

Code No.: MA305BS

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CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II-B.TECH-I-Semester End Examinations (Regular) - January- 2022
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) Explain large and small samples. [2M]
- b) Define point and interval estimations. [2M]
- c) Explain level of significance. [2M]
- d) What is the critical region? [2M]
- e) Express 2021 in base sixteen. [2M]
- f) State the Fundamental theorem of arithmetic. [2M]
- g) Check whether the LDE $2019x + 2022y = 2021$ has a solution or not? [2M]
- h) Solve the congruence $21x \equiv 9 \pmod{15}$ [2M]
- i) State Euler's theorem. [2M]
- j) Find $\phi(2022)$, where ϕ is Euler phi-function. [2M]

PART-B

(50 Marks)

2. Find the mean and standard deviation of sampling distribution of variances for the population 2, 3, 4, 5 by drawing samples of size two with replacement. [10M]
- OR**
3. An ambulance service company claims that on an average it takes 20 minutes between a call for an ambulance and the patient's arrival at the hospital. If in 6 calls the time taken (between a call and arrival at hospital) are 27, 18, 26, 15, 20, 32. Can the company's claim be accepted? [10M]
4. Past experience shows that 40% of Indian youth favored 'cricket'. If in a random sample of 15 Indian youth, 8 favoured cricket, is there reason to believe that the proportion of Indian youth favoring cricket today has increased. Use 0.05 level of significance. [10M]
- OR**
5. Can we conclude that the two population variances are equal for the following data of post graduates passed out from a 'state' and 'private' university? [10M]
State: 8350 8260 8130 8340 8070
Private: 7890 8140 7900 7950 7840 7920
6. Using the Euclidean algorithm, express the gcd of 3076, 1976 as a linear combination of 3076, 1976. [10M]
- OR**
7. (a) If p is a prime and $p|ab$, then show that $p|a$ or $p|b$. [5M]
(b) Using the canonical decompositions of 720 and 8800, find their gcd and lcm. [5M]
8. (a) Solve the following 2 X 2 linear system [6M]
 $5x + 11y \equiv 8 \pmod{13}$, $11x + 5y \equiv 9 \pmod{13}$
(b) Using modular exponentiation, find the remainder when 2^{35} is divided by 7. [4M]
- OR**
9. Using Chinese Remainder Theorem, solve the following system [10M]
 $x \equiv 1 \pmod{2}$, $x \equiv 2 \pmod{3}$, $x \equiv 3 \pmod{5}$.

10. (a) State and prove Wilson's theorem.
(b) Calculate $40! \pmod{43}$.

[5M]
[5M]

OR

11. (a) State and prove Fermat's little theorem.
(b) If $1234^{4321} + 4321^{1234} \equiv n \pmod{11}$, then find n.

[5M]
[5M]
