CBCS SCHEME

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BCH301

Third Semester B.E/B.Tech. Degree Supplementary Examination, June/July 2024
Probability and Statistics

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. M : Marks , L: Bloom's level , C: Course outcomes.
3. Statistical table and data handbook may be provided

		Module – 1	M	L	C
1	a.	Explain : i) Range ii) Interquartile Range iii) Quartile deviation.	6	L1	CO1
	b.	Find mean deviation about mean for the data : Class: 0 – 5 | 5 – 10 | 10 – 15 | 15 – 20 | 20 – 25 Frequency: 3 | 5 | 12 | 6 | 4	7	L2	CO1
	c.	The following are the scores of two batsmen A and B in a series of innings : A: 12 | 115 | 6 | 73 | 7 | 19 | 119 | 36 B: 47 | 12 | 16 | 42 | 4 | 51 | 37 | 48 Who is the better score getter and who is more consistent?	7	L3	CO1
		OR			
2	a.	An incomplete frequency distribution is given as follows : Variable: 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 Frequency: 12 | 30 | ? | 65 | ? | 25 | Given that the total frequency is 229 and median is 46. Find the missing frequencies.	6	L2	CO1
	b.	Calculate the mean and standard deviation for the data : Size of item: 6 | 7 | 8 | 9 | 10 | 11 | 12 Frequency: 3 | 6 | 9 | 13 | 8 | 5 | 4	7	L2	CO1
	c.	The first four moments about the working mean 28.5 of a distribution are 0.294, 7.144, 42.409 and 454.98. Calculate the skewness and kurtosis of the distribution.	7	L3	CO1
		Module – 2			
3	a.	The two regression equations of the variables x and y are x = 19.13 – 0.87y and y = 11.64 – 0.50x. Find : i) Mean of x and y ii) The correlation coefficient between x and y.	6	L2	CO2
	b.	Find the coefficient of correlation between industrial production and export using the following data and comment on the result. Production (in crores): 55 | 56 | 58 | 59 | 60 | 60 | 62 Exports (in crores): 35 | 38 | 38 | 39 | 44 | 43 | 45	7	L3	CO2
	c.	Fit a second degree parabola $y = a + bx + cx^2$ to the data : x: 0 | 1 | 2 | 3 | 4 y: 1 | 1.8 | 1.3 | 2.5 | 6.3	7	L3	CO2

OR

4	a.	Find the regression line of y on x for the data : x: 1, 3, 4, 6, 8, 9, 11, 14 y: 1, 2, 4, 4, 5, 7, 8, 9 Estimate the value of y when x = 10.	**6**	**L2**	**CO2**
	b.	i) Explain positive correlation and negative correlation ii) Compare correlation and regression.	**7**	**L1**	**CO2**
	c.	If P is the pull required to lift a load W by means of a pulley block, find a linear law of the form P = mw + C connecting p and w, using the data : P: 12, 15, 21, 25 W: 50, 70, 100, 120 Where P and W are taken in kg. compute P when w = 150kg.	**7**	**L3**	**CO2**

Module – 3

5	a.	i) Define mutually exclusive events with example. ii) Define independent events with example.	**6**	**L1**	**CO3**
	b.	A pair of dice is tossed twice. Find the probability of scoring 7 points i) Once ii) At least once iii) twice.	**7**	**L2**	**CO3**
	c.	A can hit a target 3 times in 5 shots. B 2 times in 5 shots and C three times in 4 shots. They fire a valley. What is the probability that : i) Two shots hit ii) at least 2 shots hit?	**7**	**L3**	**CO3**

OR

6	**a.**	Define : i) Random experiment ii) Event iii)Sample space.	**6**	**L1**	**CO3**
	b.	Given : $P(A)=\frac{1}{4}$, $P(B)=\frac{1}{3}$ and $P(A\cap B)=\frac{1}{2}$, evaluate P(A/B), P(B/A), P(A∩B′).	**7**	**L2**	**CO3**
	c.	Three machines M_1, M_2 and M_3 produce identical items, of their respective output 5%, 4% and 3% of items are faulty. On a certain day M_1 has produced 25% of the total output, M_2 has produced 30% and M_3 the remainder. An item selected at random is found to be faulty, what are the chances that it was produced by the machine with the highest output?	**7**	**L3**	**CO3**

Module – 4

7	a.	The probability distribution of a finite random variable is given by x: –2, –1, 0, 1, 2, 3 P(X): 0.1, K, 0.2, 2K, 0.3, K i) Find K ii) P(x < 1) iii) P(–1 < x ≤ 2).	**6**	**L2**	**CO4**
	b.	The proability that the pen manufactured by the company will be defective is 0.1. If 12 such pens are selected, find the probability that : i) Exactly two will be defective ii) Atleast 2 will be defective iii)None will be defective.	**7**	**L2**	**CO4**
	c.	The mean and standard deviation of the marks obtained by 1000 students in an exam are respectively 34.4 and 16.5. Assuming the normality of the distribution, find the approximate number of students expected to obtain the marks between 50 and 60.	**7**	**L2**	**CO4**

		OR			
8	a.	The probability density function of the continuous random variable x is $P(x)=\begin{cases} Kx(1-x)e^{x}, & 0\le x\le 1 \\ 0, & \text{elsewhere} \end{cases}$ i) Find K ii) mean iii) Standard deviation.	**6**	**L2**	**CO4**
	b.	If the probability of a bad reaction from a certain injection is 0.001. Describe the chance that out of 2000 individuals, more than 2 will get a bad reaction.	**7**	**L3**	**CO4**
	c.	The sales per day for a shop is exponentially distributed with the average sale amounting to Rs.100 and net profit is 8%, find the probability that the net profit exceeds Rs.30 on two consecutive days.	**7**	**L2**	**CO4**
		Module – 5			
9	a.	Explain the following terms : i) Standard error ii) Critical region iii) Test of significance.	**6**	**L1**	**CO5**
	b.	A coin was tossed 400times, and the head turned up 216 times. Test the hypothesis that the coin is unbiased at 5% level of significance.	**7**	**L2**	**CO5**
	c.	The nine items of the sample have the values, 45, 47, 50, 52, 48, 47, 49, 53 and 51. Does the mean of these differ significantly from the assumed mean of 47.5? $[t_{0.05}(8)= 2.31]$.	**7**	**L2**	**CO5**
		OR			
10	a.	Define null hypothesis, significance level, Type–I and Type–II error.	**6**	**L1**	**CO5**
	b.	The means of two random samples of sizes 9 and 7 are 196.42 and 198.82 respectively. The sum of squares of the deviations from the mean are 26.94 and 18.73 respectively. Can the sample be considered to have been drawn from the same normal population?	**7**	**L2**	**CO5**
	c.	The following table gives the number of road accidents that occurred in a city during the various days of a week. Day | Sun | Mon | Tue | Wed | Thu | Fri | Sat No. of accident | 14 | 16 | 8 | 12 | 11 | 9 | 14 $\left[\Psi^{2}_{0.05}(6)=12.59\right]$	**7**	**L3**	**CO5**

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