**Hall Ticket No:**

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# BVRIT HYDERABAD

**COLLEGE OF ENGINEEING FOR WOMEN**

Nizampet Road, Bachupally, Hyderabad-500 090

II B. Tech I Semester II Midterm Examinations, May - 2023

# (Mathematical and Statistical Foundations)

CSE (AI&ML)

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| Date: 02/05/2023 FN | Duration : 1 hour | Max Marks: 10 |

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| **Q.No.** | | **Question** | **Course outcome** | **Blooms level** | **Marks** |
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| **Unit- III** | | | | | |
| 1. | a) | Write any five properties of *t*-distribution. | C213.4 | Knowledge | **2M** |
|  | b) | A population consists of five numbers 2,3,6,8 and11 .Consider all possible samples of size two which can be drawn without replacement from this population. Find  (i) The mean of the population  (ii) The standard deviation of the population  (iii) The mean of the sampling distribution of means and  (iv) The standard deviation of the sampling distribution of means. | C213.4 | Apply | **3M** |

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| **Unit- IV** | | | | | |
| 2. | a) | A machine produces metal pieces that are cylindrical in shape. A sample of pieces is taken, and the diameters are found to be 1.01, 0.97, 1.03, 1.04, 0.99, 0.98, 0.99, 1.01, and 1.03 centimeters. (a) Find a 99% confidence interval for the mean diameter of pieces from this machine, assuming an approximately normal distribution. (b) Find the 95% tolerance limits that contain 95% of the diameters. | C213.5 | Apply | **2M** |
| b) | A certain change in a process for manufacturing component parts is being considered. Samples are taken under both the existing and the new process so as to determine if the new process results in an improvement. If 75 of 1500 items from the existing process are found to be defective and 80 of 2000 items from the new process are found to be defective, find a 90% confidence interval for the true difference in the proportion of defectives between the existing and the new process. | C213.5 | Apply | **3M** |

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| **Unit-V** | | | | | |
| 3. | a. | Which of the following matrices are stochastic? Discuss?   1. (ii)  (iii) | C213.6 | Apply | **2M** |
|  | b. | The transition probability matrix is given by and (i) Find the distribution after three transitions (ii) Find the limiting probabilities. | C213.6 | Apply | **3M** |

Answer any two Questions. Each question carries equal marks.

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| **Unit-IV & Unit-V** | | | | | |
| 4. | a) | In a random sample of *n* = 500 families owning television sets in the city of Hamilton, Canada, it is found that *x* = 340 subscribe to HBO. Find a 95% confidence interval for the actual proportion of families with television sets in this city that subscribe to HBO. | C213.5 | Apply | **2M** |
|  | b) | An engineering professor acquires a new computer once every two years. The professor can choose from three models: *M*1, *M*2, and *M*3. If the present model is *M*1, the next computer can be *M*2 with probability .25 or *M*3 with probability .1. If the present model is *M*2, the probabilities of switching to *M*1 and *M*3 are .5 and .15, respectively. And, if the present model is *M*3, then the probabilities of purchasing *M*1 and *M*2 are .7 and .2, respectively. Represent the situation as a Markov chain. Write the transition diagram. | C213.6 | Apply | **3M** |