



PAPER ID-311271

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Subject Code: BAS302

Roll No:

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**BTECH**  
**(SEM III) THEORY EXAMINATION 2023-24**  
**MATHEMATICS-III**

TIME: 3HRS

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.	Solve the Partial differential equation $pq = 3p + 4q$	2	1												
b.	Tell the classification of the following partial differential equation $4 \frac{\partial^2 u}{\partial x^2} - 2 \frac{\partial^2 u}{\partial x \partial t} + 6 \frac{\partial^2 u}{\partial t^2} = 0$	2	2												
c.	State convolution theorem on Fourier transformation	2	2												
d.	For a Binomial distribution, mean is 6 and variance is 4. Determine q.	2	3												
e.	If Regression Coefficients are 0.5 and 0.5, what would be the value of coefficient of correlation?	2	3												
f.	Find the missing value of the following table: <table style="margin-left: 40px; border-collapse: collapse;"> <tr> <td style="padding-right: 10px;">x:</td> <td style="padding-right: 10px;">1</td> <td style="padding-right: 10px;">2</td> <td style="padding-right: 10px;">3</td> <td style="padding-right: 10px;">4</td> <td style="padding-right: 10px;">5</td> </tr> <tr> <td>f(x):</td> <td>7</td> <td>-</td> <td>13</td> <td>21</td> <td>37</td> </tr> </table>	x:	1	2	3	4	5	f(x):	7	-	13	21	37	2	4
x:	1	2	3	4	5										
f(x):	7	-	13	21	37										
g.	Write the formula of Trapezoidal rule.	2	5												

**SECTION B**

**2. Attempt any three of the following:**

**7 x 3 = 21**

a.	Examine the partial differential equation $(D^2 - 2DD' + D'^2)z = \cos(2y - 3x)$	7	1												
b.	Determine the solution of one dimensional heat equation with the given conditions $u(0, t) = 0, u(l, t) = 0, u(x, 0) = x$ .	7	2												
c.	From the following data, calculate the equations of line of regression of y on x and x on y. <table style="margin-left: 40px; border-collapse: collapse;"> <tr> <td style="padding-right: 10px;">x</td> <td style="padding-right: 10px;">6</td> <td style="padding-right: 10px;">2</td> <td style="padding-right: 10px;">10</td> <td style="padding-right: 10px;">4</td> <td style="padding-right: 10px;">8</td> </tr> <tr> <td>y</td> <td>9</td> <td>11</td> <td>5</td> <td>8</td> <td>7</td> </tr> </table>	x	6	2	10	4	8	y	9	11	5	8	7	7	3
x	6	2	10	4	8										
y	9	11	5	8	7										
d.	Find a positive value of $(17)^{1/3}$ correct to four decimal places by Newton's Raphson method.	7	4												
e.	Use fourth order Runge -Kutta method to find $y(0.2)$ solving $\frac{dy}{dx} = 1 + y^2; y(0) = 0$	7	5												

**SECTION C**

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

**7 x 1 = 7**

a.	Solve the Partial differential equation of $x^2 \frac{\partial^2 z}{\partial x^2} - y^2 \frac{\partial^2 z}{\partial y^2} = x^2 y^2$	7	1
b.	By using Charpit's method to evaluate the solution of $px + qy = pq$	7	1



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

7 x 1 = 7

a.	Determine Fourier Sine transform of the function $F(x) = \frac{e^{-ax}}{x}$ , $a > 0$ .	7	2
b.	Solve the following partial differential equation by method of separation of variables: $\frac{\partial u}{\partial t} - \frac{\partial u}{\partial x} + 2u = 0$ . $u(x, 0) = 10e^{-x} - 6e^{-4x}$ .	7	2

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

7 x 1 = 7

a.	Use the method of least squares to fit the curve $y = a + bx$ for the following data: <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>x</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr> <td>y</td><td>12</td><td>14</td><td>15</td><td>19</td><td>22</td></tr> </table>	x	1	2	3	4	5	y	12	14	15	19	22	7	3
x	1	2	3	4	5										
y	12	14	15	19	22										
b.	Compute skewness and Kurtosis, if the first four moments of a frequency distribution about the value 4 of the variable are 1, 4, 10 and 45.	7	3												

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

7 x 1 = 7

a.	Find a real root of the following equations by the method of false position correct to four decimal places $x^3 - 5x + 3 = 0$	7	4												
b.	Using Newton's divided difference formula. Calculate the value of $f(6)$ from the following data: <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>x</td><td>1</td><td>4</td><td>7</td><td>9</td><td>12</td></tr> <tr> <td>f(x)</td><td>10</td><td>22</td><td>32</td><td>43</td><td>56</td></tr> </table>	x	1	4	7	9	12	f(x)	10	22	32	43	56	7	4
x	1	4	7	9	12										
f(x)	10	22	32	43	56										

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

7 x 1 = 7

a.	Solve the system of equations using gauss Seidel method. $2x + 10y + z = 51$ , $10x + y + 2z = 44$ , $x + 2y + 10z = 61$ .	7	5
b.	Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Simpson's one - third rule.	7	5