

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.

$2 \ge 7 = 14$

Q no.	Question	Marks	СО
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

Attempt any *three* of the following: 2.

g.	Find the value of $\int_2^6 x^3 dx$ by Simpson's rule.	2	5	-0
2.	SECTION B Attempt any <i>three</i> of the following:	7 x 3 =	21	~ ⁵
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 1 a Part. Motion is started	7	2	
	by displacing the string in form y= a $\sin \frac{\pi x}{r}$ from which it is released at a			
	time t=0. show that, $y(x,t) = a \sin \frac{\pi x}{2} \cdot \cos \frac{\pi ct}{2}$.			
C	The probability that a bomb droped from a plane will strike the target is	7	3	
с.	1/5. If the six bombs are dropped, find the probability that	,	5	
	i) Exactly two will strike the target.			
	ii) At least two will strike the target.			
d.	Develop the divided difference table from the data given below and	7	4	
	obtain the interpolation polynomial.			
	x 2 4 6 8 10			
	f(x) = 6 = 10 = 18 = 22 = 30			
e.	Test the following system of equations is diagonally dominant and hence	7	5	
	solve this system using Gauss-Seidel method:			
	2x + y + 4z - 7 $3x + y + 2z - 6$ $-x + 4y + 2z - 5$			
	2A + y + TL - I, $3A + y + 2L - 0$, $-A + TY + 2L - 3$.			

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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7 x 1 = 7



Roll No:

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4. Attempt any *one* part of the following:

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:



Q no.	Question	Marks	CO	
a.	A sample of 100 dry battery cells tested to find the length of life	7	3	
	produced the following results $\overline{x} = 12$ hours, $\sigma = 3$ 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.		N	1
	(Given area at $z = 1$ is 0.3413, $z = 2$ is 0.4772 and $z=0.67$ is 0.2485)	C	1.	
b.	Out of 8000 graduates in a town, 800 are females, out of 1600 graduate	7	3	
	employees, 120 are females. Use χ^2 –test to determine if any distinction	5		
	is made in appointment on the basis of sex. The value of χ^2 for 1 degree	\cdot		
	of freedom at 5% level is 3.841.			

6. Attempt any *one* part of the following:

7 x 1 = 7

Q no.	Question						Marks	CO	
a.	Using	Lagra	nge's interp	olation form	ula, find t	he values	of y	7	4
	corres	corresponding to $x=10$ from the following table:							
		Х	5	6	9	11			
			10	10		1.6	_		
		У	12	13	5114	16			
b.	Using Regula-Falsi method, compute the real root of the equation					7	4		
	$x^3 - 4x$	$x^{3}-4x = 9.$							

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