

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Winter 2021 – 22 Examination

Semester: 4**Subject Code: 203191251****Subject Name: Probability, Statistics and Numerical method****Date: 28-10-2021****Time: 10:30 am to 01:00 pm****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 - (Fill in the blanks, one word answer, MCQ-not more than Five in case of MCQ) (All are compulsory) (Each of one mark) (15)

1. A bag contains 10 red balls and 7 blue balls. A ball is drawn at random. The probability that ball drawn is not red is _____
2. Three Point Gaussian quadrature formula is exact for polynomials up to degree _____
3. $\Delta \nabla =$ _____
4. Relation between Shifting Operator and Newton's Forward difference operator is _____
5. The n^{th} difference of a polynomial of degree n is _____
6. Runge-Kutta method of second order is the _____ method
 - a) Euler method
 - b) Modified Euler method
 - c) Taylor's method
 - d) None of these
7. While evaluating the definite integral by Trapezoidal rule, the accuracy can be increased by taking _____
 - a) Large number of sub-intervals
 - b) Even number of sub-intervals
 - c) $h=4$
 - d) has a multiple of 3
8. The probability of an event cannot be
 - a) 1
 - b) 0.5
 - c) 0.3
 - d) -0.5
9. The two lines of regression become identical when:
 - a. $r=1$
 - b. $r=-1$
 - c. $r=0$
 - d. a or b
10. Which of the following is not true statement about Binomial probability distribution.
 - a. Each outcome is independent of each other.
 - b. Each outcome can be classified as either success or failure.
 - c. The probability of success must be constant from trial to trial.
 - d. The random variable of interest is continuous.

11. Given $x = 1 \ 2 \ 3$, $f(x) = 3 \ 8 \ 15$, then $\Delta^2 f(1) =$ _____.

12. Define Mutually Exclusive events with example.

13. Define Interpolation.

14. Write down name of a Numerical method to solve Ordinary Differential Equation.

15. Define Conditional Probability.

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

(15)

Solve the following system of linear equations by Gauss Jacobi method, correct up to 3 decimal places

$$27x + 6y - z = 85$$

$$x + y + 54z = 110$$

$$6x + 15y + 2z = 72$$

B) The sale and expenditure of 10 companies are given below. Find the coefficient of correlation between sale and expenditure.

Sale	50	55	55	60	65	65	65	60	60	50
Expenditure	11	13	14	16	16	15	15	14	13	13

(C) $\sin 45^\circ = 0.7071$, $\sin 50^\circ = 0.7660$, $\sin 55^\circ = 0.8192$, $\sin 60^\circ = 0.8660$. Find $\sin 52^\circ$ using Newton's forward formula.

D) The following information is about the heights of students of two colleges

	College A	College B
Mean height (in inches)	67.42	67.25
S.D. (in inches)	2.58	2.50
Sample size	1000	1200

Is the difference in mean is significant? (At 5% level of significance, $z = 1.96$)

Q.3

A) Derive the iterative formula for $\sqrt[k]{N}$, where N is a positive number and evaluate $\sqrt[3]{58}$ correct up to three decimal places.

(07)

(B)

(08)

(i) Using three point Gaussian Quadrature formula evaluate $\int_2^4 (1 + x^4) dx$.

(ii) The following table shows the ages(X) and blood pressure(Y) of 8 persons.

X	52	63	45	36	72	65	47	25
Y	62	53	51	25	79	43	60	33

Obtain the regression Y on X. Find the expected blood pressure of a person who is 49 years old.

OR

B) A factory production line is manufacturing bolts using 3 machines A, B and C. Of the total output, machines A is responsible for 25%, machines B is responsible for 35% and machines C is responsible for the rest. It is known from the previous experience with the machines that 5% of the output from machine A is defective, 4% from machine B and 2% from machine C. Bolt is chosen at random from the production line and found to be defective. What is the probability that it came from (i) machine A, (ii) machine B and (iii) machine C.

(08)

Q.4**(07)**

A) In a large city A, 20% of a random sample of 900 school boys had defective eye-sight. In another large city B, 15.5% of a random sample of 1600 school boys had the same defect. Is the difference between two proportions significant? (At 5% level of significance , $z = 1.96$)

OR

A) Evaluate $y(0.1)$ correct to four decimal places using Taylor's Series Methods If

(07)

$$\frac{dy}{dx} = x^2y - 1$$
$$, y(0) = 1$$

B) (i) In some determinations of the value v of carbon dioxide dissolved in a given volume of water at different temperatures θ , the following pairs of values were obtained:

(08)

θ	0	5	10	15
V	1.8	1.45	1.18	1.00

Obtain by the method of least squares, a relation of the form $v = a + b\theta$ which best fits to these observations.

(ii) The mean and variance of a Binomial distribution are 15 and 6 respectively. Find the values of n and p .