Reg. No.						
Question Paper Code12903						
B.E. / B.Tech DEGREE EXAMINATIONS, APRIL / MAY 2024						
Third Semester						
Artificial Intelligence and Data Science						
(Common to Computer Science and Engineering (AIML) & Computer Science and						
Engineering (IoT))						
20BSMA302 - PROBABILITY AND STATISTICAL MODELLING						
Regulations - 2020						
Duration: 3 Hours Max.	Marks	: 100				
PART - A $(10 \times 2 = 20 \text{ Marks})$ Answer ALL Questions	Marks	K– Level CO				
1. What is the probability that a non-leap year selected at random will contain 53 Tuesdays?	2	KI COI				
 The mean of Binomial distribution is 20 and standard deviation is 4. Find the parameters of the distribution 	2	K1 CO1				
3. The joint probability function (X,Y) is given by $P(x,y) = k (2x + 3y)$ x = 0.12, y = 1.23 Find the value of K	2	K2 CO2				
4. State Central Limit Theorem.	2	K2 CO2				
5. Define the null hypothesis and alternative hypothesis.	2	KI CO3				
6. The regression equations are $3x + 2y = 26$ and $6x + y = 31$. Find the correlation coefficient.	2	K1 CO3				
7. Mention the advantages of Nonparametric Tests.	2	K1 CO4				
8. Explain sign test.	2	K2 CO4				
9. Define point estimation.	2	K2 CO5				
10. What do you mean by stationarity of time series?	2	K2 CO5				
PART - B (5 × 16 = 80 Marks) Answer ALL Questions						

11. a) A bolt is manufactured by 3 machines A, B, and C. A turn out twice 16 K2 COI as many items as B and machines B and C produce equal number of items. 2% of bolts produced by A and B are defective and 4% of bolts produced by C are defective. All bolts are put into 1 stock pile and 1 is chosen from this pile. What is the probability that it is defective?

OR

b) In a test on 2000 electric bulbs, it was found that bulbs of a ¹⁶ K² CO1 particular make, was normally distributed with an average life of 2040 hours and standard deviation of 60 hours. Estimate the number of bulbs likely to burn for :
1. more than 2150 hours; 2. less than 1950 hours; 3. less than 1980

4. more 1920 hours but less than 2100 hours

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create 12903

12.	a)	The joint distribution of X and Y is given by $f(x, y) = \frac{x+y}{21}$, x = 1,2,3; y = 1,2. Find the marginal distributions of X and Y.	16	K3 CO2
	b)	The lifetime of a certain brand of an electric bulb may be considered a RV with mean 1200h and standard deviation 250h. Find the probability, using central limit theorem, that the average life time of 60 bulbs exceeds 1250h.	16	K3 CO2
13.	a)	From the following data, find (i)The two regression equations (ii) The coefficient of correlation between the marks in Mathematics and Statistics (iii) The most likely marks in Statistics when marks in Mathematics are 30. Marks in Maths: 25 28 35 32 31 36 29 38 34 32 Marks in Statistics: 43 46 49 41 36 32 31 30 33 39	16	K3 CO3
	b)	The accompanying data resulted from an experiment comparing the	16	K3 CO3
	-)	degree of soiling for fabric copolymerized with the 3 differentmixtures of met acrylic acid. Analyze the classification.Mixture 1: 0.561.120.901.070.94Mixture 2: 0.720.690.870.780.91Mixture 3: 0.621.081.070.990.93		
14.	a)	In 30 tosses of a coin, the following sequence of head and tails is obtained HTTHTHHHTHHTHTHTHTHHTHTHTHTHTHTHTHT (i) Determine the number of runs (ii) Test at 0.10 level of significance, whether the sequence is random.	16	K3 CO4
	b)	Apply Mann-Whitney U test to determine if there is a significant	16	K3 CO4
	,	difference in the age distribution of the two groups Day College: 26 18 25 27 19 30 34 21 33 31 Evening College: 32 24 23 30 40 41 42 39 45 35		
15.	a)	For a random sampling from a normal population find the maximum likelihood estimators for (i) The population mean, when the population variance is known. (ii) The population variance, when the population mean is known. (iii) The simultaneous estimation of both the population mean and	16	K4 CO5
		variance.		
	b)	Explain the brief details about the ARIMA models for time series forecasting.	16	K4 CO5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create 2 12903