KADI SARVA VISHWAVIDYALAYA

B.E. Semester-IV (CE & IT) EXAMINATION MAY 2014

Subject Code: CC401 **Subject Name : Probability and Numerical method**

Date: 10/5/2014 **Time: 10.30 am to 1.30 pm** **Total Marks : 70**

Instructions:
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 attempted along with its respective question number.
5 Use the last page of main supplementary for rough work

Section-I

Q.1 (a) A chess tournament has 10 competitors, of which 4 are French, 3 are from the United States, 2 are from Great Britain, and 1 is from India. If the tournament result lists just the flag of the player's nation in the order in which they placed, how many outcomes are possible? [5]

(b) How many different letter arrangements can be made from the letters [5]
(i)Fluke
(ii) Propose
(iii) Mississippi
(iv) Arrange

(c) Two dice are thrown. Let E be the event that the Sum of the dice is odd, let F be the event that at least one of the dice lands on 1,and let G be the event that the sum is 5. Describe the event sets EF,E ∪ F, FG, EF^c ,and EFG. [5]

OR

(d) A certain typing agency employs 2 typists. The average number of errors per article is 3 when typed by the first artist and 4.2 when typed by the second. If your article is equally likely to be typed by either typist, approximate the probability that It will have no error? [5]

Q. 2

(a) A laboratory blood test is 95 percent effective in detecting a certain disease when it is, in fact, present. However, the test also yields a "false positive" result for 1 percent of the healthy persons tested.(That is ,if a healthy person is tested, then, with probability 0.01, the test result will imply that he or she has the disease.)If 0.5 percent of The population actually has the disease, what is the probability that a person has the disease given that the test result is positive? [5]

(b) Suppose that A and B are mutually exclusive events for which P(A) = 0.3 and P(B) =0 .5.What is the probability that (a) either A or B occurs? (b) A occurs but B does not? (c) Both A and B occur? [5]

OR

Q.2 (a) An urn contains 6 white and 9 black balls. If 4 balls are to be randomly selected without replacement, what is the probability that the first 2 selected are white and the last 2 black [5]

(b) Suppose that a die is rolled twice. What are the possible values that the following random variables can take on: [5]

(a) the maximum value to appear in the two rolls;
(b) the minimum value to appear in the two rolls;
(c) the sum of the two rolls;
(d) the value of the first roll minus the value of the second roll?

OR

Q-3 (a) A school class of 120 students is driven in 3 buses to a symphonic performance. There are 36 students in one of the buses, 40 in another, and 44 in the third bus. When the buses arrive, one of the 120 students is randomly chosen. Let X denote the number of students on the bus of that randomly chosen student, and find E[X]. [5]

(b) The number of years that a radio functions is an exponentially distributed random variable with parameter $\lambda = 1/8$. If Jones buys a used radio, what is the probability that it will be working after an additional 8years? [5]

OR

Q-3 (a) If X is uniformly distributed over (0, 10), calculate the probability that (i) $X < 3$, (ii) $X > 6$, and (iii) $3 < X < 8$. [5]

(b) A box contains 5 red and 5 blue marbles. Two marbles are withdrawn randomly. If They are of the same color, then you win Rs 110, otherwise you loose Rs 100.Calculate [5]
(i)The expected value of the amount you win.
(ii) The variance of the amount you win

Section-II

Q.4

(a) Find a real root of the equation $2x^3 - 3x + 4 = 0$ correct up to four decimal places using Newton- Raphson method. [5]

(b) Find a real root of the equation $x^4 - x - 10 = 0$ correct up to 3 places of decimal using Bisection method. [5]

c) Solve by Jacobi's Method [5]
4x+y+3z=17
x+5y+z=14
2x-y+8z=12

OR

Solve by Gauss-Seidel's Method [5]
27x+6y-z = 85
6x+15y+2z = 72
x+y+54z = 110

Q-5

(a) Find $f(5.4)$ from the following table [5]

X	5	6	7	8	9	10	11
f(x)	16.25	18.43	19.84	20.70	21.15	21.24	20.98

(b) Find f(9) from the following data [5]

X	5	7	11	13	17
f(x)	150	392	1452	2366	5202

OR

Q-5 (a) Using backward difference formula find t when p=84 from the following data [5]

P	60	70	80	90
T	226	250	276	304

(b) Using lagrange's interpolation formula find the distance travelled by the particle at t=3.5 sec from the table [5]

Sec(t)	0	1	3	4
Ft./sec(v)	21	15	12	10

Q-6 (a) Evaluate $\int_0^3 e^{\sqrt{x}}$ by simpson's $\frac{3}{8}$th rule. Take h=0.25. [5]

(b) Find the root of the equation $cosx - 3x + 1 = 0$ correct to three decimal positions using false position method. [5]

OR

Q-6 (a) Compute the value of the definite integral $\int_{0.2}^{1.4}(sinx - \log_e x + e^x)dx$ by [5]

1) Trapezoidal Rule
2) Simpson's $\frac{1}{3}$th rule

(b) Find an iterative formula for $\sqrt{N}$ where N is positive number and hence find the value of$\sqrt{5}$. [5]

KADI SARVA VISHWAVIDYALAYA

B.E. Semester-IV (CE & IT) EXAMINATION MAY 2014

Subject Code: CC401B **Subject Name : Probability and Numerical method**
Date: 1/11/2014 **Time: 10.30 am to 1.30 pm** **Total Marks : 70**

Instructions:
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 attempted along with its respective question number.
5 Use the last page of main supplementary for rough work

Section-I

Q.1 (a) A coin is tossed twice. List the sample space. Find the probability that at least one Head occurs if P(H)= 1/2 (unbiased coin)and P(H)= 1/3(biased coin) [5]

(b) How many different letter arrangements can be made from the letters [5]
(i) Pepper
(ii) Madam
(iii) Miscellaneous
(iv) Doddle

(c) If two dice are rolled, what is the probability that the sum of the upturned faces will equal 7 [5]

OR

(d) Explain Exponential Random Variable and calculate its E[X] and VAR[X] [5]

Q. 2

(a) A bin contains 3 different types of disposable flashlights. The probability that a type1 flashlight will give over 100 hours of use is 0.7, with the corresponding probabilities for type2 and type3 flashlights being .4 and .3, respectively. Suppose that 20 percent of the flashlights in the bin are type1, 30 percent are type2, and 50 percent are type3. [5]
1. What is the probability that a randomly chosen flashlight will give more than 100 hours of use?
2. Given that a flashlight lasted over 100 hours, what is the conditional probability that it was a type j flashlight, j = 1,2,3?

(b) Explain De-Morgan theorem [5]

OR

Q.2 (a) A 5-card poker hand is said to be a full house if it consists of 3 cards of the same denomination and 2 other card s of the same denomination (of course, different from The first denomination). Thus, one kind of full house is three of a kind plus a pair. What is the probability that one is dealt a full house? [5]

(b) Suppose that a die is rolled twice. What are the possible values that the following random variables can take on: [5]
(a) the maximum value to appear in the two rolls;
(b) the minimum value to appear in the two rolls;
(c) the sum of the two rolls;

(d) the value of the first roll minus the value of the second roll?

OR

Q-3 (a) It is known that screws produced by a certain company will be defective with probability 0.01, independently of each other. The company sells the screws in packages of 10 and offers a money-back guarantee that at most 1 of the 10 screws is defective. What proportion of packages sold must the company replace? [5]

(b) The number of years that a radio functions is an exponentially distributed random variable with parameter $\lambda = 1/8$. If Jones buys a used radio, what is the probability that it will be working after an additional 8years? [5]

OR

Q-3 (a) Buses arrive at a specified stop at 15-minute intervals startingat7 A.M. That is, they arrive at7, 7:15, 7:30, 7:45, and soon. If a passenger arrives at the stop at a time that [5]
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.

(b) Explain Normal Random Variable in detail [5]

Section-II

Q.4

(a) Find a real root of the equation $x\log_{10} x = 1.2$ correct up to four decimal places using Newton- Raphson method. [5]

(b) Find a real root of the equation $x^3 - 5x + 3 = 0$ correct up to 3 places of decimal using Bisection method. [5]

c) Solve by Jacobi's Method [5]
20x+y-2z = 17
3x+20y-z = -18
2x-3y+20z = 25

OR

Solve by Gauss-Seidel's Method [5]
6x+y+z = 105
4x+8y+3z = 155
5x+4y-10z = 65

Q-5

(a) Find $f(6.4)$ from the following table [5]

X	5	6	7	8	9	10	11
f(x)	16.25	18.43	19.84	20.70	21.15	21.24	20.98

(b) Find f(1) from the following data [5]

X	-4	-1	0	2	5
f(x)	1245	33	5	9	1335

OR

Q-5 (a) Find f(27.5) from the following table by Newton's backward formula [5]

X:	25	26	27	28	29
F(x):	16195	15919	15630	15326	15006

(b) Determine by Langrange's formula the percentage of criminal under 35 years [5]

Age	25	30	40	50
% of no of criminals	52	67.3	84.1	94.4

Q-6 (a) Evaluate $\int_0^4 .e^x\, dx$ by Simpson's $\frac{1}{3}$ rule. [5]

(b) Find the root of the equation $f(x) = x^2 - x - 2 = 0$ in the range $1 < x < 3$, correct to three decimal positions using false position method. [5]

OR

Q-6 (a) Compute the value of the definite integral $\int_{0.2}^{1.4} (sinx - \log_e x + e^x)dx$ by [5]

1) Trapezoidal Rule
2) Simpson's $\frac{1}{3}$ rule

(b) Show that the iterative procedure for evaluating the reciprocal of a number N using Secant Method is [5]

$x_{n+1} = x_n + (1 - Nx_n)x_{n-1}, n = 1,2 ...$

Exam Seat no. ....

KADI SARVA VISHWAVIDHYALAYA,

B.E. SEMESTER–IV EXAMINATION (April 2015)

Subject Code: CC401 B **Subject:Probability and Numerical Methods**

Date: 28/04/2015 **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) In how many ways can the letters of the word ENGINEERING is rearranged?
2) In how many ways can 4 mathematicians and 5 physicists sit around a table so that no two mathematicians are together?
3) In how many ways can a committee of four professors and three students be selected from eight professor and seven students?
4) State Baye's theorem.
5) A card is drawn from a well shuffled deck of 52 cards. Find the probability that the card is face card.

B) Find the probability that a leap year selected at random will contain **[05]**

1) 53 Sundays
2) 53 Mondays and Tuesdays
3) 53 Mondays or Tuesdays.

C) One production company has three units A, B and C, which produce 35%, 40% and 25% respectively of the production. Experience shows that 5% items produced by A are defective, 2% items produced by B and 3%items produced by C are defective. An item selected at random and found defective. Find the probability that it was produced by B. Also find the probability that it was produced by C. **[05]**

OR

C) A and B toss a coin alternately on the understanding that the first to throw a head wins. If A starts game find the probability that A wins the game. **[05]**

Q.2 A) Out of 800 families with 5 children each, how many families would be expected to have 1) Three boys and two girls 2) One girl 3) At the most two girls. (Probabilities for boys and girls are equal). **[05]**

B) Do as directed **[05]**

1) A certain pen making machine produces an average of 2 defective pens out of 100 and pack them in boxes of 200. Find the probability that a box contains 10 defective pens.

2) The probability that a targeted missile hit the target is 0.2. If six missiles are targeted find the probabilities that 1) exactly two will hit the target. 2) At least two will hit the target.

OR

Q.2 A) If X is discrete random variable with mean μ then define variance of X and also prove that $Var(X) = E[X^2] - (E[X])^2$. Also find $Var[X]$, where X is the outcome when we roll a fair die. **[05]**

B) A certain airport receives on an average of 4 aircraft per hour. What is the probability that **[05]**

1) No aircraft lands in a period of 2 hour period.

2) At most two aircraft lands in a period of 3 hour.

Q.3 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 arrive at the stop at a time that is uniformly distributed between 7 and 7:30, find the probability that he waits **[05]**

1) Less than 5 minutes for a bus.

2) More than 10 minutes for a bus.

B) Find E[X] and Var[X] when the density function of continuous random variable X is $f(X) = \begin{cases} 2X & if\, 0 \le X \le 1 \\ 0 & otherwise \end{cases}$ **[05]**

OR

Q.3 A) The mean height of 500 students is 151 cm and the standard deviation is 15 cm. Assuming that the heights are normally distributed, find the number of students whose heights lie between 120 and 155cm. **[05]**

$[P(0 \le Z \le 2.07) = 0.4808, P(0.27 \le Z \le 2.07) = 0.3744]$

B) The time (in hours) required to repair a machine is an **[05]**

exponentially distributed random variable with parameter

$\lambda = \frac{1}{2}$. What is

1) The probability that a repair time exceeds 2 hours.

2) The probability that a repair time is atmost 3 hours.

Section II

Q.4 A) Find the real root of $x^3 - 5x + 3 = 0$ using Secant method correct to four decimal places. **[05]**

B) Find the real root of $xe^x - \cos x = 0$ using bisection method correct up to four decimal points. **[05]**

C) Determine the largest eigen value and the corresponding eigen vector of the matrix $A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$. **[05]**

OR

C) Find the iterative formula for finding $\sqrt{N}$, where N is a positive real number, using Newton- Raphson method. Hence evaluate $\sqrt{27}$. **[05]**

Q.5 A) Given $\sin 45 = 0.7071$, $\sin 50 = 0.7660$, $\sin 55 = 0.8192$, $\sin 60 = 0.8660$. Find $\sin 52$, using Newton's forward interpolation formula. **[05]**

B) Determine $f(x)$as a polynomial in x for the following data **[05]**

x	-4	-1	0	2	5
f(x)	1245	33	5	9	1335

Also find f(1).

OR

Q.5 A) Use Bessel's formula to find y for x=3.75 from the following table **[05]**

x	2.5	3.0	3.5	4.0	4.5	5.0
f(x)	24.145	22.043	20.225	18.644	17.262	16.047

B) Using divided difference table, find the polynomial of degree 3 which passes the points **[05]**

x	0	2	3	4
y	2	6	20	50

Also find $\frac{dy}{dx}$ at x= 1.2.

Q.6 A) Evaluate $\int_0^6 \frac{1}{1+x^2}dx$ by using **[05]**

1) Simpson's 1/3 rule, 2) Simpson's 3/8 rule, 3) Weddle's rule

And compare the results with its actual value.

B) Solve the following using Gauss Seidel method **[05]**

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

OR

Q.6 A) solve the following system by Gauss-Elimination method with partial pivoting **[05]**

$2.5x - 3y + 4.6z = -1.05,$

$-3.5x + 2.6y + 1.5z = -14.46,$

$-6.5x - 3.5y + 7.3z = -13.74.$

B) Evaluate $\int_0^1 xe^{-x}dx$ using Gaussian Quadrature formula for n=2 and n=3. **[05]**

BEST OF LUCK