in a lot of 5000 bulbs. Find the probability that at the most 3 bulbs are defective in a box of 100 bulbs. (04)

- (ii) In a school, 300 students out of 1200 students have spectacles. Five students are selected at random from the school, find the probability that 2 students out of them have spectacles. (04)

OR

- B) (i) If $P(A) = \frac{1}{3}, P(B') = \frac{1}{4}$ and $P(A \cap B) = \frac{1}{6}$, find $P(A \cup B), P(A' \cap B')$ and $P(\frac{A'}{B})$. (04)

- (ii) A card is drawn from a pack of well-shuffled cards. Find the probability of the following events: (04)

- (a) The card drawn is a spade. (b) The card drawn is a king.
 (c) The card drawn is a face card. (d) The card drawn is not a club.

- Q.4A) (i) Find a root of the equation $x^3 - x - 11 = 0$, using the bisection method up to 3rd iteration. (03)

- (ii) Find the root of the equation $\sin x = e^{-x}$ using Newton-Raphson method, correct up to 2 decimal places. Start with $x_0 = 0.6$ (04)

OR

- A) (i) The velocity v of a particle at distance s from a point on its linear path is given by following table: (03)

s(m):	0	2.5	5	7.5	10	12.5	15	17.5	20
v(m/s):	16	19	21	22	20	17	13	11	9

Estimate a time taken by a particle to travel the distance of 20 meters, using Trapezoidal rule.

- (ii) Evaluate $\int_{-1}^1 \frac{dx}{1+x^2}$ by one-point, two-point Gaussian Quadrature formulae. (04)

- B) (i) Using Newton's forward interpolation formula evaluate $f(5)$ for the following data: (04)

x	4	6	8	10
y	1	3	8	16

- (ii) Find $f(3)$ by using Lagrange's formula for the following data: (04)

x:	0	1	2	5
f(x):	2	3	12	147