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| **CLASS : II B.TECH SEM- II ACADEMIC YEAR: 2024-2025**  **COURSE TITLE : PROBABILITY & STATISTICS REGULATION: R 23**  **FACULTY : Mrs.Y.NAGVENI BRANCH : CSE & AIML** |

**MODEL QUESTIONS**

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| **Module-I**  **Descriptive Statistics** | | | | |
| **S.NO** | **QUESTIONS** | **CO** | **BL** | **Marks** |
| 1 | Define Statistics. Explain the Applications and Limitations of Statistics. | 1 | 3 | 10 |
| 2 | Evaluate the Quartile Deviation & it’s co-efficient from the following data?   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Marks | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | | Frequency | 6 | 5 | 8 | 15 | 7 | 6 | 3 | | 1 | 5 | 10 |
| 3 | Evaluate Standard Deviation to the following data is about the expenditure of the firm.   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Expenditure ( cores of rupees) | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | | Frequency | 10 | 15 | 28 | 32 | 40 | 35 | 26 | 14 | | 1 | 5 | 10 |
| 4 | The following data is about the expenditure of 100 units in a firm. Evaluate Standard Deviation and its co-efficient of variance write comment about on data.   |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Expenses | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 | 90-100 | 100-110 | 110-120 | | Units | 4 | 10 | 11 | 12 | 18 | 15 | 10 | 8 | 8 | 4 | | 1 | 5 | 10 |
| 5 | Evaluate Karl Pearson’s coefficient of Skewness to the flowing data   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Class Intervals | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | | Frequency | 4 | 13 | 27 | 87 | 51 | 47 | 14 | | 1 | 5 | 10 |
| 6 | Evaluate the Quartile Deviation and evaluate Bowley’s Co-efficient of Skewness   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Marks | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | | Frequency | 10 | 15 | 28 | 32 | 40 | 35 | 26 | | 1 | 5 | 10 |
| 7 | Define the Karl Pearson’s coefficient Correlation with examples and explain its properties | 1 | 5 | 10 |
| 8 | Evaluate the coefficient of correlation from the following data by Karl Pearson’s coefficient correlation   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | X | 10 | 12 | 18 | 18 | 18 | 22 | 20 | 24 | | Y | 81 | 78 | 73 | 73 | 69 | 68 | 62 | 58 | | 1 | 3 | 10 |
| 9 | Fit a Straight line y = ax + b for the following data   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | x | 0 | 1 | 2 | 3 | 4 | | y | 1.0 | 1.8 | 3.3 | 4.5 | 6.3 | | 1 | 5 | 10 |
| 10 | (a) Explain the regression and its properties  (b) Briefly describe What is need of the two regression lines | 1  1 | 3  2 | 5  5 |
| 11 | The following marks have been obtained by a class of 7 students in Commerce and Economics.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Commerce | 66 | 85 | 89 | 55 | 58 | 44 | 42 | | Economics | 58 | 67 | 72 | 38 | 59 | 60 | 62 |   Estimate economics marks at Commerce marks are 95 | 1 | 6 | 10 |
| 12 | Find two Regression equations from the given data.   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | X | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | | Y | 4 | 4 | 6 | 10 | 10 | 8 | 12 | 8 | 6 | | 1 | 1 | 10 |

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| **Module-II**  **Probability** | | | | |
| 1 | 1. Define Probability of (i) Classical Definition (ii) Axiomatic Definition? 2. Determine the Probability for each of the following events   (i) A non defective bolt will be found it out of 600 bolts already examined 12 were Defective.  (ii) A non leap year having 53 Sundays. | 2 | 3 | 5  5 |
| 2 | 1. State and Prove Addition theorem on probability? 2. A card is drawn from a pack of 52 cards. Find the probability of getting a king or a heart or a red card? | 2 | 5 | 5  5 |
| 3 | Define (a) Dependent Event & Independent Event with suitable Examples.  (b) State and Prove Multiplication theorem for n-events? | 2 | 5 | 5  5 |
| 4 | a) State and Prove Baye’s theorem  b) In a bolt factory machine, A, B and C manufacture respectively 25%, 35% and 40% of the total of their output 5, 4, 2 percent are defective bolts. A bolt is drawn at random from the product and is found to be defective. What are the probabilities that it was manufactured machine C? | 2 | 5 | 5  5 |
| 5 | Each of the identical boxes B1, B2, B3 contains two coins: B1 contains both gold coins, B2 contains both silver coins and B3 contains one gold and one silver coins. If a box is chosen at random and coin is picked at random and if the coin is gold. What is the probability that the other coin in the box is also of gold? | 2 | 5 | 10 |
| 6 | A random variable X has the following probability function   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |  | 0 | K | 2k | 2k | 3k | K2 | 2k2 | 7k2+k |   (i) Determine K (ii) Evaluate (iii) Evaluate  (iv) Distribution Function of F(x) | 2 | 5 | 10 |
| 7 | The Probability Density Function of a Variate X is   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | |  | k | 3k | 5k | 7k | 9k | 11k | 13k |   (i)Determine k (*ii*) P(X<4), P (3< X ≤6) (*iii*) Mean(iii) Variance | 2 | 1 | 10 |
| 8 | The Probability function of the continuous random variable X is given by  when .Find K and Mean. | 2 | 1 | 10 |
| 9 | The Cumulative Distribution Function for a continuous random  variable X is  then find: (i) Density function. (ii) Mean. (iii) Variance. | 2 | 1 | 10 |
| 10 | A continuous random variable has the probability density function  Determine (i) k (ii) Mean (iii) Variance | 2 | 5 | 10 |
| 11 | Probability Density Function of a random variable X is  Evaluate the Mean, Mode and Median of Distribution and also find the Probability between 0 and π/2 | 2 | 5 | 10 |
| 12 | A Continues random variable X is defined by  Evaluate the Mean and Variance. | 2 | 5 | 10 |

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| **Module-III**  **Probability Distributions** | | | | |
| **S.NO** | **QUESTIONS** | **CO** | **BL** | **Marks** |
| 1 | (a) Define the Binomial Distribution.  (b) A coin is tossed 9 times, find the probability of getting 5 heads. | 3 | 1 | 5  5 |
| 2 | (a) Explain the Derivations of Binomial Distribution.  (b) 20% of items are produced from a factory are defective find the probability that in a sample space of 5 chosen at random (i) None is defective (ii) P(1 < X < 4) | 3 | 2 | 5  5 |
| 3 | During one stage in the manufacturing of integrated circuit chips, a coating must be applied. If 70% of chips received a thick enough coating, Evaluate the probabilities that among 15 chips: (i) At least 12 (ii) At most 6 (iii) Exactly 10 chips, will have thick enough coatings. | 3 | 5 | 10 |
| 4 | The probability that John hits a target is ½ . He fires 6 times, find the probability that he hits the target (i) Exactly 2 times ( ii) At least once. | 3 | 1 | 10 |
| 5 | (a) Explain the Mean and Variance of a Poisson Distribution.  (b) X is a Poisson Variate such that P(x=0) = P(x=1). Find the probability of P(x=0) using recurrence formule. Find the probabilities of x = 0, 1, 2, 3, 4, 5. | 3 | 1 | 10 |
| 6 | At a checkout Counter customers arrive at an average of 1.5 per minute. find the Probabilities that in any given minute of time: (i) At most 4 will arrive. (ii) Exactly 4 will arrive. (iii) At least 4 will arrive. | 3 | 1 | 10 |
| 7 | Derive mean of the Normal Distribution? | 3 | 2 | 10 |
| 8 | Explain the properties and uses of Normal Distribution? | 3 | 2 | 10 |
| 9 | An electrical firm manufactures light bulbs that have a life, before burn out, which is normally distributed with mean equal to 800h and a standard deviation of 40h. Evaluate the probability that a bulb burns between 778h and 834h. | 3 | 5 | 10 |
| 10 | The marks obtained in statistics in a certain examination found to be normally distributed. If 15% of the students  60 marks, 40% 30 marks, find the mean and standard deviation? | 3 | 3 | 10 |
| 11 | In a distribution of normal 7% of items are under 35 and 89% are under 63. What are mean and standard deviation of the distribution? | 3 | 2 | 10 |
| 12 | (a)Explain Normal Approximation to the Binomial Distribution.  (b) Eight coins are tossed together. Find the probability of getting 1 to 4 heads in a single toss. | 3 | 5 | 5  5 |

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| **Module-IV**  **Estimation and Testing of Hypothesis, Large Sample Tests** | | | | |
| 1 | Explain (i) Null and Alternative hypothesis.  (ii) Two types of Errors with examples. | 4  4 | 3  3 | 5  5 |
| 2 | Explain the following definitions with suitable examples  (i) Degrees of freedom  (ii) Point and Interval Estimation | 4  4 | 3  3 | 5  5 |
| 3 | Explain the following definitions with suitable examples  (i) Statistics  (ii) Sampling distributions | 4  4 | 3  3 | 5  5 |
| 4 | a) Explains the test procedure of one sample mean test?  b) An Ambulance service claims that it takes on average less than 10 minutes to reach its destination in emergency calls. A sample of 36 calls has a mean of 11 minutes and variance of 16 minutes. Test the significance at 0.05 level. | 4  4 | 3  5 | 5  5 |
| 5 | a) A random sample of size 81 was taken whose variance is 20.25 and mean is 32. Construct 98% confidence interval.  b) In a random sample of 60 workers, the average time taken by them to get to work is 33.8 minutes with a standard deviation of 6.1 minutes. Can we reject the null hypothesis 𝜇=32.6 minutes in favor of alternative null hypothesis 𝜇>32.6 and 𝛼=0.025 level of significance? | 4  4 | 3  5 | 5  5 |
| 6 | (a) Sample of 400 items is taken from a population whose standard deviation is 10. The mean of the sample is 40. Test whether the sample has come from a population with mean 38. Also calculate 95% confidence interval for the population mean?  (b) It is claimed that a random sample of 49 tyres has a mean life of 15200 Km. This sample was drawn from a population whose mean is 15150 kms and a standard deviation of 1200 Km. Test the significance at 0.05 level | 4  4 | 3  5 | 5  5 |
| 7 | a) Explains the test procedure of two sample mean test?  b) The means of two large samples of size 1000 and 2000 members are 67.5 inches and 68.0 inches respectively. Test the sample be regarded as drawn from the same population of standard deviation 2.5 inches? | 4  4 | 3  5 | 5  5 |
| 8 | (a)A sample of the height of 6400 English men has a mean of 67.85 inches and a S.D of 2.56 inches while a sample of height of 1600 Australian has a mean of 68.55 inches and S. D of 2.52 inches. Do the data indicate that the Austrians are on the average taller than the English men?  (b) The mean yield of wheat from a district A was 210 pounds with S.D. 10 pounds per acre form a sample of 100 plots. In another district the mean yield was 220 pounds with S.D. 12 pounds from a sample of 150 plots.  Assuming that the SD of yield in the entire state was 11 pounds, test whether there is any significant difference  between the mean yield of crops in the two districts? | 4  4 | 5  5 | 5  5 |
| 9 | (a)Explains the test procedure of one sample proportion test  (b)In a big city 325 men out of 600 men were found to be smokers. Does this information support the conclusion that the majority of men in this city are smokers? | 4  4 | 3  5 | 5  5 |
| 10 | (a) 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 at 0.05 level?  (b) In a sample of 1000 people in Karnataka 540 are rice eaters and the rest are wheat eaters. Can we assume that both rice and wheat are equally popular in this state at 1% level of significance? | 4  4 | 5  5 | 5  5 |
| 11 | (a) Explains the test procedure of difference of two proportions test?  (b) In a city A, 20% of a random sample of 900 school boys had a certain slight physical defect. In another city B, 18.5% of a random sample of 1600 school boys had the same defect. Is the difference between the proportions significant at 0.05 level of significance? | 4  4 | 3  5 | 5  5 |
| 12 | (a) A die was thrown 9,000 times and of these 3220 yielded a 3 or 4. Is this consistent with the hypothesis that the die was unbiased? (Use as level of significance).  (b) A manufacturer of electronic equipment subjects’ samples of two completing brands of transistors to an accelerated performance test. If 45 of 180 transistors of the first kind and 34 of 120 transistors of the second kind fail the test, what can be conclude at the level of significance about the difference between the corresponding sample proportions? | 4  4 | 5  5 | 5  5 |

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| **Module-V**  **Small Sample Tests** | | | | |
| 1 | (a) Define Small Sample.  (b) Explain the t-test procedure. | 5  5 | 3  3 | 5  5 |
| 2 | A random sample of 10 boys had the following I.Q s  70, 120, 110, 101, 88, 83, 95, 98, 107 and 100.  (i) Do these data support the assumption of a population mean I.Q of 100?  (ii) Find a reasonable range in which most of the values of the samples of 10 boys lie? | 5 | 5 | 10 |
| 3 | To compare two kinds of bumper guards, 6 of each kind were mounted on a certain kind of compact car. Then each car was run into a concrete wall at 5 miles per hour and the following are the cost of the repairs.   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Bumper guard 1 | 107 | 148 | 123 | 165 | 102 | 119 | 120 | 130 | | Bumper guard 2 | 134 | 115 | 112 | 151 | 133 | 129 | 125 | 116 |   Use the 0.01 level of significance to test whether the differences between the means of these two samples is significant? | 5 | 5 | 10 |
| 4 | A sample of 26 bulbs gives a mean life of 990 hrs with a standard deviation of 20hrs the manufacturer clamps that the mean life of bulbs is 1000hrs is the sample not up to the standard. | 5 | 5 | 10 |
| 5 | Explain the paired F- test procedure? | 5 | 3 | 10 |
| 6 | The Nestle company pre pared a nutrition food for babies select 15subject feeding on three months their weights in kg data as follows   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Before test | 11 | 11 | 13 | 11 | 15 | 9 | 12 | 12 | 12 | 10 | 10 | 13 | 11 | 12 | 10 | | After test | 14 | 11 | 15 | 13 | 18 | 12 | 14 | 13 | 15 | 12 | 14 | 12 | 14 | 13 | 15 |   Test at 0.05 level the nutrition food significantly increased weight or not? | 5 | 5 | 10 |
| 7 | Two horses A& B were tested according to the time (in seconds) to run a particular track with the following results.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Horse A | 28 | 30 | 32 | 33 | 33 | 29 | 34 | | Horse B | 29 | 30 | 30 | 24 | 27 | 29 | - |   Test whether the two horses have the same running capacity? | 5  5 | 5  5 | 5  5 |
| 8 | Explain the test procedure for - test for independence of attributes | 5 | 3 | 10 |
| 9 | To the given data Fitting of Poisson distribution good or bad test at 0.05 LOS?   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | f | 305 | 366 | 210 | 80 | 28 | 9 | 2 | 1 | | 5 | 5 | 10 |
| 10 | To determine whether there really is a relationship between an employee’s performances in the companies training program and his or her ultimate successes in the job the company takes a sample of 400 cases from its very extensive files and obtained the results shown in the following tables.   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | employee’s performances | | | | | Success in job |  | Below average | Average | Above average | | Poor | 23 | 60 | 29 | | Average | 28 | 79 | 60 | | Very good | 9 | 49 | 63 | | 5 | 5 | 10 |
| 11 | Given the following contingency table for hair colour and eye colour. Find the value of . Is there good association between the two?     |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Eye Colour | Hair Colour | | | | | |  | Fair | Brown | Black | Total | | Blue | 15 | 5 | 20 | 40 | | Grey | 20 | 10 | 20 | 50 | | Brown | 25 | 15 | 20 | 60 | | Total | 60 | 30 | 60 | 150 | | 5 | 5 | 10 |
| 12 | A Firm manufacturing rivets warns to limit variations in their length as much as possible. The lengths (in cms) of 10 rivets manufactured by a new process are   |  |  |  |  |  | | --- | --- | --- | --- | --- | | 2.15 | 1.99 | 2.05 | 2.12 | 2.17 | | 2.01 | 1.98 | 2.03 | 2.25 | 1.93 |   Examine whether the new process can be considered superior to the old if the old population has standard deviation 0.145 cm? | 5 | 5 | 10 |

**COURSE CO-ORDINATOR HOD, FED**