H Roll No. .....

TMA–202

B. TECH. (SECOND SEMESTER) MID SEMESTER EXAMINATION, 2019

(ALL BRANCHES)

PROBABILITY AND DIFFERENTIAL EQUATIONS

Time : 1 : 30 Hours

Maximum Marks : 50

Note : (i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

Section—A

1. Fill in the blanks/True-False : (1×5=5 Marks)

(a) The probability of a leap year selected at random contains 53 Sundays is $\frac{53}{366}$. (True/False)

(b) What is the probability that a number selected from the numbers 1, 2, 3, ..., 15 is a multiple of 4 ?

(c) The sum of the probability of an event and non-event is 1. (True/False)

(d) The following probabilities are given; choose the correct answer for that which is not possible ?

(i) 0.15

(ii) 2/7

(iii) 7/5

(iv) None of these

(e) Probability of second event in situation if first event has been occurred is classified as conditional probability. (True/False)

2. Attempt any *five* parts : (3×5=15 Marks)

(a) Mother, father and son line up at random for a family picture. Find P (A/B), if A and B defined as follows : A = Son on one end, B = Father in the middle.

(b) If A and B are two events associated with a random experiment such that P (A) = 0.8, P (B) = 0.5, P (B/A) = 0.4, find P (A/B) and P (A ∪ B).

(c) Define discrete random variable with an example.

(d) If a pair of dice is thrown and X denotes the sum of the numbers on them, find the probability distribution of X. Also, find the expectation of X.

(e) Define continuous probability distribution and normal distribution with examples.

(f) A pair of dice is thrown 7 times. If getting a total of 7 is considered a success, what is the probability of no success ?

Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) There are two bags. The first bag contains 5 white and 3 black balls and second bag contain 3 white and 5 black balls. Two balls are drawn at random from the first bag and are put into the second bag without noticing their colours. Then two balls are drawn from the second bag. Find the probability that the balls are white and black.

(b) Suppose that 6% of the people with blood group O are left handed and 10% of those with other blood groups are left handed. 30% of the people have blood group O. If a left handed person is selected at random, what is the probability that he/she will have blood group O ?

(c) From a lot of 10 items containing 3 defectives, a sample of 4 items is drawn at random. Let the random variable X denote the number of defective items in the sample. If the sample is drawn randomly, find

(i) $P(X \leq 1)$

(ii) $P(0 < X < 2)$

4. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) A coin is tossed 5 times. What is the probability of getting at least 3 heads ?

(b) Two cards are drawn successively with replacement from a well-shuffled deck of 52 cards. Find the mean and variance of the number of aces.

(c) Find the first two moments of a binomial distribution about mean.

5. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) Six coins are tossed 6400 times. Using the Poisson distribution, what is approximate probability of getting six heads x times ?

(b) Three groups of children contain 3 girls and 1 boy, 2 girls and 2 boys, 1 girl and

3 boys. One child is selected at random from each group. Show that the chance that the three selected consist of 1 girl and 2 boys is $\frac{13}{32}$.

(c) Calculate the coefficient of correlation between the values of x and y given below :

X	Y
8	98
2	74
6	87
4	82
2	72

370