



ACE
Engineering College
(with a Difference in Excellence)



An AUTONOMOUS Institutio

Question Paper Code:

MA301BS

ACE-R20

Semester End Examination
II B. Tech- I Semester- MARCH-2022
PROBABILITY AND STATISTICS & COMPLEX VARIABLES
(MECHANICAL ENGINEERING)

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)	State Baye's Theorem. In a certain college , 25% of boys and 10% of girls are studying Mathematics. The girls constitute 60% of the student body. (a) What is the probability that mathematics is being studied (b) If a student is selected at random and is found to be studying mathematics, find the probability that the student is a girl (c) a boy.	7
b)	If probability density of a random variable is given by $f(x) = \begin{cases} kx & \text{for } 0 \leq x \leq 2 \\ 2k & \text{for } 2 \leq x \leq 4 \\ k(6-x) & \text{for } 4 \leq x \leq 6 \end{cases}$ Find k and mean of density function	7
2. a)	The mean and variance of the Bionomial distribution are 4 and 4/3 respectively. Find $P(X \geq 1)$.	7
b)	Derive mean and variance of Bionomial distribution.	7
3. a)	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 favor (iii) 120 voted in favor.	7
b)	Write any five properties of Normal distribution	7
4. a)	In a hospital 480 females and 520 male babies were born in a week. Do these figures confirm the hypothesis that males and females are born in equal number.	7
b)	A simple sample of the height of 6400 Englishmen has a mean of 67.85 inches and a S.D. of 2.56 inches while a simple sample of heights of 1600 Austrains has a mean of 68.55 inches and S.D. of 2.52 inches. Do the data indicate that Austrains are on the average tallet than the Englishmen.	7

5. a)	An oceanographer wants to check whether the depth of the ocean in a certain region is 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														
b)	To compare two kinds of bumper guards, 6 of each kind were mounted on a car and then the car was run into a concrete wall. The following are the costs of repairs. <table border="1" data-bbox="258 481 1161 571"> <tbody> <tr> <td>Guard 1</td> <td>107</td> <td>148</td> <td>123</td> <td>165</td> <td>102</td> <td>119</td> </tr> <tr> <td>Guard 2</td> <td>134</td> <td>115</td> <td>112</td> <td>151</td> <td>133</td> <td>129</td> </tr> </tbody> </table> Use the level of significant to test whether the difference between two sample means is significant.	Guard 1	107	148	123	165	102	119	Guard 2	134	115	112	151	133	129	7
Guard 1	107	148	123	165	102	119										
Guard 2	134	115	112	151	133	129										
6. a)	show that $(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2})\log f'(z) = 0$, where $f(z)$ is analytic function.	7														
b)	Show that function $u(x,y)=e^x \cos y$ $v(x,y)$ is harmonic and determine harmonic conjugate & the analytic function $f(z)=u+iv$.	7														
7.	Evaluate $\int_C \frac{z-3}{z^2+2z+5} dz$, where C is the circle, (i) $ z =1$ (ii) $ z+1-i =2$ (iii) $ z+1+i =2$.	14														
8. a)	Expand $\frac{1}{z(z-1)^2}$ as Laurent series about $z=1$ in two different ways.	7														
b)	Under the transformation $w = \frac{1}{z}$, find the image of the circle $ z-2i =2$	7														