

THE KAVERY ENGINEERING COLLEGE*(An Autonomous Institution)***B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV/DEC 2025***Second Semester***Common to all Branches****MA3251 / UMAT24201 – Statistics and Numerical Methods****(Use of Statistical Tables Can Be Permitted)****Regulations – 2021 & 2024***Duration : 3 Hrs**Maximum : 100 Marks***PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)**

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
1.	Define type I and type II errors.	L1	1	2
2.	Write down the uses of χ^2 distribution.	L2	1	2
3.	Define the basic principle of design of experiments.	L1	2	2
4.	Write the advantages of ANOVA table.	L2	2	2
5.	State the advantage of Gauss Seidal method over Gauss Jacobi method while solving system of linear equations.	L1	3	2
6.	Solve $5x - 3y = 8$, $3x + y = 2$ by Gauss Jordan method	L2	3	2
7.	Write the Lagrange interpolation formula.	L1	4	2
8.	Write the formula for single integration using Trapezoidal rule and Simpson's $\frac{1}{3}$ rule.	L2	4	2
9.	Using Euler's method find $y(0.2)$ given that $\frac{dy}{dx} = x^2 + y$, $y(0) = 1$.	L2	5	2
10.	Write down the Adam's predictor and corrector formula.	L1	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16=80)

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>																		
11.	a i Test whether the sample having the values 63,63,64,55,66,69,70,70 and 71 has been chosen from a population with mean of 65 at 5% level of significance.	L3	1	8																		
	ii The means of two large samples of sizes 2000 and 1000 are 68 and 67.5 grams respectively. Can the sample be regarded as drawn from the same population of standard deviation 2.25 grams?	L3	1	8																		
	Or																					
b i	Two independent samples of sizes 8 and 7 contained the following values:	L3	1	8																		
	<table><tr><td>Sample I</td><td>19</td><td>17</td><td>15</td><td>21</td><td>16</td><td>18</td><td>16</td><td>14</td></tr><tr><td>Sample II</td><td>15</td><td>14</td><td>15</td><td>19</td><td>15</td><td>18</td><td>16</td><td></td></tr></table>	Sample I	19	17	15	21	16	18	16	14	Sample II	15	14	15	19	15	18	16				
Sample I	19	17	15	21	16	18	16	14														
Sample II	15	14	15	19	15	18	16															
	Is the difference between the sample means significance? Use 5% level of significance.																					

- ii Mechanical engineers testing a new arc-welding technique classified welds both with respect to appearance and an X-ray inspection: L3 1 8

X-ray	Appearance			
		Bad	Normal	Good
	Bad	20	7	3
	Normal	13	51	16
	Good	7	12	21

Using Chi-square Test for independence using 0.05 level of significance.

12. a Analyze the variance in the Latin square of yields (in kgs) of paddy where P, Q, R, S denote the different methods of cultivation: L3 2 16

S 122	P 121	R 123	Q 122
Q 124	R 123	P 122	S 125
P 120	Q 119	S 120	R 121
R 122	S 123	Q 121	P 122

Examine whether the different methods of cultivation have given significantly different yields at 5% LOS

Or

- b The following data represent a certain person to work from Monday to Friday by four different routes: L3 2 16

Routes	Days				
	Mon	Tues	Wed	Thu	Fri
1	22	26	25	25	31
2	25	27	28	26	29
3	26	29	33	30	33
4	26	28	27	30	30

Test at the 0.05 level of significance whether the difference among the means obtained for the different routes are significant and also whether the differences among the means obtained for the different days of the week are significant.

13. a i Find by N-R method the real root of $x^3 - 6x + 4 = 0$ correct to 4 decimal places. L3 3 8

- ii Apply Gauss Seidal method $27x + 6y - z = 85$; $6x + 15y + 2z = 72$; $x + y + 54z = 110$. L3 3 8

Or

- b i Solve by using Power method find the dominant Eigen value of the matrix: L3 3 8

$$\begin{bmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & -4 \end{bmatrix}$$

- ii Apply Gauss Elimination method to solve $2x - y + 3z = 9$; $x + y + z = 6$; $x - y + z = 2$. L3 3 8

14. a i Evaluate $\int_2^3 \int_1^2 \frac{dx dy}{x^2+y^2}$ using Simpson's rule by four sub intervals. L3 4 8

ii Using Lagrange's interpolation formula find f(3) from the following data: L3 4 8

x	0	1	4	5
f(x)	4	3	24	39

Or

b i Evaluate $\int_0^6 \frac{dx}{1+x^2}$ taking h=1 using (i) Trapezoidal rule (ii) Simpson's $\frac{1}{3}$ rule. L3 4 8

ii Find the values of Y at X=21 and X=28 from the following data by using Newton's forward and backward interpolation. L3 4 8

X	20	23	26	29
Y	0.3420	0.3907	0.4384	0.4848

15. a i Use Modified Euler's method to find $y(0.1)$ & $y(0.2)$ given $\frac{dy}{dx} = x^2 + y^2$; $y(0) = 1$. L3 5 8

ii Use Milne's method to find $y(0.8)$ from $\frac{dy}{dx} = 1 + y^2$ given that $y(0)=0$; $y(0.2)=0.2027$; $y(0.4)=0.4228$; $y(0.6)=0.6841$. L3 5 8

Or

b i Solve $\frac{dy}{dx} = \frac{1}{x+y}$, $y(0) = 1$ find $y(0.1)$ using Runge Kutta method of fourth order. L3 5 8

ii Solve $\frac{dy}{dx} = x^2 - y$ given $y(0) = 1$ and find values of $y(0.1)$ and $y(0.2)$ using Taylor's series method correct to 4 decimal places. L3 5 8