PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech/Int. Btech Summer 2022 - 23 Examination

Semester: 4/8   Date: 29/03/2023
Subject Code: 203191254   Time: 02:00 pm to 04:30 pm
Subject Name: Probability, Statistics and Numerical Methods   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. Binomial distribution tends to which distribution, when number of trials n is very large, p and q are not very small.
   (a) Normal distribution   (b) Poisson distribution
   (c) Binomial distribution   (d) Discrete probability distribution

2. The mean of Poisson distribution is 1.44 and it's S.D. = _____
   (a) 2.88   (c) 1.2
   (b) 14.4   (d) 1.22

3. The mean of binomial distribution is 8 and probability of success is 0.5 then n=_____.
   (a) 4   (c) 8
   (b) 16   (d) 2

4. When a dice is thrown, A and B are the events of getting odd numbers and even numbers respectively then, $P(A \cap B) =$ _____
   (a) 1   (c) 0
   (b) 0. 5   (d) 0.8

5. Match the following:
   A)Newton-Raphson method   1)Evaluating Integration
   B)Runge – Kutta method   2)Finding the root of transcendental
                                                  equation
   C)Gauss – Seidel method   3)Ordinary Differential Equations
   D)Simson's Rule   4)Solution of System of Linear Equations
   (a) A - 2, B - 3, C - 4, D - 1   (b) A - 3, B - 2, C - 1, D - 4
   (c) A - 1, B - 4, C - 2, D - 3   (d) None of These

6. The range of correlation coefficient is _____.
   (a) $(-1,1)$ (c) $[0,1]$
   (b) $(-\infty, \infty$ (d)$[-1,1]$

7. Newton's first divided difference $[x_0, x_1] =$ _____ .

   (a) $y_1 - y_2$ (b) $\dfrac{y_1 - y_0}{x_0 - x_1}$

   (c) $\dfrac{y_1 - y_0}{x_1 - x_0}$ (d) None of these

8. $P(B) = \frac{2}{3}$, $P(A \cap \bar{B}) = \frac{1}{6}$ and $P(A \cap B) = \frac{1}{3}$ then $P(A)=$ _____

9. The probability that a student A solves a mathematics problem is $\frac{2}{5}$ and the probability that a student B solves it is $\frac{2}{3}$. The probability that the problem is solved = _____

10. For a Poisson variate $P(x=3)=P(x=4)$, find mean and variance.

11. If A and B are mutually exclusive events, then $P(A \cap B) = 0$. (True/False)

12. If both the regression coefficients are positive, then the correlation coefficient is negative. (True/False)

13. $P(A \cup B \cup C)=$………………

14. Write the formula of Simpson's one – third rule to evaluate the integration.

15. $V(ax+b) = $ _____

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

A. Find the Lagrange interpolating polynomial for the following data:

x	0	1	4	5
$y = f(x)$	1	3	24	39

B. The following mistakes per Page observed in a book. Fit a Poisson distribution.

No. of mistakes per page	0	1	2	3	4
No. of pages	211	90	19	5	0

C. Find the Coefficient of rank correlation of the following data:

x	35	40	42	43	40	53	54	49	41	55
y	102	101	97	98	38	101	97	92	95	95

D.
Evaluate $\int_{0}^{3} \dfrac{1}{1+x} dx$, with $n = 6$ using Simpson's 3/8 rule.

Q.3 **A.** **Do as directed:**

1. There are 5 red and 7 black balls in a bag. Two balls are drawn at random one after the other. **(04)** If they are drawn (i) with replacement (ii) without replacement, find the probability that both the balls are red.

2. A card is drawn from a well-shuffled pack of cards. What is the probability that it is either a **(03)** spade or an ace?

B. Fit a second order polynomial $y = a + bx + cx^2$ to following data, using least square method. **(08)**

x_i	0	5	10	15	20
y_i	7	11	16	20	26

OR

B. **Do as directed:** **(04)**

1. A sample of 400 students has a mean height of 171.38 cms. Can it be reasonably regarded as a random sample from a large population with mean height 171.17 and standard deviation 3.3 cm? (5% level of significance.=1.96)

2. A random sample of size 20 from a normal population has mean 42 and standard deviation of **(04)** 5. Test the hypothesis that the population mean is 45. Use 5% level of significance. ($t_{0.05} = 2.09$)

Q.4 **A.** **Answer the following questions:**

1. Given that $y = 1.3$ when $x = 1$ for the differential equation $\dfrac{dy}{dx} = 3x + y$. Use the second order **(4)** R-K method to find the approximate value of y when $x = 1.2$. Use a step size of 0.1.

(3)

2. If an unbiased dice is rolled. Find the probability of getting: (i) Even Number (ii) A perfect square (iii) A number divisible by 3.

OR

A. The result in the last exam of a sample of 100 students is given below: **(07)**

	1st class	2nd class	3rd class	Total
Boys	10	28	12	50
Girls	20	22	8	50
Total	30	50	20	100

Can it be said that the performance in the exam depends upon gender

(On 2 d.f. and at 5% significance level, table value of $\chi^2 = 5.99$)

B. Find a positive root of $x^3 - 4x + 1 = 0$ correct up to three decimal places, using Bisection **(08)** method (Perform eight steps only)