Course Code : 25MC1T05

BONAM VENKATA CHALAMAYYA INSTITUTE OF TECHNOLOGY & SCIENCE

**(AUTONOMOUS)**

***I –MCA I-Semester Regular Examinations (BR25), Feb - 2026***

MATHEMATICAL AND STATISTICAL FOUNDATIONS

Time: 3 hours Max. Marks: 60

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***Answer any Five Questions One Question from One UNIT***
***ALL the Questions Carry Equal Marks***

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| | **UNIT-I** | **Marks** | **CO** | **BL** |
|---|---|---|---|---|
| 1.a) | In a class there are 10 boys and 5 girls. A committee of 4 students is to selected from the class. Find the probability for the committee to contain at least 3 girls. | 6M | CO1 | L1 |
| b) | A,B,C are aiming to shoot a balloon. A will succeed 4 times out of 5 attempts. The chance of B to shoot the balloon is 3 out of 4 and that of C is 2 out of 3. If the three aim the balloon simultaneously, then find the probability that at least two of them hit the balloon. | 6M | CO1 | L3 |
| | **OR** | | | |
| 2.a) | A bag A contains 2 white and 3 red balls and a bag B contains 4 white and 5 red balls. One ball is drawn at random from one of the bags and it is found to be red. Find the probability that the red ball drawn is from bag B. | 6M | CO1 | L3 |
| b) | Is the function defined by $f(x)=\begin{cases}0, x<2\\ \frac{1}{18}(2x+1), 2\le x\le 3\\ 0, x>3\end{cases}$ a probability density function | 6M | CO1 | L5 |

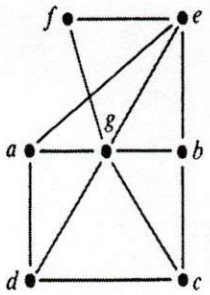
| | **UNIT-II** | **Marks** | **CO** | **BL** |
|---|---|---|---|---|
| 3.a) | A population consists of 5,10,14,18,13,24. Consider all possible samples of size two which can be drawn without replacement from the population. Find<br>(a) The mean of the population<br>(b) The standard deviation of the population<br>(c) The mean of the sampling distribution of means<br>(d) The standard deviation of the sampling distribution of means. | 12M | CO2 | L2 |
| | **OR** | | | |
| 4.a) | What is the size of the smallest sample required to estimate an unknown proportion to within a maximum error of 0.06 with at least 95% confidence $Z\alpha/2 = 1.96$ | 6M | CO2 | L4 |
| b) | A random sample of size 100 has a standard deviation of 5. What can you say about the maximum error with 95% confidence? | 6M | CO2 | L1 |

| | UNIT-III | Marks | CO | BL |
|---|---|---|---|---|
| 5.a) | Write about type I and type II errors. | 6M | CO3 | L1 |
| b) | In a random sample of 60 workers, the average time taken by them to get to work is 33.8 minutes with a standard deviation of 6.1 minutes can we reject the null hypothesis $\mu=32.6$ minutes in favour of alternative null hypothesis $\mu>32.6$ at $\alpha=0.025$ level of Significance? ($Z_{tab} = 2.58$) | 6M | CO3 | L3 |
| | **OR** | | | |
| 6.a) | 1000 students at college level were graded according to their I.Q and the economic conditions of their home. Use $\chi^2$ test to find out whether there is any association between condition at home and I.Q($\alpha = 0.05$) $X^2(0.05)=3.84$ | 12M | CO3 | L5 |

| Economic condition/I.Q | High | low | total |
|---|---|---|---|
| Rich | 460 | 140 | 600 |
| Poor | 240 | 160 | 400 |
| total | 700 | 300 | 1000 |

| | UNIT-IV | Marks | CO | BL |
|---|---|---|---|---|
| 7.a) | Let G= {-1,0,1}. Verify whether G forms an Abelian group under addition. | 6M | CO4 | L2 |
| b) | Define semi-groups and monoids. Give examples and properties of each. | 6M | CO4 | L3 |
| | **OR** | | | |
| 8.a) | Find the prime factorization of each of these integers i) 143, ii) 289 and iii) 899 | 6M | CO4 | L3 |
| b) | Find GCD of 615 and 1080 and find u and v such that GCD (615, 1080) = 615u+ 1084v | 6M | CO4 | L4 |

| | UNIT-V | Marks | CO | BL |
|---|---|---|---|---|
| 9.a) | Define the following graphs. i. Complete graph ii. Planar graph iii. Eulerian graph | 6M | CO5 | L2 |
| b) | Define Isomorphism of Graphs and give an example. | 6M | CO5 | L2 |
| | **OR** | | | |
| 10.a) | Explain chromatic number and chromatic index with example. | 6M | CO5 | L1 |
| b) | Find the Spanning tree of the following graph with vertices ordering abcdefg by using BFSA | 6M | CO5 | L4 |

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