

THE KAVERY ENGINEERING COLLEGE
(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV /DEC 2024

Second Semester

MA3251 – Statistics and Numerical Methods

(Common to all Branches)

Use of Statistical Table can be Permitted

Regulations – 2021

Duration : 3 Hrs

Maximum : 100 Marks

PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)

Q.No	Questions	BLT	CO	Marks																
1.	Define Type-I and Type-II errors in hypothesis testing.	RE	1	2																
2.	List any two applications of F-test.	RE	1	2																
3.	Give any two comparisons between CRD and RBD.	RE	2	2																
4.	Is a 2 x 2 Latin square design possible? Why?	RE	2	2																
5.	State the condition for the convergence of Iteration method.	RE	3	2																
6.	Solve the system of equations $2x + y = 3, 7x - 3y = 4$ by Gauss elimination method.	AP	3	2																
7.	Form the divided difference table of $f(x) = x^3 + x + 2$ for the arguments 1, 3, 6, 11.	UN	4	2																
8.	By Simpson's one-third rule, determine the value of $\int_0^6 \frac{dx}{1+x}$.	AP	4	2																
	<table><tr><td>x</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>y = (x)</td><td>1.00</td><td>0.50</td><td>0.33</td><td>0.25</td><td>0.20</td><td>0.17</td><td>0.14</td></tr></table>	x	0	1	2	3	4	5	6	y = (x)	1.00	0.50	0.33	0.25	0.20	0.17	0.14			
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9.	State Euler's formula to determine y at a given 'x' in solving the equation $\frac{dy}{dx} = f(x, y); y(x_0) = y_0$.	RE	5	2																
10.	How many prior values are required to predict the next value in Adam's method?	RE	5	2																

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

Q.No	Questions	BLT	CO	Marks
11.	a i A Sample of 100 students is taken from a large population. The mean height of the students in this sample is 160 cm. Can it be reasonably regarded that, in the population, the mean height is 165 cm, and the S.D. is 10 cm. ii 10 oil tins are taken at random from an automatic filling machine. The mean weight of the tin is 15.8 kg and S.D is 0.5 kg. Does the sample mean differ significantly from the intended weight of 16 kg?	AP	1	8
		AP	1	8

Or

- b i The means of two large samples of sizes 2000 and 1000 are 68 and 67.5 gms respectively. Can the sample be regarded as drawn from the same population of standard deviation 2.25 gms? AP 1 8
- ii On the basis of information given below about the treatment of 200 patients suffering from a disease, Use Chi-square test to state whether the new treatment is comparatively superior to the conventional treatment. AP 1 8

	Favourable	Non Favourable	Total
New	60	30	90
Conventional	40	70	110

12. a Three different machines are used for a production. On the basis of the outputs, set up One-way ANOVA table and test whether the machines are equally effective. UN 2 16

Outputs		
Machine-I	Machine-II	Machine-III
10	9	20
15	7	16
11	5	10
10	6	14

Or

- b Analyze the following results of a Latin square experiments. UN 2 16

A (12)	D (20)	C (16)	B (10)
D (18)	A (14)	B (11)	C (14)
B (12)	C (15)	D (19)	A (13)
C (16)	B (11)	A (15)	D (20)

The letters A, B, C, D denote the treatments and the figures in brackets denote the observations.

13. a i Find the real positive root of $3x - \cos x - 1 = 0$ by Newton-Raphson method, correct to 5 decimal places. AP 3 8
- ii Solve the following system of equations by Gauss-Seidel method correct to four decimal places. AP 3 8
- $$28x + 4y - z = 32, \quad 2x + 17y + 4z = 35, \quad x + 3y + 10z = 24$$

Or

- b Find the dominant eigen value and the corresponding eigen vector of AP 3 16
- $$A = \begin{bmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix} \text{ by Power method.}$$

14. a i Use Lagrange's interpolation formula to find $y(9.5)$ from the following data. AP 4 8

x	7	8	9	10
y	3	1	1	9

- ii Find the values of y at $x = 21$ and $x = 28$ from the following data. AP 4 8

x	20	23	26	29
y	0.3420	0.3907	0.4384	0.4848

Or

- b Evaluate $\int_1^{1.2} \int_1^{1.4} \frac{1}{x+y} dx dy$ using Trapezoidal and Simpson's rules with $h = k = 0.1$. AP 4 16
15. a i Using Taylor series method, find $y(0.1)$ correct to 4 decimal places if $y' = x^2 + y^2, y(0) = 1$, taking $h = 0.1$. AP 5 8
- ii Apply Runge-Kutta method of fourth order to find $y(0.2)$ given $y' = x + y, y(0) = 1$. AP 5 8
- Or
- b i Find $y(0.25)$, given $y' = 2xy, y(0) = 1$, by using Modified Euler's method. AP 5 8
- ii Compute $y(0.4)$ by Milne's method if $y(x)$ is the solution of $\frac{dy}{dx} = \frac{xy}{2}$ given $y(0) = 1, y(0.1) = 1.01, y(0.2) = 1.022$ and $y(0.3) = 1.023$. AP 5 8