



**ACE**  
Engineering College  
(with a Difference in Excellence)

An AUTONOMOUS Institution

Question Paper Code:

MA305BS

ACE-R20

**Semester Supplementary Examination**  
**II B. Tech- I Semester- SEPTEMBER-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	Marks												
1. a)	Find gcd(12378, 3054) by using the Euclidean Algorithm	7												
b)	Solve the linear congruence $9x \equiv 21 \pmod{30}$	7												
2. a)	Following data gives the data on rainfall and discharge in a certain river. Obtain the line of regression of y on x <table border="1" style="margin-left: 20px;"> <tr> <td>Rainfall: X</td> <td>1.53</td> <td>1.78</td> <td>2.6</td> <td>2.95</td> <td>3.42</td> </tr> <tr> <td>Discharge: Y</td> <td>33.5</td> <td>36.3</td> <td>40</td> <td>45.8</td> <td>53.5</td> </tr> </table>	Rainfall: X	1.53	1.78	2.6	2.95	3.42	Discharge: Y	33.5	36.3	40	45.8	53.5	7
Rainfall: X	1.53	1.78	2.6	2.95	3.42									
Discharge: Y	33.5	36.3	40	45.8	53.5									
b)	In a partially destroyed laboratory record, only the lines of regression of y on x and x on y available as $4x-5y+33=0$ and $20x-9y=107$ respectively. Calculate Means of X's and Y's.	7												
3. a)	If $f(x) = \begin{cases} \frac{1}{2}(x+1), & -1 < x < 1 \\ 0, & \text{elsewhere} \end{cases}$ represents pdf of a random variable X, find E(X) and V(X)	7												
b)	A car hire firm has two cars which it hires out day by day. The number of demands for a car on each day is distributed as Poisson Variate with mean 1.5. Calculate the proportion of days on which (i) Neither car is used and (ii) some demand is refused	7												
4. a)	In a normal distribution 31% of the items are under 45 and 8% are over 64. Find mean and SD of the distribution.	10												
b)	The mean height of 500 students is 151cm and sd is 15cms. Assuming that the height are normally distributed, find how many students height lie between 120 and 155cms.	4												
5. a)	A population consists of four numbers 1,5,6 and 8. 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 Variance	8												
b)	Nine items of a sample has the following values 45,47,50,52,48,47,49,53 and 51. Find $P(46 < X < 53)$	6												
6. a)	Find 95% confidence limits for mean of a normality distributed population from which the following sample was taken 15, 17, 10, 18, 16, 9, 7, 11, 13, 14.	7												

b)	According to the norms established for a mechanical aptitude test, persons who are 18 years old have an average height of 73.2 with a standard deviation of 8.6. If 40 randomly selected persons of that age averaged 76.7, test the hypothesis $\mu=73.2$ against the alternative hypothesis $\mu>73.2$ at the 0.01 level of significance.	7
7. a)	The means of two large samples of sizes 1000 and 2000 members are 67.5 inches and 68.0 inches respectively. Can the samples be regarded as drawn from the same population of S.D 2.5 inches.	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 $\alpha =0.05$ about the difference between the corresponding sample proportions?	7
8. a)	Define Stochastic Process with two examples	5
b)	Three Boys A, B and C are throwing a ball to each other. A always throws the ball to B and B always throws the ball to C. But C just as likely to throw the ball to B as to A. If C was the first person to throw the ball, find the probability that (i) A has the ball (ii) B has the ball (iii) C has the ball after 3 throw	9