PAPER ID-411137

Subject Code: BAS402

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

BTECH

(SEM IV) THEORY EXAMINATION 2023-24

MATHEMATICS –III

TIME: 3 HRS **M.MARKS: 70**

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

Q no.	Question	Marks	CO
a.	Find the complimentary function of $(D^3-4D^2D'+3DD'^2)z = 0$.	2	1
b.	Write auxiliary equation of yq-xp = z.	2	1
c.	Classify the equation $\frac{\partial^2 u}{\partial x^2}=c^2\frac{\partial^2 u}{\partial y^2}$.	2	2
d.	Write moment about mean.	2	3
e.	What is mean, median and mode of a normal distribution?	2	3
f.	What is nth divided difference of a polynomial of degree n?	2	4
g.	Find the value of $\int_2^6 x^3 dx$ by Simpson's rule.	2	5

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

Q no.	Question	Marks	CO
a.	Solve $(D^2+DD'-6D'^2)z = x^2 \sin(x+y)$.	7	1
b.	A string is stretched and fastened to two points l a Part. Motion is started by displacing the string in form y= a $\sin\frac{\pi x}{l}$ from which it is released at a time t=0. show that, y(x,t) = a $\sin\frac{\pi x}{l}.\cos\frac{\pi ct}{l}$.	7	2
c.	The probability that a bomb droped from a plane will strike the target is 1/5.If the six bombs are dropped , find the probability that i) Exactly two will strike the target. ii) At least two will strike the target.	7	3
d.	Develop the divided difference table from the data given below and obtain the interpolation polynomial.	7	4
e.	Test the following system of equations is diagonally dominant and hence solve this system using Gauss-Seidel method: 2x + y + 4z = 7 , 3x + y + 2z = 6 , -x+ 4y + 2z = 5.	7	5

x	2	4	6	8	10
f(x)	6	10	18	22	30

SECTION C

3. Attempt any *one* part of the following: **7 x 1 = 7**

Q no.	Question	Marks	CO
a.	Solve (y+z)p-(x+z)q = x-y.	7	1

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b.	Solve $(D^2-DD')z = \sin x \cos 2y$.	7	1

4. Attempt any *one* part of the following: 7 x 1 = 7

Q no.	Question	Marks	CO
a.	Solve by method of variation of variables $y^3 \frac{\partial u}{\partial x} = x^2 \frac{\partial u}{\partial y}$.	7	2
b.	Find Fourier sine and cosine transform of x^{n-1}.	7	2

5. Attempt any *one* part of the following: 7 x 1 = 7

Q no.	Question	Marks	CO
a.	A sample of 100 dry battery cells tested to find the length of life produced the following results $\bar{x}$ = 12 hours, σ = 3 hours. Assuming the data to be normally distributed, what percentage of battery cells are expected to have life. (i) More than 15 hours (ii) less than 6 hours (iii) between 10 and 14 hours. (Given area at z = 1 is 0.3413 , z = 2 is 0.4772 and z=0.67 is 0.2485)	7	3
b.	Out of 8000 graduates in a town, 800 are females, out of 1600 graduate employees, 120 are females. Use χ^2 –test to determine if any distinction is made in appointment on the basis of sex. The value of χ^2 for 1 degree of freedom at 5% level is 3.841.	7	3

6. Attempt any *one* part of the following: 7 x 1 = 7

Q no.	Question	Marks	CO
a.	Using Lagrange's interpolation formula, find the values of y corresponding to x=10 from the following table:	7	4
b.	Using Regula-Falsi method, compute the real root of the equation $x^3 - 4x = 9$.	7	4

x	5	6	9	11
y	12	13	14	16

7. Attempt any *one* part of the following: 7 x 1 = 7

Q no.	Question	Marks	CO
a.	Using Picard's method find a solution of $\frac{dy}{dx}$ =1+xy, upto third approximation, when x_0 =0, y_0 =0.	7	5
b.	Use Runge-Kutta method of fourth order to approximate y when x = 0.1 given that y = 1 at x=0 and $\frac{dy}{dx} = 3x+y^2$.	7	5