



PAPER ID-411171

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Subject Code: KAS402

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BTECH
(SEM IV) THEORY EXAMINATION 2023-24
MATHS-IV

TIME: 3 HRS**M.MARKS: 100**

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

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

Q no.	Question	Marks	CO
a.	Solve the partial differential equation $2p - 3q = 1$,	02	1
b.	Calculate particular Integral (P.I.) of $(D - 2D' + 2)z = e^{x+4y}$	02	1
c.	Tell the classification of the following partial differential equation $\frac{\partial^2 u}{\partial x^2} - 2 \frac{\partial^2 u}{\partial x \partial t} + 3 \frac{\partial^2 u}{\partial t^2} = 0$	02	2
d.	Write down the One dimensional Heat equation .	02	2
e.	Write the Normal equation of parabolic equation.	02	3
f.	If Regression Coefficients are 0.5 and 0.5, what would be the value of coefficient of correlation?	02	3
g.	A die is tossed twice , A success is getting 2 or 3 on a toss. Calculate mean	02	4
h.	Write Statement of Baye's theorem.	02	4
i.	When we use T-test.	02	5
j.	Explain one way ANOVA classification.	02	5

SECTION B**2. Attempt any three of the following:****3 x 10 = 30**

Q no.	Question	Marks	CO												
a.	Solve the following partial differential equation by Lagrange's Method: $yzp - xzq = xy$	10	1												
b.	Determine the solution of one dimensional heat equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ where the boundary conditions are $u(0, t) = 0, u(l, t) = 0, (t > 0)$ and the initial condition $u(x, 0) = 3 \sin \frac{\pi x}{l}$: l being the length of the bar.	10	2												
c.	From the following data, calculate the equations of line of regression of y on x and x on y. <table><tr><td>x</td><td>6</td><td>2</td><td>10</td><td>4</td><td>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	10	3
x	6	2	10	4	8										
y	9	11	5	8	7										
d.	In a test on 100 electric bulbs, it was found that the life of a particular make, was normally distributed with an average life of 12 hours and S.D of 3 hours. Calculate the number of bulbs likely to burn for More than 15 hours, (b) less than 6 hours (c) more than 10 hours but less than 14 hours.	10	4												
e.	The 9 items of a sample have the following values : 45,47,50,52,48,47,49,53,51.	10	5												



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	Does the mean of these values differ significantly from the assumed mean 47.5? [The tabulated value of $t_{0.05}=2.31$ for 8 d.f]		
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SECTION C

3. Attempt any one part of the following: 1 x 10 = 10

Q no.	Question	Marks	CO
a.	Solve the partial differential equation $x^2 \frac{\partial^2 z}{\partial x^2} - y^2 \frac{\partial^2 z}{\partial y^2} = xy$	10	1
b.	Use Cauchy's method of characteristics to solve the first order partial differential equation $u_x + u_y = 1 + \cos y$, $u(0, y) = \sin y$	10	11

4. Attempt any one part of the following: 1 x 10 = 10

Q no.	Question	Marks	CO
a.	Solve the following partial differential equation by method of separation of variables: $\frac{\partial u}{\partial t} - \frac{\partial u}{\partial x} + 2u = 0$. $u(x, 0) = 10e^{-x} - 6e^{-4x}$.	10	2
b.	Determine the solution of Laplace equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ subject to the boundary conditions $u(0, y) = u(l, y) = u(x, 0) = 0$ and $u(x, a) = f(x)$.	10	22

5. Attempt any one part of the following: 1 x 10 = 10

Q no.	Question	Marks	CO
a.	Compute skewness and Kurtosis, if the first four moments of a frequency distribution about the value 4 of the variable are 1, 2.5, 5.5 and 16.	10	3
b.	Use the method of least squares to fit the curve $y = a + bx$ for the following data:	10	3

x	1	2	3	4	5
y	14	27	40	55	68

6. Attempt any one part of the following: 1 x 10 = 10

Q no.	Question	Marks	CO
a.	Two urns contain 4 white, 6 blue and 4 white, 5 blue balls respectively. One of the urns is selected at random and a ball is drawn from it. If the ball drawn is white. What is the probability that it was drawn from the (i) first urn (ii) second urn.	10	4



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b.	The following table gives the no.of days in a 200 day period during which automobile accidents occurred in a city. <table><tr><td>No. of accidents</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>No. of days</td><td>122</td><td>60</td><td>15</td><td>2</td><td>1</td></tr></table> Fit a Poisson distribution to the data and calculate the theoretical frequencies.	No. of accidents	0	1	2	3	4	No. of days	122	60	15	2	1	10	4
No. of accidents	0	1	2	3	4										
No. of days	122	60	15	2	1										

7. Attempt any one part of the following:**1 x 10 = 10**

Q no.	Question	Marks	CO																						
a.	The demand for a particular spare part in a factory was found to vary from day- to -day. In a sample study the following information was obtained <table><tr><th>Days</th><th>Mon</th><th>Tue</th><th>Wed</th><th>Thurs</th><th>Fri</th><th>Sat</th></tr><tr><td>No. of parts demanded</td><td>14</td><td>18</td><td>12</td><td>11</td><td>15</td><td>14</td></tr></table> Use χ^2-test to test the hypothesis that the number of parts demanded does not depend on the day of the week. [The value of $\chi^2_{0.05} = 11.07$ for 5 d.f] .	Days	Mon	Tue	Wed	Thurs	Fri	Sat	No. of parts demanded	14	18	12	11	15	14	10	5								
Days	Mon	Tue	Wed	Thurs	Fri	Sat																			
No. of parts demanded	14	18	12	11	15	14																			
b.	Following is the data of defectives of 10 samples of size 100 each. <table><tr><th>Sample no.</th><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr><tr><th>No.of defectives</th><td>15</td><td>11</td><td>9</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>7</td><td>1</td></tr></table> Construct p-chart and state whether the process is in statistical control.	Sample no.	1	2	3	4	5	6	7	8	9	10	No.of defectives	15	11	9	6	5	4	3	2	7	1	10	5
Sample no.	1	2	3	4	5	6	7	8	9	10															
No.of defectives	15	11	9	6	5	4	3	2	7	1															