Code No.: MA305BS | R20 | H.T.No. | | | 8 | R | | | | |

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–I–Semester End Examinations (Regular) - February- 2023
NUMBER THEORY & STATISTICAL METHODS
(CSC)

[Time: 3 Hours]   [Max. Marks: 70]

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 20 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A   (20 Marks)

1. a) State Central Limit Theorem. [2M]
   b) If the mean and variance of a binomial random variable X are 5 and 4, find $P(X=2)$. [2M]
   c) Write the test statistic in the test of significance for single mean. [2M]
   d) Explain briefly the chi square test. [2M]
   e) Find the canonical decomposition of 1919. [2M]
   f) Find GCD of 5295, 4321. [2M]
   g) State Chinese remainder theorem. [2M]
   h) Solve $9x = 12 \pmod{15}$. [2M]
   i) Define Euler's phi function. [2M]
   j) Compute $\varphi(6120)$. [2M]

PART-B   (50 Marks)

2. A survey of 240 families with 4 children each revealed the following distribution. [10M] Find the expected frequencies by Binomial distribution and test the goodness of fit.

Male Births	4	3	2	1	0
Observed freq.	10	55	105	58	12

OR

3. A Random sample of n=2and population size N=6 has the elements of 6, 10, 13, 14, [10M] 18 and 20. Find sampling distribution of without replacement estimate of
   i. Population mean.
   ii. Standard deviation of the population.
   iii. Mean of the sampling distribution of means

4. A random samples of size 20 from a normal population gives a mean of 42 and a [10M] variance of 25. Test the hypothesis that the population standard deviation is 8 at 5% level of significance.

OR

5. A sample of 64 students have a mean weight of 70 kgs. Can this be regarded as a [10M] sample from a population with mean weight 56 kgs and standard deviation 25 kgs.

6. State and prove fundamental theorem of arithmetic. [10M]

OR

7. By using Eucludean algorithm Find gcd of 26 &18 and express it in the form of linear [10M] combination.

8. Find the solution to the linear Diophantine equation $47x + 30y = 1$. [10M]

OR

9. Solve the linear congruence equation $17x = 9 \pmod{276}$. [10M]

10. State and prove Fermat's little theorem. [10M]

OR

11. Solve the linear congruence $4x = 7 \pmod{15}$ using Euler's theorem. [10M]

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