



B.Tech III Semester Supplementary Examinations, February 2024

PROBABILITY & STATISTICS AND COMPLEX VARIABLE
(MECHANICAL ENGINEERING)

Maximum Marks: 70

Date: 16.02.2024 Duration: 3 hours

- Note:**
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X2M=20 Marks)		CO	Bloom Tx
1	Explain Discrete random variables	1	L2
2	The mean and variance of a binomial distribution are 6 & 3 respectively find the mode of the binomial distribution.	1	L1
3	Explain Continuous random variables.	2	L2
4	If $f(x) = k(2x + 3)$ in $0 < x < 2$, then find k?	2	L1
5	Illustrate population and sample.	3	L2
6	Illustrate type I error.	3	L2
7	Find $t_{0.05}$ when $v = 16$	4	L1
8	Explain F- test.	4	L2
9	Explain C-R equations in Cartesian form	5	L2
10	Explain Generalized Cauchy's Integral formula	5	L2

Part-B

Answer All the following questions								(5X10M=50 Marks)																			
11	A random variable 'x' has the following probability function								1	L5																	
<table><tr><td>x</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr><tr><td>P(x)</td><td>0</td><td>k</td><td>2k</td><td>2k</td><td>3k</td><td>K²</td><td>2k²</td><td>7k²+k</td></tr></table>										x	0	1	2	3	4	5	6	7	P(x)	0	k	2k	2k	3k	K ²	2k ²	7k ² +k
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P(x)	0	k	2k	2k	3k	K ²	2k ²	7k ² +k																			
i) Find the value of 'k'																											
ii) Evaluate p(x < 6) , p(x ≥ 6)																											
iii) p(0 < x < 5) [10]																											
OR																											
12	If 10% of the rivets produced by a machine are defective, find the probability that out of 5 rivets chosen of random (i)Non will be defective (ii) one will be defective (iii) at most two rivets will be defective [10]								1	L3																	
13	Probability density function of random variable 'x' is f(x) = e ^{-x} x ≥ 0 = 0 other wise. Find mean , Variance ? [10]								2	L3																	

	OR																																		
14	1000 students has written an examination the mean is 35 and standard deviation is 5. [10] Assuming the distribution to be normal find (i)How many students to marks lie between 25 and 40. (ii)How many get more than 40 (iii)How many students get below 20	2	L3																																
15	A population consists of five numbers 2,3,6,8,and 11.Consider all possible samples of size two Which can be drawn with replacement from this population. Find i) The population mean. ii) The standard deviation of the population.iii) The mean of the sampling distribution of means. iv) standard deviation of the sampling distribution of means. [10]	3	L3																																
	OR																																		
16	a) A sample of size 300 was taken whose variance is 225 and mean 54. Construct 95% confidence interval for the mean. And also find maximum error of mean at 95% confidence? [5] b) A sample of 64 students have a mean weight of 70 kgs. Can this be regarded as a sample from a population with mean weight 56 kgs and standard deviation 25 kgs. [5]	3	L3																																
17	To compare two kinds of bumper guards 6 of each kind were mounted on a car and then the car was run in to a concrete wall the following are the costs of repaires. <table border="1"><tr><td>Guard1</td><td>107</td><td>148</td><td>123</td><td>165</td><td>102</td><td>119</td></tr><tr><td>Gaurd2</td><td>134</td><td>115</td><td>112</td><td>151</td><td>133</td><td>129</td></tr></table> Use the 0.01 level of significance to test whether the difference between two sample means is significant. [10]	Guard1	107	148	123	165	102	119	Gaurd2	134	115	112	151	133	129	4	L4																		
Guard1	107	148	123	165	102	119																													
Gaurd2	134	115	112	151	133	129																													
	OR																																		
18	Use F test to test the significance difference variances of two diets. At 5% level of significance. [10] <table border="1"><tr><td>DietA</td><td>25</td><td>32</td><td>30</td><td>34</td><td>24</td><td>14</td><td>32</td><td>24</td><td>30</td><td>31</td><td>35</td><td>25</td><td>-</td><td>-</td><td>-</td></tr><tr><td>DietB</td><td>44</td><td>34</td><td>22</td><td>10</td><td>47</td><td>31</td><td>40</td><td>30</td><td>32</td><td>35</td><td>18</td><td>21</td><td>35</td><td>29</td><td>22</td></tr></table>	DietA	25	32	30	34	24	14	32	24	30	31	35	25	-	-	-	DietB	44	34	22	10	47	31	40	30	32	35	18	21	35	29	22	4	L4
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DietB	44	34	22	10	47	31	40	30	32	35	18	21	35	29	22																				
19	Prove that the function f(z) defined by $f(z) = \begin{cases} \frac{x^3(1+i)-y^3(1-i)}{x^2+y^2} & z \neq 0 \\ 0 & z = 0 \end{cases}$ is continuous and the C-R equations are satisfied at the origin yet $f'(0)$ does not exist. [10]	5	L5																																
	OR																																		
20	Evaluate $\int_c \frac{1}{z^8(z+4)}dz$ where C is the circle $ z = 2$ [10]	5	L5																																