Question Bank

UNIT TEST -II

Statistical Modelling For Machine learning (SML) (313307)

UNIT -3 Probability of Random Variable(CO3) (2 marks)

1. Three unbiased coins are tossed. What is the Probability of getting all heads.
2. Find the probability of getting two heads when five coins are tossed.
3. In a single throw of a pair of dice, what is the probability of getting the sum a perfect square.
4. From a pack of 52 cards, one is drawn at random. Find the probability of getting a king.
5. If P(A)= 0.5, P (A or B) = 0.8, Let P(B) =p. For what value of p are the events A and B is independent.
6. How many 3 digits even number can be made using the digits 1, 2, 3, 4, 6, 7 if no digit is repeated.
7. A bag contains 30 balls numbered 1 to 30. One ball is drawn at random. Find the probability that the number on the ball drawn will be a multiple of 5 or 7.

UNIT -4 Interpolation (CO4) (2 marks)

1. Construct a forward difference table for the following data:

x	0	1	2	3	4	5	6
y	1	3	11	31	69	131	223

2. If $f(x)= x^2-3x+1$, construct a forward difference table by taking x= 0,1 ,2, 3, 4, 5 Verify that the second differences are constant.
3. Find relation between **E** and **Δ.**
4. Prove that $\Delta^3(1-x)\,(1-2x)\,(1+3x) =36$, where h=1
5. Prove that $\boldsymbol{\Delta^3 y_2 = \nabla^3 y_5}$
6. Form the backward difference table of $f(x) = x^3 – 3x^2 + 5x + 7$ for the values of 0, 2, 4, 6, 8.

UNIT -5 Sampling Method (CO5) (2 marks)

1. A random sample of 50 items gives mean 6.2 & Standard deviation 10.24 & population mean 5.4. Find the value of Standard normal Variate Z.
2. Inteligence test given to two groups of boys and girls gave the following information.

	Mean Score	S.D.	Number
Girls	75	10	100

Boys	70	12	200

3. Define: (i) Random Sampling (ii) Non-random Sampling
4. In a sample of 500 people from Andhra Pradesh, 280 are found to be rice eaters and the rest wheat eaters. Can we assume that both the food articles are equally popular ?

UNIT -3 Probability of Random Variable (CO3) (4 marks)

1. If two dice are rolled simultaneously, then find the probability that sum of the number is 6 or 10.
2. A bag-I contains 4 white and 6 black balls. While another bag-II contains 4 white and 3 black balls. One ball is drawn at random from one of the bags and it is found to be black. Find the probability that it was from bag-I.
3. An insurance company insured 2000 scooter drivers, 4000 car drivers and 6000 truck drivers. The probability of accident is 0.01, 0.03 and 0.15 respectively. One of the persons meets with an accident. Calculate the probability that he is scooter driver.
4. Determine the probability that a card drawn at random from a pack of 52 cards is an ace or a red queen or a king of heart.
5. An urn contains 20 red and 10 blue balls. Two balls are drawn from a bag one after the other without replacement. What is the probability that both the ball drawn are red?
6. In a bolt factory, Machines A, B and C manufacture respectively 25%, 35% and 40% of the total. Of their output 5, 4, and 2 percent are defective bolts. A bolt is drawn at random from the product and is found 10 be defective. What is the probability that it is was manufactured by Machine B?
7. A card is drawn from a pack of 52 cards, find the probability that a card is a diamond or a face card.
8. A bag contains 3 red and 7 black balls. Two balls are drawn at random without replacement. If the second ball is red, what is the probability that the first ball is also red?
9. A man is known to speak the truth 2 out of 3 times the throws a die and reports that the number obtained is a four. Find the probability that the number obtained is actually a four.

UNIT -4 Interpolation (CO4) (4 marks)

1. (i)graph of the function in passing through the points (0,5), (1,9), (2,15), (3,23) and (4,33). Using Newton's forward interpolation formula, find the function y = f(X).

(ii) Given the square of the integers in the following table find the value of $(13)^2$ using extrapolation:

X	3	5	7	9
Y	9	25	49	81

2. (i)Using Lagrange's interpolation formula, find the value of y when x = 10, from the following table:

X	5	6	9	11
Y	12	13	14	16

(ii) Given f (1) = 6, f (2) = 16 and f (3) = 32. Estimate f (2.5) using Lagrange's interpolation formula.

3.(i) Construct the forward difference table for the following data:

X	0	1	2	3
Y	3	6	11	18

Hence, write down the value of $\Delta f(0)$ and $\Delta f(2)$.

(ii) Prove that $(\Delta^2/E) x^3 = 6x$

4.(i) If f (1.15) = 1.0723, f (1.20) = 1.0954, f (1.25) = 1.1180 and f (1.30) = 1.1401 Find f (1.28) by using Newton's Backward difference Interpolation formula.

(ii)Compute y (19) from the following data:

x	8	10	12	14	16	18
y	10	19	32.5	54	89.5	15.4

UNIT -5 Sampling Method (CO5) (4 /6 Marks)

1. The following table gives the number of accidents in a district during a week. Apply χ 2 test to find whether the accident are uniformly distributed over the week.

day	Sun	Mon	Tue	Wed	Thu	Fri	Sat
no. of days	13	12	11	9	15	10	14

2. In a malaria campaign in a certain area, quinine was administered to 812 persons out of total population of 3248. The number of fever cases is shown below:

Treatment	Fever	No Fever	Total
Quinine	140	30	170
No Quinine	60	20	80
Total	200	50	250

Calculate the value of χ 2 and discuss the usefulness of quinine in checking malaria (Given for 1 degree of freedom value of χ 2 at α=0.05, l.o.s. 3.84).

3. From the following data find whether there is any significant liking in the habit of taking soft drinks among the categories of employees in an institute:

Employee (B) Soft Drinks (A)	Clerks	Teacher	Officer	Total
Pepsi	10	25	65	100
Fanta	15	30	65	110
Fruti	50	60	30	140
Total	75	115	160	350

4. Solve the following: i) Sample of 12 values shows the S.D. = 11 Does this agree with the hypothesis that the population S.D. is 10, the population being normal?

ii) A coin was tossed 400 times and the head turns up 216 tosses. Test the hypothesis that the coin is unbiased at 5% L.O.S.

5. A survey of 320 families with 5 children each shows the following information.

No. of Boys	5	4	3	2	1	0
No. of Girls	0	1	2	3	4	5
No. of Families	14	56	110	88	40	12

Is the result consistent with the hypothesis that male and female births are equally probable?

6. (i) A machine produced 20 defective items in batch of 400. After overhauling, it produced 10 defective items in a batch of 300. Has the machine improved? Use 1% level of significance.
   (ii) A dice was thrown 1500 times and the number 4 was obtained 290 times. Can the dice be considered fair at 0.01 level of significance?
7. The nine items of a sample had the following values: 45, 47, 50, 52, 48, 47, 49, 53, 51 Does the mean of the nine items differ significantly from the assumed population mean of 47.5? [t for 8 d.f. at 5% Los = 2.31]
8. (a) (i) Test whether the sample having values 63, 63, 64, 55, 66, 69, 70, 70, 71 has been chosen from a population mean 65 at 5% level of significance. (value of t for 8 degrees of freedom = 2.31) (ii) In a sample of 600 men from certain city 450 are found smokers. In another sample of 900 men for another city 450 are smokers. Find standard normal variate Z using sampling distribution of proportions.
9. The mean life of sample of 100 electric bulbs produced by a company is computed to be 1570 hours with standard deviation of 120 hours. The company claims that average life of bulbs produced by it is 1600. Find value of t using t distribution & state whether the claim made is acceptable. (Given: Value of t at 5% LOS = 1.96)