


B.E/B.TECH DEGREE EXAMINATIONS: APRIL/MAY 2024

(Regulation 2018)

Fourth Semester

COMMON TO CSE/IT/ISE

U18MAI4201: Probability and Statistics

COURSE OUTCOMES

- CO1:** Compute correlation between variables and predict unknown values using regression.
- CO2:** Understand and apply the concept of probability and random variables and predict probabilities of events in models following normal distribution.
- CO3:** Perform hypothesis testing and interpret the results.
- CO4:** Understand the principles of design of experiments and perform analysis of variance.
- CO5:** Sketch control charts and comment on the process control.
- CO6:** Apply the above concepts to solve problems using R Studio.

Time: Three Hours**Maximum Marks: 100**

Answer all the Questions: -
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

1. Write the properties of Correlation Co-efficient. CO1 [K₁]
2. What is the chance that a leap year selected at random will contain 53 Tuesdays? CO2 [K₁]
3. State Baye's theorem. CO2 [K₁]
4. State the properties of Normal Distribution. CO2 [K₁]
5. A sample of 200 persons with a particular disease was selected. Out of these, 100 were given a drug and the others were not given any drug. The results are as follows: CO3 [K₂]

No. of persons	Drug	No drug
Cured	65	55
Not cured	35	45

Find the Chi-square Value.

6. Define Parameter and Statistics on Testing of Hypothesis. CO3 [K₁]
7. Write the three basic principles of an Experimental Design. CO4 [K₁]

8. A completely Randomized Design experiment with ten plots and three treatments gave the results given below. Find the Correction Factor (C.F). CO4 [K₂]

Treatments	Replications			
A	5	7	1	3
B	4	4	7	
C	3	1	5	

9. Write the Control Limits for the mean and range charts. CO5 [K₁]
10. Write the Control Limits for the p-chart and np-chart. CO5 [K₁]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11. a) Calculate the rank correlation coefficient of correlation for the following data: (8) CO1 [K₃]

X:	68	64	75	50	64	80	75	40	55	64
Y:	62	58	68	45	81	60	68	48	50	70

- b) Marks obtained by 10 students in Mathematics (x) and Statistics (y) are given below: (8) CO1 [K₃]

x:	60	34	40	50	45	40	22	43	42	64
y:	75	32	33	40	45	33	12	30	34	51

Find the two regression lines.

12. a) The contents of urns I,II, III are as follows: 1 white, 2 black and 3 red balls; 2 white, 1 black and 1 red balls; 4 white, 5 black and 3 red balls respectively. One urn is chosen at random and two balls are drawn from it. They happen to be white and red. What is the probability that they come from urns I, II or III? (8) CO2 [K₂]
- b) When a die is thrown, X denotes the number that throws up. Find $E(X)$, $E(X^2)$, $\text{Var}(X)$ and standard deviation. (8) CO2 [K₃]

13. Two random samples gave the following results:

(16) CO3 [K4]

Sample	Size	Sample Mean	Sum of the square of deviations from Mean
1	10	15	90
2	12	14	108

Examine whether the samples come from the same normal population at 5% level of significance.

14. Analyze the variance in the Latin square of yields (in kgs.) of paddy where P, Q, R, S denote the different methods of cultivation. (16) CO4 [K4]

S122	P121	R123	Q122
Q124	R123	P122	S125
P120	Q119	S120	R121
R122	S123	Q121	P122

Examine whether the different methods of cultivation have given significantly different yields.

15. The measurements are given below with 5 samples each containing 5 items at equal intervals of time. Construct \bar{X} and R charts and comment on the state of control (16) CO5 [K3]

Sample Number	Measurements				
1	46	45	44	43	42
2	41	41	44	42	40
3	40	40	42	40	42

4	42	43	43	42	45
5	43	44	47	47	45

16. a) Suppose the heights of men of a certain country are normally distributed with average 68 inches and standard deviation 2.5. Find the percentage of men who are (i) between 66 inches and 71 inches in height (ii) approximately 6 feet tall. (8) CO2 [K₂]
- b) The theory predicts the population of beans in four groups A,B,C and D should be in 9:3:3:1. In an experiment among 1600 beans, the number in the four groups were 882, 313, 287 and 118. Does the experimental result support the theory? (8) CO3 [K₃]
