Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – April/May– 2017**

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| **Code :** | **16MA1004** | **Duration :** | **3hrs** |
| **Sub. Name :** | **APPLIED MATHEMATICS-PROBABILITY AND STATISTICS** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| Q. No. | Sub Div. | Questions | Course  Outcome | | | Marks |
| 1. | a. | A freshman class consists of 40 students, 30 of which are women. The class needs to select a committee of 7 to represent them in the student senate. How many committees are possible if  (i) the committee must have exactly 5 women?  (ii) the committee must have at least 5 women? | CO1 | | | 10 |
|  | b. | A lot consists of 10 good articles, 4 with minor defects and 2 with major defects. Two articles are drawn at random, Find the probability that (i) both are good article (ii) both have major defects (iii) at least one is good (iv) at most 1 is good (v) Exactly 1 is good. | CO1 | | | 10 |
| (OR) | | | | | | |
| 2. | a. | Twelve skiers are competing in the final round of the Olympic freestyle skiing aerial competition.  a) In how many different ways can the skiers finish the competition? (Assume there are no ties).  b) In how many different ways can 3 of the skiers finish first, second, and third to win the gold, silver, and bronze medals? | CO1 | | | 10 |
|  | b. | a)An elementary School has 500 students. How many of them were born on the same day of the year?  b) Derek must choose a four-digit PIN number. Each digit can be chosen from 0 to 9.How many different possible PIN numbers can Derek choose? | CO1 | | | 10 |
| 3. | a. | It has been claimed that in 60% of 5 solar heat installations for the utility bill is reduced by at least one third. Use binomial distribution and find the probability that utility bill is reduced by at least one third in(i) Exactly four installations (ii) At least  four installations. | CO2 | | | 10 |
|  | b. | A bag contains 7 red and 3 black marbels and another bag contains 4 red and 5 black marbels. One marble is transferred from the first bag and then a marble is taken out of the second bag at random. If the marble happens to be red, find the probability that a black marble was transferred. | CO2 | | | 10 |
| (OR) | | | | | | |
| 4. | a. | The probability that a new airport will get an award for its design is 0.16, the probability that it will get an award for the efficient use of materials is 0.24, and the probability that it will get both awards is 0.11.  a)What is the probability that it will get at least one of the two awards?.  b) What is the probability that it will get only one of two awards? | CO2 | | | 10 |
|  | b. | If the probability that a communication system has high selectivity is 0.54 and the probability that it will have high fidelity is 0.81 and the probability that it will have both is 0.18. What is the probability that  (i) a system with high fidelity will also have high selectivity?  (ii) a system with high selectivity will also have high fidelity? | CO2 | | | 10 |
| 5. | a. | A typist kept a record of, mistakes per day during 300 working days. Fit a Poisson distribution for the following data:   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Mistakes | 0 | 1 | 2 | 3 | 4 | | No of days | 143 | 90 | 44 | 14 | 9 | | CO3 | | | 10 |
|  | b. | Out of 800 families with 4 children each , how many families would be expected to have i) 2 boys and 2 girls. ii) atleast one boy? Assume equal probabilities for both boys and girls. | CO3 | | | 10 |
| (OR) | | | | | | |
| 6. | a. | If X is a normal variate with means 30 and S.D is 5.  Find P(26<X<40). | | CO3 | | 10 |
|  | b. | The time required to assemble a piece of machinery is a random variable having approximately a normal distribution with mean 12.9 minutes and SD is 2 minutes. Using normal distribution, Find the probabilities that assemble of a piece of machinery of this kind will take (i) Less than 11.5 minutes (ii) More than 13.5  (iii) between 11 and 14.8. | | CO3 | | 10 |
| 7. | a. | Draw the histogram, frequency polygon, frequency curve for the following distribution of marks obtained by 49 students:   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Class | | 5-10 | 10-15 | | 15-20 | | 20-25 | 25-30 | 35-40 | | Frequency | | 5 | 6 | | 15 | | 10 | 5 | 4 | | Class | 40-45 | | 45-50 | | | Frequency | 2 | | 2 | | | | CO4 | 10 | |
|  | b. | Two random variables have the lines of regression as 3x + 2y = 26 and 6x + y = 31.Calculate mean values and coefficient of correlation between x and y. | | CO4 | 10 | |
| (OR) | | | | | | |
| 8. | a. | Calculate the mode for the following data:   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Weight | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | | No of  articles | 16 | 19 | 20 | 28 | 23 | 19 | | | CO4 | 10 | |
|  | b. | Find the rank Correlation Co-efficient between x and y :   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | x | 1 | 2 | 3 | 4 | 6 | 7 | 5 | 8 | | y | 2.5 | 5 | 2.5 | 8 | 4 | 1 | 6 | 7 | | | CO4 | 10 | |
|  | | **Compulsory**: | |  |  | |
| 9. |  | Calculate mean, median and mode of the following data:   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | x | 10 - 20 | 20 - 30 | | | 30 - 40 | 40 – 50 | 50 - 60 | | f | 5 | 8 | | | 30 | 82 | 45 | | x | 60 - 70 | | 70 – 80 | | f | 24 | | 6 | | | CO3 | 20 | |

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