PAPER ID-411528

Roll No: | | | | | | | | | | | | | |

BTECH
(SEM III) THEORY EXAMINATION 2021-22
MATHEMATIVS-V

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

a.	Write the formula to find Fourier sine transform of derivative of f(x).
b.	Find Z transform of a constant k.
c.	In Poisson distribution if mean of random variable is 4 then find the variance.
d.	Define probability density function.
e.	Write the formula used in Newton Raphson method.
f.	Express $\Delta - \nabla$ in terms of E, E^{-1}.
g.	Find the degree of freedom for Chi square test for a contingency table of order 2X3.
h.	Define the null hypothesis.
i.	Mention any two objectives of experimental design.
j.	Differentiate between CRD and RBD.

SECTION B

2. Attempt any *three* of the following: 10x3=30

a. Compute Fourier transform of $f(x) = \begin{cases} \frac{1}{2a}, |x| \le a \\ 0, |x| > a \end{cases}$.

b. If 10% of the bolts produced by a machine are defective, determine the probability that out of 10 bolts chosen at random (i) 1 (ii) none (iii) at least one bolt will be defective.

c. Find the cubic Lagrange's interpolating polynomial which takes the following values:

x	0	1	2	5
f(x)	2	3	12	147

d. The following table gives the death records of three hospitals

Hospital A	3	4	3	5	0
Hospital B	6	3	3	4	4
Hospital C	7	3	4	6	5

From these data. Discuss about the difference in the number of the deaths per months among three hospitals. Given that the tabulated value of F for 2 and 12 degrees of freedom is 3.88 at 5% level of significance.

e. Discuss the difference between np-chart and p-chart. Following is the data of defective of 10 samples of size 100 each. Construct np-chart and explain your findings.

Sample no.	1	2	3	4	5	6	7	8	9	10
No. of defectives	3	4	7	11	3	2	1	5	12	8

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SECTION C

3. Attempt any *one* part of the following: 10x1=10

a.	Determine Fourier sine transform of $\frac{e^{-ax}}{x}$, a > 0.
b.	Solve the following difference equation: $y_{n+2} + 2y_{n+1} + y_n = n$ given that $y_0 = y_1 = 0$.

4. Attempt any *one* part of the following: 10x1=10

a.	A manufacture knows from experience that the resistance of resistors he produces is normal with mean 100 ohms and standard deviation 2 ohms. Determine what percentage of resistors will have resistance between 98 ohms and 102ohms.
b.	A random variable x has the following probability function: x: 0 1 2 3 f(x): 3k 2k 2k k Determine (i) k (ii) mean of the distribution.

5. Attempt any *one* part of the following: 10x1=10

a.	Using Regula-Falsi method, compute the real root of the equation $x^3 - 4x = 9$.
b.	Using forward difference operatorcalculate the missing terms in the following data:

x	0	5	10	15	20	25
F(x)	6	10	-	17	-	31

6. Attempt any *one* part of the following: 10x1=10

a.	A die is thrown some times and the results are observed as: No. appeared on die: 1 2 3 4 5 6 Frequency: 40 32 29 59 57 59 Test whether die is biased or not. Given Chi square of 5% level of significance for 5 degree of freedom is 11.09.
b.	The 9 items of a sample have the following values: 45, 47, 50, 52, 48, 47, 49, 53, 51. Apply t test to check the mean of these values differ significantly from the assumed mean 47.5. Use at 5% level of significance for 8 degree of freedom is 2.31.

7. Attempt any *one* part of the following: 10x1=10

a.	Explain the following terms: (i) Replication (ii) Randomization (iii) Components of variation in experimental designs.
b.	The following data shows the value of sample mean $\overline{X}$ and range R for 10 samples of size 5 each. Calculate the values for central line and control limits for $\overline{X}$ and R charts. Also determine whether the process is in under control or not.

Sample no.	1	2	3	4	5	6	7	8	9	10
Mean $\overline{X}$	11.2	11.8	10.8	11.6	11	9.6	10.4	9.6	10.6	10
Range R	7	4	8	5	7	4	8	4	7	9