**Hall Ticket Number: 18MA003**

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| **II/IV B.Tech (Regular/Supplementary) DEGREE EXAMINATION** | | | |
| **July, 2021** | **Common to IT & ME** | | |
| **Fourth Semester** | **Probability and Statistics** | | |
| **Time:** Three Hours | | **Maximum: 5**0 Marks | |
| *Answer Question No. 1 Compulsorily.* | | | (10X1 = 10 Marks) |
| *Answer* ***ANY ONE*** *question from each Unit.* | | | (4X10=40 Marks) |

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| 1. | a) | Define a random variable. | CO1 | |  |
|  | b) | Define Uniform distribution. | CO1 | |  |
|  | c) | Find the value of | CO1 | |  |
|  | d) | Define a population parameter. | CO2 | |  |
|  | e) | Write the test statistic for one mean. | CO2 | |  |
|  | f) | Write the test statistic for a paired t-test. | CO2 | |  |
|  | g) | What are the assumptions of ANOVA. | CO3 | |  |
|  | h) | What is the test statistic for β0. | CO3 | |  |
|  | i) | Explain correlation. | CO4 | |  |
|  | j) | Write normal equations of linear regression. | CO4 | |  |
| **Unit – I** | | | | | |
| 2. | a) | In a certain country, the proportion of highway sections requiring repairs in any given year is a random variable have Beta distribution with The probability distribution function is  (i) On the average, what percentage of the highway sections require repairs in any given year.  (ii) Find the probability that at most half of the highway sections will require repairs in any given year. | CO1 | **5M** | |
|  | b) | If X is a normal random variable with mean 30 and standard deviation 5. Find the probability that | CO1 | **5M** | |
|  |  | **(OR)** |  |  | |
| 3. | a) | The joint probability density of two random variables is given by    Find the probability that the first random variable will take on a value less than 2 and second random variable will take on a value greater than 2 . | CO1 | **5M** | |
|  | b) | The probability that an electronic components will fail in less than 1000 hours of continuous use is 0.25. Use the normal approximation to find the probability that among 200 such components fewer than 45 will fail in less than 1000 hours of continuous use. | CO1 | **5M** | |
| **Unit – II** | | | | | |
| 4. | a) | A sample of 26 bulbs gives a mean life of 990 hours with a standard deviation of 20 hours. The manufacturer claims that the mean life of bulbs is 1000 hours. Is the sample not up to the standard. Take α = 0.05 | CO2 | **5M** | |
|  | b) | Two horses A and B were tested according to the time (in seconds) to run a particular track with the following results   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Horse A | 28 | 30 | 32 | 33 | 33 | 29 | 34 | | Horse B | 29 | 30 | 30 | 24 | 27 | 29 |  |   Test whether both horses have the same running capacity. Take α = 0.05 | CO2 | **5M** | |
|  |  | **(OR)** |  |  | |
| 5. | a) | A random sample of size 16 values form a normal population showed a mean of 53 and a sum of squares of deviations from the mean equals to 150. Obtain 95% confidence limits of the mean of the population. | CO2 | **5M** | |
|  | b) | Scores obtained in a shooting competition by soldiers before and after intensive training are given below   |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Before | 67 | 24 | 57 | 55 | 63 | 54 | 56 | 68 | 33 | 43 | | After | 70 | 38 | 58 | 58 | 56 | 67 | 68 | 75 | 42 | 38 |   Test whether intensive training is useful at 0.01 level. | CO2 | **5M** | |
| **P.T.O**  **18MA003**  **Unit - III** | | | | | |
| 6. | a) | Three different machines are used for a production. On the basis of the outputs, test whether the machines are equally effective   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Machine 1 | 10 | 5 | 11 | 10 | | Machine 2 | 9 | 7 | 5 | 6 | | Machine 3 | 20 | 16 | 10 | 4 | | CO3 | **10M** | |
|  |  | **(OR)** |  |  | |
| 7. | a) | The lapping process which is used to grind certain silicon wafers to the proper thickness is acceptable only if, the population standard deviation of the thickness of dice cut from the wafers is at most 0.50 mil. Use the 0.05 level of significance to test the null hypothesis =0.50 against the alternative hypothesis > 0.50, if the thickness of 15 dice cut from such wafers have a standard deviation of 0.64 mil. | CO3 | **5M** | |
|  | b) | In a random sample of 600 cars making a right turn at a certain intersection, 157 pulled into wrong lane. Test the null hypothesis that actually 30% of all drivers make this mistake at the given intersection, using the alternative hypothesis p  0.30 and the level of significance = 0.05. | CO3 | **5M** | |
| **Unit - IV** | | | | | |
| 8. | a) | Calculate coefficient of correlation between X and Y   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | X | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | Y | 12 | 11 | 13 | 15 | 14 | 17 | 16 | 19 | 18 | | CO4 | **5M** | |
|  | b) | Fit a straight line to the following data by the method of least squares   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | x | 1 | 5 | 7 | 9 | 12 | | y | 10 | 15 | 12 | 15 | 21 | | CO4 | **5M** | |
|  |  | **(OR)** |  |  | |
| 9. | a) | The following data pertain to the number of computer jobs per day and the central processing unit time required:   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | x | 1 | 2 | 3 | 4 | 5 | | y | 2 | 5 | 4 | 9 | 10 |  1. Use the equation of the least squares line estimate the CPU time when x = 2.4. 2. Test the null hypothesis H0: β1 = 0 against the alternative H1: β1  0 at the 0.05 level of significance. 3. Find R2, the coefficient of determination. | CO4 | **10M** | |

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