4th

Exam Seat No : .....

KADI SARVA VISHWAVIDYALAYA
B.E 4th SEM(CE/IT/CSE) EXAMINATION (October 2023)
SUBJECT: Probability, Statistics and Numerical Methods (Code: CC402B-N)

Date: 25/10/2023 Time: 3 hour Marks: 70

Instruction:
1. Answer each section in separate Answer Sheet.
2. Use of scientific Calculator is permitted
3. All questions are compulsory.
4. Indicate **clearly**,the option you attempted along with its respective question number.
5. Use the last page of main supplementary for rough work.

Section:1

Q.1 (a) In how many ways can a party of 7 persons arrange themselves **[05]**

(i) in a row of 7 chairs?

(ii) around a circular table?

(b) Compute cosh(0.56) using Newton's forward difference formula from following data. **[05]**

x	0.5	0.6	0.7	0.8
y	1.127626	1.185465	1.255169	1.337435

(c) Suppose that X is a continuous random variable whose probability density function is given by $f(x) = \begin{cases} Cx^2 & , -1 < x < 1 \\ 0 & , \text{Otherwise} \end{cases}$ **[05]**

(i) Find the constant C? (ii) Find $P\{X \geq 1\}$.

OR

(c) Use Gauss's forward interpolation formula to find y(3.3) from the following data. **[05]**

x	1	2	3	4	5
$y = f(x)$	15.3	15.1	15	14.5	14

Q.2 (a) Using Stirling's interpolation formula, to compute $y(35)$ from the following data. **[05]**

x	20	30	40	50
$y(x)$	512	439	346	243

(b) A die is tossed 3 times. What is the probability using Binomial Distribution **[05]**

(i) No fives turning up? (iii) 3 fives?

(ii) 1 five?

OR

Q.2 (a) Using Newton divide difference formula, calculate the value of $f(6)$ from the following data. **[05]**

x	1	2	7	8
$y = f(x)$	1	5	5	4

(b) Write Baye's Theorem and Three urns contain 6 green, 4 black; 4 green, 6 black and 5 green, 5 black balls respectively. Randomly selected an urn and a ball is drawn from it. If the ball drawn is Green then find the probability that it is drawn from the first urn. **[05]**

Q.3 (a) Find the real root of $f(x) = x^3 + x - 1$, using Newton-Raphson method correct upto six decimal places. **[05]**

(b) You arrive at a bus stop at 10 o'clock, knowing that the bus will arrive at some time uniformly distributed between 10 and 10:30. **[05]**

(i) What is the probability that you will have to wait longer than 10 minutes?

(ii) If at 10:15 the bus has not yet arrived, what is the probability that you will have to what at least an additional 10 minutes?

OR

Q.3 (a) Find the positive root of $x - \cos x = 0$ correct upto three decimal places by bisection method. **[05]**

(b) Evaluate $\int_0^6 \frac{1}{1+x}\,dx$ by simpson's $\frac{1}{3}$ with $h = 1$. **[05]**

Section:2

Q.4 (a) A committee of 3 persons is to be constituted from a group of 2 men and 3 women. **[05]**

(i) In how many ways can this be done?

(ii) How many of these committees would consist of 1 man and 2 women?

(b) Find the root of $x log_{10}(x) - 1.9 = 0$, correct upto three decimal places with $x_0 = 3$ and $x_1 = 4$, Using Secant Method. **[05]**

(c) Three light bulbs are chosen at random from 15 bulbs of which 5 are defective. Find the probability that **[05]**

(i) none is defective (ii) exactly one is defective (iii) at least one is defective

OR

(c) Evaluate $\int_0^1 \frac{1}{1+x^2}\,dx$ by Trepezoidal rule with $h = 0.2$ **[05]**

Q.5 (a) Determine the interpolating polynomial of degree three using Lagrange's interpolation for the following table. **[05]**

x	-1	0	1	3
$y = f(x)$	2	1	0	-1

(b) State Simpson's 3/8 rule and evaluate $\int_4^{5.2} log(x)\,dx$ with h=0.2. **[05]**

OR

Q.5 (a) Solve the following linear equation by Gauss-seidel method. **[05]**

$$10x + y + z = 12$$
$$2x + 10y + z = 13$$
$$2x + 2y + 10z = 14$$

(b) A (blindfolded) marksman finds that on the average he hits the target 4 times out of 5. If he fires 4 shots, what is the probability(Use Binomial Distribution) of [05]

(i) more than 2 hits?

(ii) at least 3 misses?

Q.6 (a) Write definition of conditional probability. A lot of 100 keyboard contain 20 that are defective. Two keyboards are selected at random, without replacement, from the lot. [05]

(i) What is the probability that the first one selected is defective?

(ii) What is the probability that the second one selected is defective given that the first one was defective?

(iii) What is the probability that both are defective?

(b) Find the coefficient of correlation between the Intelligence Ratio(I.R.) and Emotional Ratio(E.R)from the following data. [05]

Student	1	2	3	4	5	6	7	8	9	10
I.R	105	104	102	101	100	99	98	96	93	92
E.R.	101	103	100	98	95	96	104	92	97	94

OR

Q.6 (a) Evaluate $\int_0^1 e^{-x^2}\,dx$ by the Trapezoidal rule with $h = 0.1$. [05]

(b) A die is tossed thrice. Getting 1 or 6 on a toss is a success. Find the mean or expectation and variance of the number of successes. [05]

Exam Seat no. .....

KADI SARVA VISHWAVIDHYALAYA,

Gandhinagar

BE Semester–IV (May 2023)

Probability, Statistics and Numerical Methods (CC402B-N)

Max Marks: 70 Date- 08/05/2023 **Duration: 3 hr.**

Instruction: 1) Answer each section in separate Answer sheet.
2) Use of Scientific calculator is permitted.
3) All questions are compulsory.
4) Indicate clearly, the options you attempt along with its respective question number.
5) Use the last page of main supplementary for rough work.

Section I

Q.1 (i) Three light bulbs are chosen at random from 15 bulbs of which 5 are defective. Find the probability that (a) none is defective (b) exactly one is defective (c) exactly two is defective (d) at least one is defective (e) all are defective. [5]

(ii) From the following data, find f(35) by Newton Gregory Forward difference formula [5]

x:	20	30	40	50
f(x):	512	439	346	243

(iii) Find the approximate root of $x=e^{-x}$, using Regula Falsi method correct upto three decimal places. [5]

OR

(iii) The probabilities of X, Y and Z becoming managers are 4/9, 2/9 and 1/3 respectively. The probabilities that the Bonus Scheme will be introduced if X, Y and Z becomes managers are 3/10, 1/2 and 4/5 respectively. What is the probability that the manager appointed was X if the Bonus Scheme has been introduced. [5]

Q.2 (i) In an examination, the probability of A passing in physics is 2/3 and the probability of passing in both physics and English is 14/45. The probability that he passes atleast one of these subjects is 4/5. Find the probability that he passes the English subject? [5]

(ii) A problem of design is given to three architects whose chances of designing are 1/4, 1/2 and 3/4 respectively. Find the probability that the design problem will be solved if all of them try independently? [5]

OR

(i) Find f(5) by Lagrange's interpolation formula for f(1)=2, f(2)=4, f(3)=8, f(4)=16, f(7)=128. [5]

(ii) Evaluate $\int_0^1 \frac{1}{1+x^2} dx$ by using Simpson's 3/8 rule taking h=1/6. [5]

Q.3 (i) 4 coins are tossed simultaneously. Using Binomial distribution, What is the probability of getting (a) atleast 2 heads (b) atmost two heads. [5]

(ii) The probability distribution of a random variable X is given below. [5]

X:	-2	-1	0	1	2
P(X=x):	0.2	0.1	0.3	0.3	0.1

Find

(a) E(X) (b) Var(X) (c) E(2X-3) (d) Var(2X-3) (e) Standard deviation (X)

OR

(i) Using Newton's backward difference interpolation Formula, find the population for the year 1925 of a town. The population is as given below: [5]

Year :	1891	1901	1911	1921	1931
Population : (thousands)	46	66	81	93	101

(ii) Evaluate $\int_4^{5.2} y\,dx$ by using Simpson's 1/3 rule taking n=6 for following data: [5]

x:	4.0	4.2	4.4	4.6	4.8	5.0	5.2
y:	1.3863	1.4351	1.4816	1.5261	1.5686	1.6049	1.6487

Section II

Q.4 (i) Find the positive root of $x^3-4x-9=0$ correct upto three decimal places by Bisection method. [5]

(ii) Find the root of the equation $x=\cos(x)$ using Newton-Raphson method correct to 4 decimal places taking $x_0=0.5$ as initial root. [5]

(iii) A random variable X has the probability mass function given by [5]

x	0	1	2	3	4	5	6	7
P(X=x)	a	4a	3a	7a	8a	10a	6a	9a

Find (i) find the value of a (ii) P(X<3)

OR

(iii) In a certain cafeteria, 25% of the customer ordered Tea, 15% of the customer ordered Coffee and 10% of the customer ordered both Tea and Coffee. A customer is selected at random. [5]

(a) If he ordered coffee, what is the probability that he ordered Tea?

(b) If he ordered Tea, what is the probability that he ordered coffee?

(c) What is the probability that he ordered coffee or Tea?

Q.5 (i) If the probability of a bad reaction from a certain injection is 0.001, Using Poisson distribution, determine the chance that out of 2000 individuals, more than two will get bad reaction. [5]

(ii) Apply Gauss Seidel iteration method to solve the following system of equations: $10x_1+x_2+x_3=12$, $2x_1+10x_2+x_3=13$, $2x_1+2x_2+10x_3=14$. [5]

OR

(i) Calculate the Spearman's rank correlation coefficient for the following data. [5]

x:	1	3	7	5	4	6	2	10	9	8
y:	3	1	4	5	6	9	7	8	10	2

(ii) Suppose the temperature T during June is normally distributed with mean 68^o and standard deviation 6^o. Find the probability p that the temperature is between 70^o and 80^o. (Use $P(0 \le T^* \le 2) = .4772$, $P(0 \le T^* \le .33) = .1293$ where T^* is standard normal variate) [5]

Q.6 (i) Calculate the correlation coefficient between x and y using the following data: [5]

x:	2	4	5	6	8	11
y:	18	12	10	8	7	5

(ii) Subway trains on a certain line run every half hour between mid-night and six in the morning. Using uniform distribution, find the probability that a man entering the station at a random time during this period will have to wait atleast twenty minutes. [5]

OR

(i) Using the Gauss's forward Interpolation formula to get $f(32)$ for following data [5]

x:	25	30	35	40
f(x):	0.2707	0.3027	0.3386	0.3794

(ii) Find the constant k such that the function [5]

$$f(x) = \begin{cases} kx^2 & 0 < x < 3 \\ 0 & \text{otherwise} \end{cases}$$

is a probability density function and compute $P(1< x <2)$.

BEST OF LUCK

Exam Seat no. .....

KADI SARVA VISHWAVIDHYALAYA,

B.E. SEMESTER–IV EXAMINATION (October 2022)

Subject Code: CC402 B-N **Subject: Probability, Statistics and Numerical Methods**
Date: 3/11/2022 **Duration: 3 hours** **Total Marks: 70**

Instruction: 1) Answer each section in separate Answer sheet.
2) Use of Scientific calculator is permitted.
3) All questions are **compulsory**.
4) Indicate **clearly**. the options you attempt along with its respective question number.
5) Use the last page of main supplementary for **rough work**.
6) Make necessary assumption when value is not mention

Section I

Q.1 A) Do as directed **[05]**

1) How many 3-digit numbers can be formed from the digits 2, 3, 5, 6, 7 and 9, which are divisible by 5 and none of the digits is repeated?
2) In how many ways a committee, consisting of 5 men and 6 women can be formed from 8 men and 10 women?
3) A box contains 2 white balls, 3 black balls and 4 red balls. In how many ways can 3 balls be drawn from the box, if at least one black ball is to be included in the draw?
4) How many 4-letters words with or without meaning, can be formed out of the letters of the word, 'LOGARITHMS', if repetition of letters is not allowed?
5) In how many different ways can the letters of the word 'OPTICAL' be arranged so that the vowels always come together?

B) Find a root of the equation $x^3 - x - 11 = 0$ using the bisection method up to fourth approximation. **[05]**

C) Let a card be selected at random from an ordinary deck of 52 cards. Let A = the card is spade and B = the card is face card, that is a jack, queen or king, What is P(A),P(B) and P(A∩B) ? **[05]**

OR

C) Three boxes A, B and C, contain red and black balls. Box A contains 2 red and 3 black balls, box B contains 1 red and 4 black balls, and box C contains 3 red balls and 1 black ball. We choose randomly a box, and from this box we choose randomly one of the balls. Assume that the drawn ball is red. Find the probability that the ball comes from box A. **[05]**

Q.2 A) A tray of electronics components contains nine good components and three defective components. If two components are selected at random, what is the expected no of defective components? [05]

B) Using Newton – Raphson method find an iterative formula to find $\sqrt{N}$ and hence find $\sqrt{10}$. [05]

OR

Q.2 A) On an average Friday, a waitress gets no tip from 5 customers. Find the probability that, she will get no tip from 7 customers this Friday. [05]

B) Find the value of $f(0.56)$ using Newton's forward interpolation formula. [05]

x	0.5	0.6	0.7	0.8
f(x)	1.127626	1.185465	1.255169	1.337435

Q.3 A) A problem in Statistics is given to three students A, B and C whose chances of solving it are 1/2, 3/4 and 1/4 respectively. What is the probability that the problem will be solved if all of them try independently? [05]

B) Find the value of y when x=10 using Lagrange's interpolation formula. [05]

X	5	6	9	11
y	12	13	14	16

OR

Q.3 A) A manufacturer of metal pistons finds that on the average, 12% of his pistons are rejected because they are either oversize or undersize. What is the probability that a batch of 10 pistons will contain [05]
(a) No more than 2 reject? (b) At least 2 rejects?

B) Using Gauss's backward interpolation formula, find the population of the year 1986 for following data. (Population is in thousands). [05]

Year	1961	1971	1981	1991	2001	2011
Population	14	17	32	43	60	95

Section II

Q.4 A) Buses arrive at a specified stop at 15-minute intervals starting at 7 A.M. That is, they arrive at 7, 7:15, 7:30, 7:45, and so on. If a passenger arrives at the stop at a time that is uniformly distributed between 7 and 7:30, find the probability that he waits (a) less than 5 minutes for a bus (b) more than 10 minutes for a bus. [05]

B) Using Stirling's interpolation formula, to compute y(35) from the following data. [05]

x	20	30	40	50
y	512	439	346	243

C) Two judges in a beauty contest rank the 12 contestants as follows [05]

X	1	2	3	4	5	6	7	8	9	10	11	12
y	12	19	6	10	3	5	4	7	8	2	11	1

What degree of agreement is there between the judges? Using Spearman's rank Correlation Method.

OR

C) Following tables gives the data on rainfall and discharge in a certain river. Obtain the line of regression of y on x. [05]

Rainfall(inches)	1.53	1.78	2.60	2.95	3.42
Discharge(1000 cc)	33.5	36.5	40	45.8	53.5

Q.5 A) Evaluate $\int_0^1 \frac{1}{1+x^2} dx$ using trapezoidal rule with h = 0.2 [05]

B) Hospital records show that of patients suffering from a certain disease, 75% die of it. What is the probability that of 6 randomly selected patients, 4 will recover? [05]

OR

Q.5 A) Consider the experiment of throwing a fair die. Let X be the random variable which assigns 1 if the number that appears is even and 0 if the number that appears is odd (a) What is the range of X? (b) Find P(X = 1) and P(X = 0). [05]

B) Using Newton's divided difference table, compute the value of f(9.2). [05]

x	8.0	9.0	9.5	11.0
y	2.079442	2.197275	2.251292	2.397895

Q.6 A) Solve the following system of equations by Gauss-Jacobi Method. [05]

$10x + y + z = 6$
$x + 10y + z = 6$
$x + y + 10z = 6$

B) Three light bulbs are chosen at random from 15 bulbs of which 5 are defective. Find the probability that [05]
(a) none is defective, (b) exactly one is defective, (c) at least one is defective

OR

Q.6 A) The average speed of a car is 65 kmph with a standard deviation of 4. Find the probability that the speed is less than 60 kmph. [05]

B) Evaluate $\int_0^6 \frac{1}{1+x}\, dx$ by taking h = 1 using Simpson's 1/3 rule. [05]

BEST OF LUCK

Exam Seat no. .....

KADI SARVA VISHWAVIDHYALAYA,

Gandhinagar

BE Semester–IV (June 2022)

Probability, Statistics and Numerical Methods (CC402B-N)

Max Marks: 70 **Duration: 3 hr.**

Instruction: 1) Answer each section in separate Answer sheet.
2) Use of Scientific calculator is permitted.
3) All questions are **compulsory**.
4) Indicate **clearly**, the options you attempt along with its respective question number.
5) Use the last page of main supplementary for **rough work**.
6) Use of table for area under the standard normal curve is permitted.

Section I

Q.1 (i) In an examination, the probability of *A* passing in physics is 2/3 and that of mathematics is 4/9. If the probability of passing both courses is 2/5, find the probability of *A* [5]
(i) passing atleast one of the courses (ii) passing none of the courses.

(ii) From the following data, find the number of person earning weekly wages between 10 and 15 rupees. [5]

Wages in Rs:	0- 10	10-20	20-30	30-40
No. of person :	9	30	35	42

(iii) Find the approximate root of $xe^x-1 = 0$, correct upto three decimal places using Secant Method by taking $x_0=0$ and $x_1=1$. [5]

OR

(iii) Using the Gauss's forward interpolation formula to get $f(32)$ for the following data: [5]

x:	25	30	35	40
$f(x)$:	0.2707	0.3027	0.3386	0.3794

Q.2 (i) A factory production line is manufacturing bolts using three machines, A, B and C. Of the total output, machine A is responsible for 25%, machine B for 35% and machine C for the rest. It is known from previous experience with the machines that 5% of the output from machine A is defective, 4% from machine B and 2% from machine C. A bolt is chosen at random from the production line and found to be defective. What is the probability that it came from (a) machine A (b) machine B (c) machine C? [5]

(ii) Let X be a random variable with PDF given by $f(x) = \begin{cases} cx^2, & |x| \leq 1 \\ 0, & \text{otherwise} \end{cases}$. Find [5]

(a) the constant c (b) E(X) (c) Var (X) (d) $P(X \geq \frac{1}{2})$ (e) The $F_X(x)$ (CDF of X)

OR

(i) Buses arrive at a specified stop at 15-minute intervals starting at 7 A.M. That is, they arrive at 7, 7:15, 7:30, 7:45, and so on. If a passenger arrives at the stop at a time that is uniformly distributed between 7 and 7:30, find the probability that he waits : [5]
(a) less than 5.minutes for a bus
(b) more than 10 minutes for a bus.

(ii) With the usual notations, find p for a binomial variate X, if n=6 and $9P(X=4)=P(X=2)$. [5]

Q.3 (i) The probability that a man will live 10 more years is 3/7, and the probability that his wife will live 10 more years is 5/13. Find the probability that [5]
(a) Both will be alive in 10 years (b) none will be alive in 10 years,
(c) only wife will be alive in 10 years. (d) Only one will be alive in 10 years
(e) at least one will be alive in 10 years.

(ii) Using Newton's backward difference interpolation Formula, find the population of a town for the year 1925: [5]

Year:	1891	1901	1911	1921	1931
Population: (in thousands)	46	66	81	93	101

OR

(i) Evaluate $\int_0^6 \frac{1}{1+x^2} dx$, by using Weddle's rule for n=6. [5]

(ii) Ten participants in a contest are ranked by two judges as follows: [5]

x:	1	3	7	5	4	6	2	10	9	8
y:	3	1	4	5	6	9	7	8	10	2

Calculate the Spearman's rank correlation coefficient.

Section II

Q.4 (i) A problem in Statistics is given to three students A, B and C whose chances of solving it are 1/4, 1/2, and 3/4 respectively. What is the probability that the problem will be solved if all of them try independently? [5]

(ii) Find the value of f(5) using Lagrange's interpolation formula for the given table: [5]

x:	1	2	3	4	7
f(x):	2	4	8	16	128

(iii) In a certain college, 25% of the students failed mathematics, 15% of the students failed chemistry and 10% of the students failed both mathematics and chemistry. A student is selected at random. [5]

(a) If he failed chemistry, what is the probability that he failed mathematics?

(b) If he failed mathematics, what is the probability that he failed chemistry?

(c) What is the probability that he failed mathematics or chemistry?

OR

(iii) The number of bacterial cells (y) per unit volume in a culture at different hours (x) is given below: [5]

x:	0	1	2	3	4	5	6	7	8	9
y:	43	46	82	98	123	167	199	213	245	272

Find line of regression of y on x .

Q.5 (i) Find the cube root of the equation $x^3-18=0$ assuming 2.5 as initial approximation using Newton-Raphson method correct to 3 decimal places. [5]

(ii) Using the bisection method to obtain the root of the equation $x^3 - 4x - 9 = 0$ correct upto two decimal places. [5]

OR

(i) If the probability of a bad reaction from a certain injection is 0.001, Using Poisson Distribution, determine the chance that out of 2000 individuals (a) none (b) one (c) more than one will get bad reaction. ($e^{-2} = 0.1353$) [5]

(ii) Suppose the heights of H of 800 students are normally distributed with mean 66 inches and standard deviation 5 inches. Find the number N of students with heights greater than or equal to 72 inches. (Use $P(0 \leq H^* \leq 1.2) = .3849$ where H^* is standard normal variable) [5]

Q.6 (i) By Newton's divided difference formula, find the values of f(2) from the following table: [5]

x :	4	5	7	10	11	13
f(x) :	48	100	294	900	1210	2028

(ii) Apply Gauss Seidel iteration method to solve the following system of equations: [5]
$9x_1-2x_2+x_3=50$, $x_1+5x_2-3x_3=18$, $-2x_1+2x_2+7x_3=19$ up to 4^{th} iterations.

OR

(i) Evaluate $\int_4^{5.2} \log_e x \, dx$ by using Simpson's 3/8 rule by taking h=0.2. [5]

(ii) Prove that (i) $(1 + \Delta)(1 - \nabla) = 1$ (ii) $\Delta\nabla = (\Delta - \nabla)$ [5]

BEST OF LUCK