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(An Autonomous Institution)

Regulations: A20

**Code No:8HC16** **Date: 06-August-2024 (FN)**

**B.Tech II-Year II- Semester External Examination, August-2024 (Supplementary)**

**PROBABILITY AND STATISTICS (EEE,CSE,IT,ECM)**

**Time: 3 Hours** **Max.Marks:70**

***Note:*** *a) No additional answer sheets will be provided.*
*b) All sub-parts of a question must be answered at one place only, otherwise it will not be valued.*
*c) Missing data can be assumed suitably.*

**Bloom's Cognitive Levels of Learning (BCLL)**

| | | | | | |
|---|---|---|---|---|---|
| Remember | L1 | Apply | L3 | Evaluate | L5 |
| Understand | L2 | Analyze | L4 | Create | L6 |

## Part - A Max.Marks:20

## ANSWER ALL QUESTIONS

| | | BCLL | CO(s) | Marks |
|---|---|---|---|---|
| 1 | If X is a Poisson variate Such that $3P(X=1)=3P(X=2)$ find $\mu$ | L2 | CO1 | [2M] |
| 2 | Define estimate and estimator. | L1 | CO2 | [2M] |
| 3 | Define type-I and type-II errors | L2 | CO3 | [2M] |
| 4 | Write properties of t-distribution | L1 | CO4 | [2M] |
| 5 | Explain the about the Moments ,skewness | L1 | CO5 | [2M] |
| 6 | Write normal equations of parabola | L2 | CO6 | [2M] |
| 7 | Define Poisson distribution | L1 | CO2 | [2M] |
| 8 | Write the applications of chi- square distribution. | L2 | CO4 | [2M] |
| 9 | Write the properties of Rank correlation coefficient | L1 | CO6 | [2M] |
| 10 | Find the Mean of Binomial distribution | L2 | CO1 | [2M] |

## Part – B Max.Marks:50

## ANSWER ANY FIVE QUESTIONS. EACH QUESTION CARRIES 10 MARKS.

| | | | BCLL | CO(s) | Marks |
|---|---|---|---|---|---|
| 11. | a) | A box contains 6 Red ,9 Blue and 11 White balls ,3 balls are drawn together from the bag .Find the probability that (i) One is red one is blue and one is white (ii) Two white & one red (iii) Three White balls | L2 | CO1 | [5M] |
| | b) | A random variable X has the following probability function: | L3 | CO1 | [5M] |

| X | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| P(X) | K | 3K | 5K | 7K | 9K | 11K | 13K | 15K | 17K |

Then find (i) K (ii) The mean (iii) The Variance

| | | | | | |
|---|---|---|---|---|---|
| 12. | a) | A population consisting of five numbers 5, 10, 14, 18, 13, 24. Consider all the possible samples of size two which can be drawn with replacement from this population, find i) The mean of population. ii)The standard deviation of the population. iii)The mean of sampling distribution means. | L3 | CO2 | [5M] |
| | b) | A random Sample of 300 items is taken from a Population whose Standard deviation is 18.The mean of the Sample is 82 Construct 95% Confidence interval for the mean. | L2 | CO2 | [5M] |
| 13. | a) | A manufacturer claimed that at least 95% of the equipment which he supplied to factory conformed to specifications. An examination of a sample of 200 pieces of equipment revealed that 18 were faulty .Test his claim 5 % level of significance | L2 | CO3 | [5M] |
| | b) | Define Type-I and Type-II Errors, Critical region, Level of Significance. Null Hypothesis, Alternative Hypothesis. | L2 | CO3 | [5M] |
| 14. | a) | Two Horses A & B were tested according to the time (in seconds) to run a particular track with the following results. | L3 | CO4 | [5M] |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Horse A | 28 | 30 | 32 | 33 | 33 | 29 | 34 |
| Horse B | 29 | 30 | 30 | 24 | 27 | 29 | -- |

b) Pumpkins were grown under two experimental conditions. Two random samples of 11 and 9 pumpkins, show the sample standard deviation of their weights as 0.8 and 0.5 respectively. Assuming that the weight distributions are normal, test hypothesis that the true variances are equal — L3 CO4 [5M]

15. a) Find Karl Pearson's coefficient of correlation from the following data. — L3 CO5 [5M]

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 28 | 41 | 40 | 38 | 35 | 33 | 40 | 32 | 36 | 33 |
| Y | 23 | 34 | 33 | 34 | 30 | 26 | 28 | 31 | 36 | 38 |

b) Calculate the first four Moments of the following distribution about the mean: — L2 CO5 [5M]

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| X | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| f(x) | 1 | 8 | 28 | 56 | 70 | 56 | 28 | 8 | 1 |

Also evaluate Skewness & Kurtosis.

16. a) Fit a Second degree polynomial to the following data. — L3 CO6 [5M]

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

b) Calculate the regression equations of Y on X from the data given below, taking deviations from actual means of Y on X . — L3 CO6 [5M]

| | | | | | | |
|---|---|---|---|---|---|---|
| X | 10 | 12 | 13 | 12 | 16 | 15 |
| Y | 40 | 38 | 43 | 45 | 37 | 43 |

17. a) In a normal distribution 31% of the items are under 45 and 8% are under 64. Determine the mean and the variance of the distribution — L2 CO1 [5M]

b) A random sample size 100 is taken from population with standard deviation 5.1 and the sample mean is 21.6. Construct a 95% confidence interval for the population men — L2 CO2 [5M]

18. a) A pair of dice are thrown 360 times and the frequency of each sum is indicated below — L3 CO4 [5M]

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sum | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Frequency | 8 | 24 | 35 | 37 | 44 | 65 | 51 | 42 | 26 | 14 | 14 |

Would you say that the dice are fair on the basis of the Chi-Square test at 0.05 level of significance

c) Fit a straight line of the form y = a+bx to the following data — L2 CO6 [5M]

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| X | 10 | 12 | 13 | 16 | 17 | 20 | 25 |
| Y | 10 | 22 | 24 | 27 | 29 | 33 | 37 |

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