Roll No. | | | | | | | | | | | | | Total No. of Pages : 03

Total No. of Questions : 18

B.Tech. (CSE/IT) (2018 & Onwards)/(CE)/(ME) (Sem.–2)

MATHEMATICS-II

Subject Code : BTAM-204-18

M.Code : 76257

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

Answer the following :

1) Define Probability of an event.

2) Let X be the random variable such that P(X = –2) = P (X = –1), P(X = 2) = P(X=1) and P(X>0) = P(X<0) = P(X = 0). Obtain the probability mass function of X.

3) What is Spearman's rank correlation coefficient?

4) State chi-square and Student's t- distributions.

5) Define Discrete Variables.

6) If arithmetic mean is 56.50, median is 59.50 and standard deviation is 12.40. Find the skewness.

7) Differentiate between the discrete and continuous random variables.

8) Write the normal equations for the curve fitting $y = a + b\,x$ by the method of least squares.

9) Define Regression Coefficients.

10) Define Null and alternative hypothesis.

SECTION-B

11) a) Find the Karl Pearson's coefficient of skewness from the following data :

Size :	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Frequency :	10	18	30	25	12	3	2

b) Show that the correlation coefficient r_{xy} between the two variables x and y is given by

$$r_{xy} = \frac{\sigma_x^2 + \sigma_y^2 - \sigma_{x-y}^2}{2\sigma_x\sigma_y}$$

where σ_x, σ_y and σ_{x-y} are the standard deviations of x, y and $x - y$ respectively.

12) a) Two fair dice are thrown independently. Three events A, B and C is defined as follows :

A: Even face with first dice.

B: Even face with second dice.

C: Sum of the points on the two dice is odd.

Discuss the independence of events A, B and C.

b) From a bag containing 4 white and 6 red balls, three balls are drawn at random. If each white ball drawn carries a reward of Rs. 4 and each red ball Rs. 6, find the expected reward of the draw.

13) a) With the usual notations, find p for a binomial random variable X if $n = 6$ and $9\,P(X = 4) = P(X = 2)$.

b) If the flowers on a truck are classified as A, B, and C according to a size-weight index as: under 75, between 75 and 80, and above 80. Find approximately (assuming a normal distribution) the mean and standard deviation of a lot in which A are 58%, B are 38% and C are 4%. Given that $P(0< Z< 0.20) = 0.08$ and $P(0<Z< 1.75) = 0.46$, where Z is standard normal variate.

14) From the given data, find :

Marks in Mathematics	25	38	35	32	31	36	29	38	34	32
Marks in Statistics	43	46	49	41	36	32	31	30	33	39

a) The two regression equations,

b) The coefficient of correlation between the marks in Mathematics & Statistics

c) The most likely marks in Statistics when the marks in Mathematics are 30.

SECTION-C

15) The intelligence quotients (IQ) of 16 students from B.Tech. IInd year showed a mean of 107 and a standard deviation of 10, while the IQs of 14 students from B.Tech. 1st year showed a mean of 112 and a standard deviation of 8. Is there a significant difference between the IQs of the two groups at significance levels of 0.05? Given that critical value at 28 degree of freedom with 5% level of significance is 2.05.

16) a) Suppose that the life length of the two bulbs B1 and B2 have distribution N(x; 40,36) and N(x; 45, 9) respectively. If the bulb is to be used for 45-hour period, which bulb is to be preferred? If it is to be used for 48-hour period, which bulb is to be preferred? Given that P(Z<0.83)=0.7967, P(Z<1.33)=0.9082, P(Z<1.00) = 0.8143.

b) The time required to repair a machine is exponentially distributed with parameter ½. What is the probability that a repair time exceeds 2 hours? What is the conditional probability that a repair time takes at least 10 hours given that its duration exceeds 9 hours?

17) The prices of a commodity during 2011-2016 are given below. Fit a parabola $Y = a + bX + cX^2$ to these data.

Year (X)	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Price (Rs.) (Y)	100	107	128	140	181	192

18) a) Before an increase in excise duty on tea, 400 people out of a sample of 500 persons were found to be tea drinkers. After an increase in duty, 400 peoples were tea drinker in a sample of 600 people. Using standard error of proportion, state whether there is a significant decrease in the consumption of tea. Take level of significance at 5%.

b) The number of scooter accidents per month in a certain town were as follows :

12	8	20	2	14	10	15	6	9	4

Are these frequencies in agreement with the belief that accident conditions were the same during this 10 month period? (The table value of χ^2 for 9 d.f. at 5% level of significance is 16.919).

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.