BACHELOR OF TECHNOLOGY (CBCS - 2023)
B. Tech. Sem-I COMPUTER SCIENCE & ENGINEERING : SUMMER : 2024
SUBJECT: PROBABILITY & STATISTICS

Day : Wednesday
Date : 15/05/2024

S-27610-2024

Time : 10:00 AM-01:00 PM
Max. Marks : 60

N. B. :

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Draw neat and labelled diagrams **WHEREVER** necessary.
4) Use of non-programmable calculator is **ALLOWED**.
5) Assume suitable data, if necessary.

Q. 1 **a)** A doctor is to visit a patient. From the past experience, it is known that the probabilities that he will come by train, bus, scooter or by other means of transport are respectively 3/10, 1/5, 1/10 and 2/5. The probabilities that he will be late are ¼, 1/3 and 1/12. If he comes by train, bus and scooter respectively but if he comes by other means of transport, then he will not be late. When he arrives, he is late. What is the probability that he comes by train? **(10)**

OR

b) One bag contains 4 white and 2 black balls. Another contains 3 white and 5 black balls. If one ball is drawn from each bag. Find the probability that:

i) Both are white
ii) Both are black
iii) One is white and one is black

Q. 2 **a)** Find the value of k, if the function: **(10)**

$f(x) = kx^2(1-x^3)\ 0 \le x \le 1$

$= 0$, *Otherwise*

is a probability function. Also find $P(0 \le x \le 1/2)$ and the mean and variance.

OR

b) For the adjoining bivariate probability distribution of X and Y, Find:

i) $P(X \le 1, Y = 2)$

ii) $P(X \le 1)$

iii) $P(Y \le 3)$

iv) $P(X < 3, Y \le 4)$

X \ Y	1	2	3	4	5	6
0	0	0	1/32	2/32	2/32	3/32
1	1/16	1/16	1/8	1/8	1/8	1/8
2	1/32	1/32	1/64	1/64	0	2/64

Q. 3 **a)** A manufacturer, who produces medicine bottles, finds that 0.1 % of the bottles are defective. The bottles are packed in boxes containing 500 bottles. A drug manufacturer buys 100 boxes from the producer of bottles. Using Poisson distribution, find how many boxes will contain: **(10)**

i) No defective
ii) At least 2 defectives.

(Given $e^{-0.5} = 0.6065$)

P. T. O.

OR

b) X is a normal variate with mean 30 and S.D. 5. Find the probabilities that:

i) $26 \leq X \leq 40$

ii) $X \geq 45$

iii) $1X - 301 > 5$

Q. 4 a) Ten competition in a musical test were ranked by the three judges A, B and C in the following order: **(10)**

Ranks by A	1	6	5	10	3	2	4	9	7	8
Ranks by B	3	5	8	4	7	10	2	1	6	9
Ranks by C	6	4	9	8	1	2	3	10	5	7

Using rank correlation method, discuss which pair of judges has the nearest approach for common likings in music.

OR

b) The marks obtained by 10 students in Mathematics (X) and Statistics (Y) are given below. Find the coefficient of correlation between X and Y.

Roll No.	1	2	3	4	5	6	7	8	9	10
X	75	30	60	80	53	35	15	40	38	48
Y	85	45	54	91	58	63	35	43	45	44

Q. 5 a) For 10 randomly selected observations, the following data were recorded: **(10)**

Observation No.	1	2	3	4	5	6	7	8	9	10
Overtime hrs. (X)	1	1	2	2	3	3	4	5	6	7
Additional Units(Y)	2	7	7	10	8	12	10	14	11	14

Determine the coefficient of regression and regression equation using the non-linear form:

$y = a + b_1 X + b_2 X^2$.

OR

b) Calculate the 2 lines of regression for the following data. Also obtain the estimate of X for Y=70

X	65	66	67	67	68	69	70	72
Y	67	68	65	68	72	72	69	71

Q. 6 a) Set up two way ANOVA table for data: **(10)**

Plots → / **Fertilizer ↓**	**A**	**B**	**C**	**D**
Nitrogen	6	4	8	6
Potash	7	6	6	9
Phosphate	8	5	10	9

Given F – Value for $v_1 = 3$, $v_2 = 6$ *is* 4.76 and

F – Value for $v_1 = 2$, $v_2 = 6$ *is* 5.14 both at 5 % *L.o.S.*

OR

b) Find the regression equation of X_1 on X_2 and X_3 given the following results:

Traits	Mean	Standard deviation	r_{12}	r_{23}	r_{31}
X_1	28.02	4.42	+ 0.80	–	–
X_2	4.91	110	–	- 0.56	–
X_3	594	85	–	–	- 0.40

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