ACE Engineering College
(with a Difference in Excellence)
An AUTONOMOUS Institution

Question Paper Code: MA305BS

ACE-R20

Semester End Examination
II B. Tech- I Semester- MARCH-2022
Mathematical and Statistical Foundations
(Common to CSM, CSD)

Time: 3 Hours **Max. Marks: 70**

H. T. No										

*Answer any **5 Questions out of 8 Questions** from the following*

Q.No	Question	M
1. a)	Find the gcd of (2100, 21201)	7
b)	Solve the system of linear congruence $X \equiv 2 \pmod 3$, $X \equiv 3 \pmod 5$, $X \equiv 2 \pmod 7$	7
2. a)	Fit a simple linear regression eqaution Y=a+bX to the following data X: 1, 2, 3, 4, 5, 6, 7, 8 Y: 1, 1.2, 1.8, 2.5, 3.6, 4.7, 6.6, 9.1	7
b)	The two regression equations of the variables x and y are x=19.13-0.87y and y=11.64-0.50x. Find Mean of x's, y's and correlation coefficient between x and y.	7
3. a)	A random variable X has the following probability function x: -2, -1, 0, 1, 2, 3 P(x): 0.1, k, 0.2, 2k, 0.3, k Find the value of k, mean and variance.	7
b)	X is random variable following binomial distribution with mean 2.4 and variance 1.44. Find P(X>=5), P(1<X<=4).	7
4. a)	The mean and sd of the marks obtained by 1000 students are 34.4 and 16.5 respectively. Assuming the normality of distribution find approximate number of students to obtain marks between 30 and 60.	6
b)	In a referendum 60% of voters voted in favor. A random sample of 200 voters was selected. What is the probability that in the sample (i) more than 130 voted in favor? (ii) between 105 and 130 inclusive voted in favour? (iii) 120 voted in favour?	8
5. a)	A population consists of five numbers 2,3,6,8 and11.Consider all possible samples of size 2 that can be drawn without replacement from this population. Find 1) The mean of the population 2) The standard deviation of the population 3) The mean of the sampling distribution of means	7
b)	Ten individuals are chosen at random from a normal population and their heights are found to be 63,63,66,67,68,69,70,70,71,71 inches. Find the probability of height more than 65 inches.	7

6. a)	Ten bearings made by a certain process have a mean diameter of 0.5060 cm with S.D of 0.0040 cm. Assuming that the data may be taken as a random sample from a normal distribution, construct a 95% confidence interval for the actual average diameter of the bearings?	7
b)	An oceanographer wants to check whether the depth of the ocean in a certain region 57.4 fathoms, as had previously been recorded. What can he conclude at the 0.05 level of significance, if readings taken at 40 random locations in the given region yielded a mean of 59.1 fathoms with a standard deviation of 5.2 fathoms.	7
7. a)	The mean yield of wheat from a district A was 210 pounds with S.D 10 pounds per acre from a sample of 100 plots. In another district the mean yield was 220 pounds with S.D 12 pounds from a samp le of 150 plots. Asssumeing that the S.D of yield in the entire state was 11 pounds, test whether there is any significant difference between the mean yield of crop in the two districts.	7
b)	A manufacturer of electronic equipment subjects samples of two completing brands of transistors to an accelerated performance test. If 45 of 180 transistors of the first kind and 34 of 120 transistors of the second kind fail the test, what can he conclude at the level of significance $\propto = 0.05$ about the difference between the corresponding sample proportions?	7
8. a)	Define Markov Processes and Markov Chain and give examples	5
b)	A person owning a scooter has the option to switch over to scooter, bike or a car next time with the probability of [0.3 0.5 0.2]. If the transition probability matrix is $\begin{bmatrix} 0.4 & 0.3 & 0.3 \\ 0.2 & 0.5 & 0.3 \\ 0.25 & 0.25 & 0.5 \end{bmatrix}$ what are the probability of vehicles elated to his fourth purchase.	9