Question Paper Code: R18A22HS02

R18

ANURAG Engineering College

(An Autonomous Institution)

II B.Tech II Semester Supplementary Examinations, June/July – 2024

PROBABILITY AND STATISTICS

(MECHANICAL ENGINEERING)

Time: 3 Hours **Max.Marks:75**

Section – A (Short Answer type questions) **(25 Marks)**

Answer All Questions		Course Outcome	B.T Level	Marks
1.	State Baye's theorem.	CO1	L1	2M
2.	State and prove Addition theorem.	CO1	L1	3M
3.	In 256 sets of 12 tosses of a coin, in how many cases one can expect 8 heads and 4 tails.	CO2	L2	3M
4.	If X is a poisson variate such that P(X=2) = 9P(X=4)+ 90P(X=6). Find the variance.	CO2	L2	2M
5.	Briefly explain about Kurtosis?	CO3	L1	2M
6.	Test whether the equations $2x + 3y = 4$ and $x - y = 5$ represent valid regression lines.	CO3	L2	3M
7.	What is the size of the smallest sample required to estimate an unknown proportion to within a maximum error of 0.06 with at least 95% confidence.	CO4	L1	3M
8.	Define types of Errors.	CO4	L1	2M
9.	Write the formula for Chi-square test for goodness of fit.	CO5	L1	2M
10.	Write down the ANOVA table for one way classification.	CO5	L1	3M

Section B (Essay Questions)

Answer all questions, each question carries equal marks. **(5 X 10M = 50M)**

11. A)	In a bolt factory machines A,B,C manufactures 20%,30% and 50% of the total of their output and 6%,3% and 2% are defective. A bolt is drawn at random and found to be defective. Find the probabilities that it is manufactured from i) machine A, ii) machine B, iii) machine C.	CO1	L3	10M
	OR			
B)	A random variable X has the following probability distribution	CO1	L3	10M

X	-2	-1	0	1	2	3
P(x)	0.1	k	0.2	2k	0.3	3k

Find i) k ii) Evaluate P(x<2) and P(-2<x<2)
iii) Mean iv) Variance.

12. A)	i) A hospital switch board receives an average of 4 emergency calls in a 10 minute interval, What is the probability that a) there are at most 2 emergency calls in a 10 minute interval b) there are exact 3 emergency calls in a 10 minute interval.	CO2	L2	5M
	ii) Find the mean values of the variables X and Y and correlation coefficient from 2Y-X-50=0; 3Y-2X-10=0 regression equations.	CO2	L2	5M
	OR			
B)	In a Normal distribution, 7% of the items are under 35 and 89% are under 63. Determine the mean and variance of the distribution.	CO2	L3	10M

13. A) Ten competitors in a musical test were ranked by the three judges A,B and C in the following order, CO3 L3 10M

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

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

OR

B) Fit a second degree polynomial to the following data by the method of least squares CO3 L3 10M

X	0	1	2	3	4
Y	1	1.8	1.3	2.5	6.3

14. A) i) Experience had shown that 20% of a manufactured product is of the top quality. In one day's production of 400 articles only 50 are of top quality. Test the hypothesis at0.05 level. CO4 L2 5M

ii) In two large populations there are 30%, and 25% respectively of fair haired people. Is this difference likely to be hidden in samples of 1200 and 900 respectively from the two populations? CO4 L2 5M

OR

B) i) Define Null and Alternative Hypothesis. CO4 L1 3M

ii) Samples of students were drawn from two universities and from their weights in kilograms, mean and standard deviations are calculated and shown below. Make a large sample test to test the significance of the difference between the means. CO4 L3 7M

	Mean	Standard deviation	Size of the sample
University A	55	10	400
University B	57	15	100

15. A) A die is thrown 264 times with the following results. Show that the die is biased CO5 L3 10M

No. Appeared on the die	1	2	3	4	5	6
Frequency	40	32	28	58	54	52

OR

B) Three samples, each of size 5 were drawn from three uncorrelated normal populations with equal variance. Test the hypothesis that the population means are equal at 0.05 level of significance. CO5 L3 10M

Sample 1	10	12	9	16	13
Sample 2	9	7	12	11	11
Sample 3	14	11	15	14	16