Q.P. Code: 20CS0845 **R20**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B. Tech II Year I Semester Supplementary Examinations November-2022
MATHEMATICAL AND STATISTICAL METHODS
(Common to CSM & CIC)

Time: 3 hours Max. Marks: 60

(Answer all Five Units **5 x 12** = **60** Marks)

UNIT-I

1	**a**	State and prove division algorithm.	L4	6M
	b	If n is a composite integer, show that n has a prime factor not exceeding $\sqrt{n}$.	L2	6M

OR

2	**a**	Applying Euclidean algorithm, find the general solution of $63x-23y=-7$.	L2	6M
	b	Factorize 809009 using Fermat's method of factorization.	L3	6M

UNIT-II

3	**a**	Solve system of linear equations $3x+4y\equiv 5(\text{mod } 13)$ $2x+5y\equiv 7\ (\text{mod } 13)$.	L4	8M
	b	State and prove Wilson's theorem.	L3	4M

OR

4	**a**	Determine $2^{9!}(\text{mod } 5, 157, 437)$	L2	6M
	b	Find the remainder when 15^{1976} is divided by 23.	L2	6M

UNIT-III

5	**a**	If we can assert with 95% that the maximum error is 0.05 and p=0.2. Find the sample size.	L4	6M
	b	The mean and the standard deviation of a population are 11.795 and 14054 respectively. If n=50, find 95% confidence interval for the mean? And what is the maximum error we can assert at 95% confidence level?	L2	6M

OR

6		The mean of a random sample is an unbiased estimate of the mean of population 3, 6, 9, 15, 27. (a) List of all possible samples of size 3 that can be taken without replacement from the finite population? (b) Calculate the mean of each of the sample listed in (a) and assigning each sample a probability of 1/10. Verify that the mean of these X is equal to the mean of the population θ. Prove that $\bar{x}$ is an unbiased estimate of θ	L4	12M

UNIT-IV

7	**a**	Three boys A, B, C are throwing a ball to each other. A always through the ball to B and B always throws to C but C is just as likely to throw the ball to B as to A. show that the process is Markov chain. Find the transition matrix and classify the states.	L4	6M
	b	A college student X has the following study habits. If he studies one night, he is 70% sure to study the next night. If he does not study one night, he is only 60% sure not to study the next night also. Find (i) the transition probability matrix (ii) how often he studies in the long run.	L2	6M

OR

8	A gambler has Rs.2. He bets Re.1 at a time and wins Re.1 with probability $\frac{1}{2}$. He stops playing if he loses Rs.2 or wins Rs.4. (a) what is the transition probability matrix of the related Markov chain? (b) What is the probability that he has lost his money at the end of 5 plays? What is the probability that the game lasts more than 7 plays?	**L5**	**12M**

UNIT-V

9	At a railway station only one train is handled at a time. The railway yard is sufficient only for two trains to wait while other is given signal to leave the station. Trains arrive at the station at an average rate of 6 per hr. and the railway station can handled them on an average of 12 per hr. Assuming Poisson arrivals and exponential service distribution, find the steady state probabilities for the various number of trains in the system. Find also the average waiting time of a new train coming into the yard.	**L5**	**12M**

OR

10	Arrival rate of telephone calls at a telephone booth are according to Poisson distribution with an average tome of 12 min between two consecutive call arrivals. The length of telephone calls is assumed to be exponential distributed with mean 4 minutes. (i) Find the average queue length that forms from time to time. (ii) Probability that a caller arriving at the booth will have to wait. (iii) What is the probability that an arrival will have to wait for more than 15 minutes before the phone is free. (iv)Find the fraction of a day that the phone will be in use.	**L5**	**12M**

*** END ***