



Indra Ganesan

COLLEGE OF ENGINEERING

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
Accredited by NAAC with 'B+' Grade, 2(f) & 12B Status Institution by UGC

IG Valley, Madurai Main Road, Manikandam, Tiruchirappalli - 620012

NAAC DOCUMENTS

QUALITY INDICATOR FRAME WORK

CRITERION – 1

CURRICULAR ASPECTS

SUBMITTED BY

IQAC

INTERNAL QUALITY ASSURANCE CELL

INDRA GANESAN COLLEGE OF ENGINEERING





Indra Ganesan

COLLEGE OF ENGINEERING

Madurai Main Road (NH-45B), Manikandam, Tiruchirappalli - 620 012
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
NAAC Accredited, 2(F) Status Institution by UGC



Criteria 1	Curricular Aspects	100
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1.1 Curricular Planning and Implementation (20)

1.1.1 The Institution ensures effective curriculum planning and delivery through a well-planned and documented process including Academic calendar and conduct of continuous internal Assessment

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INDRAGANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012,
India (Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

DEPARTMENT OF SCIENCE AND HUMANITIES

PREFACE OF THE COURSE FILE

Batch : 2022-2026

Academic Year : 2022-2023/EVEN

Program : MATHEMATICS

Year & Semester : 1st Year / 2nd Semester


Course Code : MA3251

NBA Course Code:

Name of the Course : STATISTICS AND NUMERICAL METHODS

Faculty in-charge : Dr. A. IRAVITHUL BASIRA


Signature of the Faculty-in-charge


HoD/S & H


Dr. G. Balakrishnan, M.E., Ph.D.,
Principal

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Manikandam, Trichy-620 012.



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Department of Mathematics (S & H)

WorkLoad-EVEN Semester 2022-23

S.NO.	Teacher's Name	Course Code	Course Name	Semester	Lecture/week
1	Dr A IRAVITHUL BASIRA	MA3251	STATISTICS & NUMERICAL METHODS	I/AI&DS	6
		BA4201	QUANTITATIVE TECHNIQUES FOR DECISION MAKING	MBA	6
2	Dr K SARANYA	MA3251	STATISTICS & NUMERICAL METHODS	I/AGRI	6
3	Mr. S SYED ILYAS ALI	MA3251	STATISTICS & NUMERICAL METHODS	I/ECE	6
			STATISTICS & NUMERICAL METHODS	I/MECH	
			STATISTICS & NUMERICAL METHODS	I/EEE	
4	Mrs. K RAMYA	MA3251	STATISTICS & NUMERICAL METHODS	I/IT	6
5	Mr. P RAJAMOHAN	MA3251	STATISTICS & NUMERICAL METHODS	I/CSE	6


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COURSE OBJECTIVES:

- This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I TESTING OF HYPOTHESIS

9+3

Sampling distributions - Tests for single mean, proportion and difference of means (Large and small samples) - Tests for single variance and equality of variances - Chi square test for goodness of fit - Independence of attributes.

UNIT II DESIGN OF EXPERIMENTS

9+3

One way and two way classifications - Completely randomized design - Randomized block design - Latin square design - 2^2 factorial design.

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS

9+3

Solution of algebraic and transcendental equations - Fixed point iteration method - Newton Raphson method - Solution of linear system of equations - Gauss elimination method - Pivoting - Gauss Jordan method - Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method and Jacobi's method for symmetric matrices.

UNIT IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION

9+3

Lagrange's and Newton's divided difference interpolations - Newton's forward and backward difference interpolation - Approximation of derivatives using interpolation polynomials - Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules.



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UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 9+3

Single step methods: Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step methods: Milne's and Adams - Bash forth predictor corrector methods for solving first order differential equations.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to:

- Apply the concept of testing of hypothesis for small and large samples in real life problems.
- Apply the basic concepts of classifications of design of experiments in the field of agriculture.
- Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.
- Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
- Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

TEXT BOOKS:

1. Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.
2. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

REFERENCES:

1. Burden, R.L and Faires, J.D., "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2. Devore, J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
3. Gerald, C.F. and Wheatley, P.O., "Applied Numerical Analysis", Pearson Education, Asia, New Delhi, 7th Edition, 2007.
4. Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.
5. Spiegel, M.R., Schiller, J. and Srinivasan, R.A., "Schaum's Outlines on Probability and Statistics", Tata McGraw Hill Edition, 4th Edition, 2012.
6. Walpole, R.E., Myers, R.H., Myers, S.L. and Ye, K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

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DEPARTMENT OF SCIENCE AND HUMANITIES

Lecture Schedule

Degree Program: **B.E/MECH**

Course code & Name: **MA3251- STATISTICS & NUMERICAL METHODS**

Duration: **2022-23 (EVEN)**

Semester: **II** Faculty: **Dr. A. Iravithul Basira**

OBJECTIVES:

- This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

COURSE OUTCOMES:

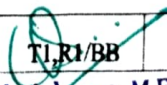
Upon successful completion of the course, students should be able to:

CO	Course Outcomes	POs	PSOs
CO1	Apply the concept of testing of hypothesis for small and large samples in real life problems.	1,2,3,4,5,9,11, 12	-
CO2	Apply the basic concepts of classifications of design of experiments in the field of agriculture	1,2,3,4,5,9,11, 12	-
CO3	Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems	1,2,3,4,5,9,11, 12	-
CO4	Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.	1,2,3,4,5,9,11, 12	-
CO5	Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.	1,2,3,4,5,9,11, 12	-
CO6	Techniques to get a knowledge of Engineering applications	1,2,3,4,5,9,11, 12	-

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S.No	Period	Topic to be covered	Reference/Teaching aids and methods	Planned date
UNIT I - TESTING OF HYPOTHESIS				
1	1	Sampling distributions	T2,R2/BB	08.05.23
2	1	Tests for single mean	T2,R2/BB	11.05.23
3	5	Test for Population mean	T2,R2/BB	13.05.23
4	6	Proportion and difference of means	T2,R2/BB	16.05.23
5	3	Test for small samples	T2,R2/BB	17.05.23
6	1	Test for Large samples	T2,R2/BB	18.05.23
7	1	Test for single variance	T2,R2/BB	19.05.23
8	5	Test for multiple variance	T2,R2/BB	20.05.23
9	5	Equality of variances	T2,R2/BB	23.05.23
10	6	Chi square test	T2,R2/BB	24.05.23
11	2	Goodness of fit	T2,R2/BB	25.05.23
12	4	Independence of attributes	T2,R2/BB	26.05.23
UNIT II DESIGN OF EXPERIMENTS				
13	1	Introduction	T2,R2/BB	02.06.23
14	1	One way classification	T2,R2/BB	03.06.23
15	3	One way classification based on problems	T2,R2/BB	05.06.23
16	5	Two way classification	T2,R2/BB	05.06.23
17	1	Two Way Classification based on problems	T2,R2/BB	06.06.23
18	1	Latin Square Design	T2,R2/BB	07.06.23
19	5	Latin Square Design based on problems	T2,R2/BB	08.06.23
20	5	Two Square Factorial Design	T2,R2/BB	09.06.23
21	6	Two Square Factorial Design based on problems	T2,R2/BB	10.06.23
22	6	2 ² factorial design	T2,R2/BB	10.06.23
23	2	2 ² factorial design based on problems	T2,R2/BB	12.06.23
24	5	Applications	T2,R2/BB	12.06.23
UNIT III SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS				
25	1	Solution Of Algebraic And Transcendental Equations	T1,R1/BB	13.06.23


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26	5	Introduction - Iteration Method	T1,R1/BB	15.06.23
27	6	Fixed Point Iteration Method	T1,R1/BB	16.06.23
28	1	Newton Raphson Method	T1,R1/BB	17.06.23
29	1	Solution Of Linear System Of Equations	T1,R1/BB	19.06.23
30	5	Gauss Elimination Method	T1,R1/BB	20.06.23
31	6	Gauss Jordan Method	T1,R1/BB	21.06.23
32	5	Iterative Methods	T1,R1/BB	22.06.23
33	5	Gauss Seidel Method	T1,R1/BB	24.06.23
34	1	Gauss Jacobi Method	T1,R1/BB	24.06.23
35	4	Eigen Values Of A Matrix By Power Method	T1,R1/BB	27.06.23
36	2	Power Method	T1,R1/BB	30.06.23

UNIT V INTERPOLATION NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION

37	1	Lagrange's Interpolation	T1,R1/BB	13.07.23
38	1	Introduction - Interpolation	T1,R1/BB	14.07.23
39	3	Lagrange's Interpolation	T1,R1/BB	15.07.23
40	5	Newton's Divided Difference Interpolations	T1,R1/BB	17.07.23
41	5	Newton's Divided Difference	T1,R1/BB	18.07.23
42	6	Newton's Forward And Backward Difference Interpolation	T1,R1/BB	18.07.23
43	3	Approximation Of Derivatives Using Interpolation Polynomials	T1,R1/BB	19.07.23
44	3	Newton's Derivatives Problems	T1,R1/BB	19.07.23
45	1	Approximation Of Derivatives Using Interpolation Polynomials	T1,R1/BB	20.07.23
46	1	Maxima And Minima	T1,R1/BB	21.07.23
47	2	Numerical Single Integration Of Trapezoidal & Simpson's 1/3 Rule	T1,R1/BB	22.07.23
48	8	Double Integration Of Trapezoidal & Simpson's Rule	T1,R1/BB	22.07.23

UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

49	5	Numerical Solution Of Ordinary Differential Equations	T1,R1/BB	24.07.23
50	1	Euler's And Modified Euler's Method	T1,R1/BB	24.07.23
51	1	Taylor's Series Problem	T1,R1/BB	25.07.23
52	3	Euler's Method And Modified Euler's Method Problems	T1,R1/BB	25.07.23
53	5	Fourth Order Runge - Kutta Method For Solving First Order	T1,R1/BB	26.07.23
54	6	Rk Method - Simultaneous Method Solved	T1,R1/BB	26.07.23

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55	1	Milne's Predictor And Corrector Methods For Solving First Order Differential Equations	T1,R1/BB	27.07.23
56	1	Milne's Method Problem Solved	T1,R1/BB	27.07.23
57	3	Adam Bash Forth Predictor And Corrector Methods First Order Differential Equations	T1,R1/BB	28.07.23
58	3	Rk Method	T1,R1/BB	29.07.23
59	7	Taylor's series problems	T1,R1/BB	31.07.23
60	8	Adam Bash Forth Predictor And Corrector Methods Problems	T1,R1/BB	02.08.23


Book Reference- Text Book


S.No	Title of the Book	Author	Publisher	Year
1.	"Numerical Methods in Engineering and Science"	Grewal, B.S., and Grewal, J.S.,	Khanna Publishers, 10th Edition, New Delhi.	2015
2.	Probability and Statistics for Engineers.	Johnson, R.A., Miller, I and Freund J., "Miller and Freund	Pearson Education, Asia, 8th Edition.	2015

Book Reference-References

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1.	"Probability and Statistics for Engineering and the Sciences"	Devore, J.L.,	Cengage Learning, New Delhi, 8th Edition.	2014
2.	"Probability and Statistics for Engineers and Scientists"	Walpole, R.E., Myers, R.H., Myers, S.L. and Ye, K	Pearson Education, Asia, 2010	2010


Signature of the Faculty in-charge


HoD/S&H


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DEPARTMENT OF MATHEMATICS

Identification of Curricular Gap & Content Beyond Syllabus (CBS)

Name of the Faculty : Dr. A. Iravithul Basira Course Code & Name: MA3251/Statistics & Numerical Methods
 Degree & Program: B.Tech/B.E Semester & Section: II/All Academic Year: 2022-2023/EVEN

I. Mapping of Course Outcomes with POs & PSOs. (before CBS)

Table.1 Mapping of COs, C, PSOs with POs-before CBS.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO2	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO3	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO4	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO5	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO6	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
Cos, POs	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-

II. Identification of content beyond syllabus.

Table.2 Identification of content beyond syllabus

Detail of Content Beyond Syllabus (CBS) added	POs strengthened/v acant filled	CO/Unit
Real life Applications	PO6(2) Vacant filled	CO1 & CO2/I & II

III. Mapping of Course Outcomes with POs & PSOs. (After CBS)

Table.3 Mapping of COs, C, PSOs with POs-after CBS.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO2	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO3	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO4	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO5	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO6	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
Cos, POs	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-

Signature of the Faculty

HoD/S&H

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DEPARTMENT OF MATHEMATICS


Assignment Question Paper

Assignment-01		Date of Issue:	25.05.23	Marks	10
Course code	MA3251	Course Title	STATISTICS & NUMERICAL METHODS		
Year	I	Semester/Section	II/All	Date of Submission:	02.06.23

Q.No	Questions	CO																														
1	<p>An experiment was designed to study the performance of 4 different detergents for cleaning fuel injectors. The following cleanliness readings were obtained with specially designed equipment for 12 tanks of gas distributed over 3 different models of engines.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>I</th> <th>II</th> <th>III</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>45</td> <td>43</td> <td>51</td> <td>139</td> </tr> <tr> <td>B</td> <td>47</td> <td>46</td> <td>52</td> <td>145</td> </tr> <tr> <td>C</td> <td>48</td> <td>50</td> <td>55</td> <td>153</td> </tr> <tr> <td>D</td> <td>42</td> <td>37</td> <td>49</td> <td>128</td> </tr> <tr> <td>Total</td> <td>182</td> <td>176</td> <td>207</td> <td>565</td> </tr> </tbody> </table> <p>Perform the ANOVA and 0.01 level significance are difference in the column and row</p>		I	II	III	Total	A	45	43	51	139	B	47	46	52	145	C	48	50	55	153	D	42	37	49	128	Total	182	176	207	565	CO1
	I	II	III	Total																												
A	45	43	51	139																												
B	47	46	52	145																												
C	48	50	55	153																												
D	42	37	49	128																												
Total	182	176	207	565																												
2	<p>The sales manager of a large company conducted a sample survey in states A and B taking 400 Sample in each case. test whether the average sales is same in the two states at 1 % level</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>State A</th> <th>State B</th> </tr> </thead> <tbody> <tr> <td>Average sales</td> <td>Rs 2500</td> <td>Rs 2200</td> </tr> <tr> <td>S.D</td> <td>Rs 400</td> <td>Rs 550</td> </tr> </tbody> </table>		State A	State B	Average sales	Rs 2500	Rs 2200	S.D	Rs 400	Rs 550	CO1																					
	State A	State B																														
Average sales	Rs 2500	Rs 2200																														
S.D	Rs 400	Rs 550																														

Name and Signature of the Faculty Incharge

HoD/S & H


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DEPARTMENT OF MATHEMATICS

Assignment Answer Sheet

Name of the Student : R SUMAN


AU Register Number: 811222225036


Assignment - 01		Date of Issue:		Marks
Course code	MA3251	Course Title	STATISTICS AND NUMERICAL METHODS	
Year	I	Semester/Section	Date of Submission: 2/6/25	

Q.No	Questions	CO
1	write the formula for t -distribution, z -test	1
2	Using R-K method to solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with $y(0) = 1$, $x = 0.2$. Taking $h = 0.2$	

Mark Allocation

Rubrics	Marks Allocated	Marks obtained
Content Quality	6	4
Presentation Quality	2	2
Timely submission	2	1
Total marks	10	7


Dr. A. Ilanithal Basia
Name and Signature of the Faculty Incharge


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Register Number:



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Model-I			Date/Session	20.07.23/AN	Marks	100
Coursecode	MA3251	CourseTitle	STATISTICS & NUMERICAL METHODS			
Regulation	2021	Duration	3 Hrs	AcademicYear	2022-23	
Year	I	Semester	II	Department	All Branches	

COURSE OUTCOMES

CO1	Apply the concept of testing of hypothesis for small and large samples in real life problems.
CO2	Apply the basic concepts of classification of design of experiments in the field of agriculture.
CO3	Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems
CO4	Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
CO5	Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.
CO6	Techniques to get a knowledge of Engineering applications


Q.No.	Question	CO	BTS
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PART A
 (Answer all the Questions 10x2=20Marks)

1	Write χ^2 test for population variance.	1	K2
2	Write the test statistics for F - distribution.	1	K1
3	Write the test statistics for difference of means of two small samples.	1	K2
4	Write the formula for students "t" distribution	1	K1
5	Write the table value for Z of Two tailed, one tailed (Left and Right).	1	K1
6	What is Random sampling?	1	K1
7	Define Alternative Hypothesis	1	K2
8	What is Completely randomized design?	1	K1
9	What is a Latin Square?	1	K1
10	Give Newton Iterative Formula.	1	K1

PART B
 (Answer all the Questions 5x16=80Marks)

11a	<p>An insurance agent has claimed that the average age of policy holders who insure through him is less than the average for all agents which is 30.5 years. A random sample of 100 policy holders who had insured through him gave the following age distribution</p> <table border="1"> <tr> <td>Age last birthday</td> <td>16-20</td> <td>21-25</td> <td>26-30</td> <td>31-35</td> <td>36-40</td> </tr> <tr> <td>No. of persons</td> <td>12</td> <td>22</td> <td>20</td> <td>30</td> <td>16</td> </tr> </table> <p>Calculate the A.M and S.D of this distribution and use these values to test his claim at the 5% level of significance.</p>	Age last birthday	16-20	21-25	26-30	31-35	36-40	No. of persons	12	22	20	30	16	1	K2
Age last birthday	16-20	21-25	26-30	31-35	36-40										
No. of persons	12	22	20	30	16										


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OR

11b

Two independent samples from normal population with equal variance gave the following

Sample	Size	Mean	S.D
1	16	23.4	2.5
2	12	24.9	2.8

Is the difference between the means significant ?

1

K2

12a

A group of 10 rats fed on diet A and another group of 8 rats fed on diet B, recorded the following increase in weight (gms)

Diet A	5	6	8	1	12	4	3	9	6	10
Diet B	2	3	6	8	10	1	2	8		

Does it show superiority of Diet A and Diet B ?

2

K3

OR

12b

Two random samples drawn from normal populations are

Sample I	20	16	26	27	23	22	18	24	25	19		
Sample II	27	33	42	35	32	34	38	28	41	43	30	37

Obtain estimates of the variances of the populations and test whether the two populations have the same variance.

2

K3

13a

Two independent samples of sizes 9 and 7 from a normal population had the following values of the variables

Samples I	18	13	12	15	12	14	16	14	15
Samples II	16	19	13	16	18	13	15		

Do the estimates of the population variance differ significantly at 5% level ?

1

K2

OR

13b

Using R.K Method of fourth order, solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with $y(0) = 1$ at $x = 0.2$ and $x = 0.4$ taking $h = 0.2$.

1

K2

14a

(i) Evaluate $\int_1^{1.2} \int_1^{1.4} \frac{1}{x+y} dx dy$ by Simpson's $\frac{3}{8}$ rule by taking $h = k = 0.1$.

(ii) If $f(0) = 1, f(1) = 4, f(3) = 40, f(4) = 85$. Find $f(x)$ that satisfies this data using Newton divided difference formula hence find $f(5)$.

1

K2

OR

14b

Solve the following equations by Gauss - Seidel method
 $27x + 6y - z = 85, x + y + 54z = 110, 6x + 15y + 2z = 72$.

1

K2

15a

(i) Find a real root of a equation $\cos x = 3x - 1$ correct to four decimal places using fixed point iteration method.

(ii) Using Jacobi method to find Eigen values and the corresponding Eigen Vectors of the

matrix $\begin{pmatrix} 6 & \sqrt{3} \\ \sqrt{3} & 4 \end{pmatrix}$.

2

K3

OR

15b

Analysis data give your conclusion

BLOCK	Yield			
I	(1)	a	b	ab
	23	25	22	38
II	b	(1)	a	ab
	40	26	36	38
III	(1)	a	ab	b
	29	20	30	20
IV	ab	a	b	(1)
	34	31	24	28

1

K2

Course Faculty

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HOD Name/Sign/Date
(Name/Sign/Date)

Define χ^2 Test

Ans: It is very powerful test for testing the significance of the discrepancy between theory and experiment.

2. Write the test statistic for F-distribution

Ans: F-distribution is used to test the equality of the variances of two populations from which two small samples.

3. Write the samples of difference of two samples

Ans: The T-distribution range from $-\infty$ to $+\infty$ as n gets large the t-distribution degree of freedom changes.

4. Write Z test formula

$$Z = \frac{|\bar{x}_1 - \bar{x}_2|}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

5. Z-Test value Table value

$$5\% = 4.231 \quad (\text{One tail})$$

$$5\% = 3.703 \quad (\text{Two tail})$$

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6. What is random samp

Ans: A random sampling is one in which each member of population has an equal chance of being included in it.

7. Define alternative hypothesis?

Ans: Suppose the null hypothesis is false, then something else must be true.

8. What is completely randomized design?

Ans: In a completely randomized design the treatment variable on all the elements in the experimental group.

9. What is a latin square?

Ans: Latin square design controls variation in two directions of the experimental material as row and columns resulting in the reduction of experimental error.

Give Newton's iterative formula.

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$

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11. (a) $\alpha = 5\%$, $n = 100$, $\bar{x} = \frac{\sum fx}{n} = 29.1$

$\mu = 30.5$, $S = 6.30$

$Z = \frac{\bar{x} - \mu}{S/\sqrt{n}} = 2.532$

H_0 is rejected

(b) $n_1 = 400$, $x_1 = 2000$, $S_1 = 400$, $n_2 = 400$

$x_2 = 2200$, $S_2 = 500$

$H_0: \mu_1 = \mu_2$; $H_1: \mu_1 \neq \mu_2$ (2 tail)

$Z = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}} = 8.92$

$Z_{0.01} = 2.58$; $|Z| > 2.58$; H_0 is rejected.

12. (a) C.F. = 554.08

TSS = 23.08

SSR = 12.68

SSE = 6.58

F = 6.24

(b) T = 77, C.F. = 494.08, SSR = 24.92

TSS = 46.92, SSE = 8.17, SSE = 8.17

F (2, 40) = 11.22

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13. (a) $f(x) = e^x - 3x$

$x_1 = 0.91$

$x_2 = 0.82$

$x_3 = 0.76$

$x_4 = 0.71$

$x_9 = 0.63$

(b) $x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}, n=0,1,2, \dots$

$x_1 = \frac{1}{2} (0.25 \pm 0.2666)$

$x_2 = 0.25819$

$x_3 = 0.25819$

The value of $\frac{1}{\sqrt{e}}$ is 0.25819

14. (a) $x_0 = 1, x_1 = 0, x_2 = 2, x_3 = 4$
 $y_0 = 0, y_1 = 3, y_2 = 1, y_3 = 12$

$$y = f(x) = \frac{(x-0)(x-2)(x-3)}{(1-0)(1-2)(1-3)} (-0) + \frac{(x+1)(x-2)(x-3)}{(0+1)(0-2)(0-1)} (3) \\ + \frac{(x-1)(x-0)(x-2)}{(2-1)(2-0)(2-2)} (1) + \frac{(x+1)(x-0)(x-2)}{(3+1)(3-0)(3-2)} (12) \\ = 2(x)^3 - 6(x)^2 + 3(x) + 3 \\ = 2$$

$$(b) \quad y = y_0 + (x-x_0) \Delta y_0 + (x-x_0)(x-x_0) \Delta^2 y_0 + \dots$$

$$y(x) = x^3 + 2x^2 + 3x + 4$$

$$y'(x) = 3x^2 + 4x + 3$$

$$y'(6) = 3(6)^2 + 4(6) + 3 = 135$$

15 (a) $x_0 = 0, y_0 = 1, h = 0.1$

$$y' = x + y$$

$$y'' = 1 + y'$$

$$y''' = y''$$

$$y^{(4)} = y'''$$

$$y_1 = y_0 + \frac{h}{1!} y_0' + \frac{h^2}{2!} y_0'' + \frac{h^3}{3!} y_0''' + \dots$$

$$y(0.1) = 1.24275$$

(b) Euler's formula

$$y_{n+1} = y_n + h(x_n, y_n)$$

$$x_1 = 0.1, x_2 = 0.2, x_3 = 0.3, x_4 = 0.4, x_5 = 0.5$$

$$y_1 = y(0.1)$$

$$= y_0 + h(x_0, y_0)$$


$$y_1 = 0$$

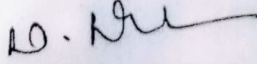
$$y_2 = 0.001$$

$$y_3 = 0.005$$

$$y_4 = 0.05$$


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HoD
(Name/Sign/Date)

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IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu - 622 012, India
(Approved by AICTE, New Delhi and affiliated to Anna University, Chennai)

Internal Assessment Test Answer Book

Name	S. Shalini			Year/ Semester/Section	7/2am	
Batch No.	8112222 48033	Date/Session		Department	AIDS	
Course code	MA3251	Course Title		Statistics and Numerical Methods		
Internal Assessment Test	IAT 1	IAT 2	<input type="checkbox"/>	IAT 3	<input type="checkbox"/>	Model <input checked="" type="checkbox"/>
Name and Signature of the Invigilator with date		P. Lalitha		P. LALITHA		

Instruction to the Student: Put tick mark to the question attended in the column against question.

Part A			Part B / Part C				Total Marks	
Q. No.	✓	Marks	Q. NO.	✓	a	b		
					Marks	Marks		
1	✓	2	11	✓	8	6	14	
2	✓	2	12	✓	8	0	8	
3	✓	2	13	✓	8	8	16	
4	✓	1	14	✓	7	6	13	
5	-	0	15	✓	6	5	11	
6	✓	1	16					
7	✓	2	Total				62	
8	✓	2	<div style="display: flex; justify-content: space-between;"> 77 <div style="text-align: right;"> <p>A. J. Pranthul Narain</p> <p><i>(Signature)</i></p> <p>7/8/23</p> <p>Name and Signature of the Examiner with date</p> </div> </div>					
9	✓	1						
10	✓	2						
Total		15	Grand Total					

To be filled by the examiner							
Course Outcomes	1	2	3	4	5	6	Total
Marks allotted	20	80					100
Marks Obtained	15	62					77
IQAC Audit - Remarks							
						<p><i>(Signature)</i></p> <p>Name and Signature of the IQAC member</p>	

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INDRAGANESAN COLLEGE OF ENGINEERING
IG VALLEY, MANIDANDAM, TIRUCHIRAPPALLI - 620
012 DEPARTMENT OF MATHEMATICS
ACADEMIC YEAR 2022 - 2023 (EVEN SEMESTER)
STUDENT MARK STATEMENT - CO BASED

AIE-I

SUBJECT CODE & TITLE: MA3251 - STATISTICS & NUMERICAL METHODS

YEAR/SEM: I/II

MONTH & YEAR: JULY/2023

S.NO	REGNO	NAME	CO 1	CO 2	TOTAL(50)	TOTAL(100)
1	811222243001	ABINAYA B	25	17	42	84
2	811222243002	ABINAYA N	22	16	38	76
3	811222243003	ABISHAKE K	28	18	46	92
4	811222243004	AKASH G	23	12	35	70
5	811222243005	AKASH G	23	12	35	70
6	811222243006	AKASH G	23	12	35	70
7	811222243007	AKASH G	23	12	35	70
8	811222243008	AKASH G	23	12	35	70
9	811222243009	AKASH G	23	12	35	70
10	811222243010	AKASH G	23	12	35	70
11	811222243011	AKASH G	23	12	35	70
12	811222243012	AKASH G	23	12	35	70
13	811222243013	AKASH G	23	12	35	70
14	811222243014	AKASH G	23	12	35	70
15	811222243015	AKASH G	23	12	35	70
16	811222243016	AKASH G	23	12	35	70
17	811222243017	AKASH G	23	12	35	70
18	811222243018	AKASH G	23	12	35	70
19	811222243019	AKASH G	23	12	35	70
20	811222243020	AKASH G	23	12	35	70
21	811222243021	AKASH G	23	12	35	70
22	811222243022	AKASH G	23	12	35	70
23	811222243023	AKASH G	23	12	35	70
24	811222243024	AKASH G	23	12	35	70
25	811222243025	AKASH G	23	12	35	70
26	811222243026	AKASH G	23	12	35	70
27	811222243027	AKASH G	23	12	35	70
28	811222243028	AKASH G	23	12	35	70
29	811222243029	AKASH G	23	12	35	70
30	811222243030	AKASH G	23	12	35	70
31	811222243031	AKASH G	23	12	35	70
32	811222243032	AKASH G	23	12	35	70

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13	811222243033	SHALINI S	26	22	48	96
14	811222243034	SUBIKSHA G	20	22	42	84
15	811222243035	THACHINAMOORTHY K	19	19	38	76
16	811222243036	THENMOZH K	18	22	40	80
17	811222243037	VAISHNAVS	20	18	38	76

MARKSRANGE:


<20	20-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
0	0	0	1	2	5	14	8	5

TotalNo.ofCandidatesPresent	38
TotalNo.ofCandidatesAbsent	02
TotalNo.ofStudentsPass	34
TotalNo.ofStudentsFail	04
PercentageofPass	97%


STAFF-IN-CHARGE


HoD/S & H


PRINCIPAL


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Manikandam, Trichy-620 012.

Register Number: _____



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(Approved by AICTE, New Delhi and affiliated to Anna University, Chennai)

RETEST

Course code	MA3251	Course Title	Date/Session	27.07.23/AN	Marks	100
Regulation	2021	Duration	STATISTICS & NUMERICAL METHODS			
Year	I	Semester	3 Hrs	Academic Year	2022-23	
			II	Department	All Branches	

COURSE OUTCOMES

CO1	Apply the concept of testing of hypothesis for small and large samples in real life problems.
CO2	Apply the basic concepts of classifications of design of experiments in the field of agriculture.
CO3	Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.
CO4	Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
CO5	Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.
CO6	Techniques to get a knowledge of Engineering applications

Q.No.	Question	CO	BTS
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PARTA

(Answer all the Questions 10x2=20Marks)

1	State Level of Significance.	1	K2
2	Define Type I and Type II errors.	1	K1
3	State assumptions involved in ANOVA	1	K2
4	What is meant by LSD?	1	K1
5	What is the rate of convergence in NR - method	2	K2
6	State the principle used in Gauss Jordan method	2	K4
7	State the Lagrange's Interpolation formula	2	K2
8	Why Simpson's 1/3 rule is called a closed formula?	2	K1
9	What is a Predictor and Corrector method of solving a differential equation?	2	K1
10	Write Milne's Predictor formula?	2	K1

PARTB

(Answer all the Questions 5x16=80Marks)

11a	Analysis data give your conclusion	1	K1																																													
<table border="1"> <thead> <tr> <th>BLOCK</th> <th colspan="4">Yield</th> </tr> </thead> <tbody> <tr> <td>I</td> <td>(1)</td> <td>a</td> <td>b</td> <td>ab</td> </tr> <tr> <td></td> <td>23</td> <td>25</td> <td>22</td> <td>38</td> </tr> <tr> <td>II</td> <td>b</td> <td>(1)</td> <td>a</td> <td>ab</td> </tr> <tr> <td></td> <td>40</td> <td>26</td> <td>36</td> <td>38</td> </tr> <tr> <td>III</td> <td>(1)</td> <td>a</td> <td>ab</td> <td>b</td> </tr> <tr> <td></td> <td>29</td> <td>20</td> <td>30</td> <td>20</td> </tr> <tr> <td>IV</td> <td>ab</td> <td>a</td> <td>b</td> <td>(1)</td> </tr> <tr> <td></td> <td>34</td> <td>31</td> <td>24</td> <td>28</td> </tr> </tbody> </table>		BLOCK	Yield				I	(1)	a	b	ab		23	25	22	38	II	b	(1)	a	ab		40	26	36	38	III	(1)	a	ab	b		29	20	30	20	IV	ab	a	b	(1)		34	31	24	28		
BLOCK	Yield																																															
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OR

11b	Solve the following equations by Gauss - Seidel method $27x + 6y - z = 85$, $x + y + 54z = 110$, $6x + 15y + 2z = 72$.	1	K1																				
12a	Two independent samples of sizes 9 and 7 from a normal population had the following values of the variables <table border="1"> <tr> <td>Samples I</td> <td>18</td> <td>13</td> <td>12</td> <td>15</td> <td>12</td> <td>14</td> <td>16</td> <td>14</td> <td>15</td> </tr> <tr> <td>Samples II</td> <td>16</td> <td>19</td> <td>13</td> <td>16</td> <td>18</td> <td>13</td> <td>15</td> <td></td> <td></td> </tr> </table> Do the estimates of the population variance differ significantly at 5% level?	Samples I	18	13	12	15	12	14	16	14	15	Samples II	16	19	13	16	18	13	15			2	K1
Samples I	18	13	12	15	12	14	16	14	15														
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OR

12b	(i) Evaluate $\int_1^{1.2} \int_1^{1.4} \frac{1}{x+y} dx dy$ by Simpson's y_3 rule by taking $h = k = 0.1$.	2	K1
-----	--	---	----

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(ii) If $f(0) = 1, f(1) = 4, f(3) = 40, f(4) = 85$. Find $f(x)$ that satisfies this data using Newton divided difference formula hence find $f(5)$.

OR

13a

An insurance agent has claimed that the average age of policy holders who insure through him is less than the average for all agents which is 30.5 years. A random sample of 100 policy holders who had insured through him gave the following age distribution

Age last birthday	16-20	21-25	26-30	31-35	36-40
No. of persons	12	22	20	30	16

Calculate the A.M and S.D of this distribution and use these values to test his claim at the 5% level of significance.

1

K3

OR

13b

Two independent samples from normal population with equal variance gave the following

Sample	Size	Mean	S.D
1	16	23.4	2.5
2	12	24.9	2.8

Is the difference between the means significant?

1

K3

14a

Two random samples drawn from normal populations are

Sample I	20	16	26	27	23	22	18	24	25	19	
Sample II	27	33	42	35	32	34	38	28	41	43	30

Obtain estimates of the variances of the populations and test whether the two populations have the same variance

2

K1

OR

14b

An insurance agent has claimed that the average age of policy holders who insure through him is less than the average for all agents which is 30.5 years. A random sample of 100 policy holders who had insured through him gave the following age distribution

Age last birthday	16-20	21-25	26-30	31-35	36-40
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Calculate the A.M and S.D of this distribution and use these values to test his claim at the 5% level of significance

1

K3

15a

(i) Find a real root of a equation $\cos x = 3x - 1$ correct to four decimal places using fixed point iteration method.

(ii) Using Jacobi method to find Eigen values and the corresponding Eigen Vectors of the matrix $\begin{pmatrix} 6 & \sqrt{3} \\ \sqrt{3} & 4 \end{pmatrix}$

1

K1

OR

15b


A group of 10 rats fed on diet A and another group of 8 rats fed on diet B, recorded the following increase in weight (gms)

Diet A	5	6	8	1	12	4	3	9	6	10
Diet B	2	3	6	8	10	1	2	8		


Does it show superiority of Diet A and Diet B?

1

K3


Course Faculty
(Name/Sign/Date)



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Manikandam, Trichy-620 012.


HoD
(Name/Sign/Date)

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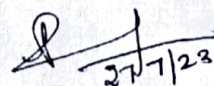
IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu - 622 012, India
(Approved by AICTE, New Delhi and affiliated to Anna University, Chennai)


Internal Assessment Test Answer Book

Name	Balasubhiksha . B			Year/ Semester/Section	I / II	
Batch No.	211222242007	Date/Session	27.7.23/AN	Department	AIE DS	
Course code	MA3251	Course Title	Statistic And Numerical Methods			
Internal Assessment Test	IAT1	<input checked="" type="checkbox"/> Retest	<input checked="" type="checkbox"/> IAT 2	<input type="checkbox"/> IAT 3	<input type="checkbox"/> Model	<input type="checkbox"/>
Name and Signature of the Invigilator with date			 (ANUSHKRISHNAN)			

Instruction to the Student: Put tick mark to the question attended in the column against question.

Q. No.	Part A		Part B / Part C				Total Marks	
	✓	Marks	Q. NO.	✓	a	b		
					Marks	Marks		
1		2	11			12		
2		1	12		13			
3		2	13		15			
4		2	14		12			
5		1	15			13		
6		0	16					
7		2	Total				65	
8		2	Grand Total 80/100					
9		1						
10		2						
Total		15						


 Do. A. Ivanthul Basin
 Name and Signature
 of the Examiner with date

To be filled by the examiner							
Course Outcomes	1	2	3	4	5	6	Total
Marks allotted	20	80					100
Marks Obtained	15	65					80
IQAC Audit - Remarks							
							 Name and Signature of the IQAC member


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 Manikandam, Trichy-620 012.



INDRAGANESAN COLLEGE OF ENGINEERING
IG VALLEY, MANIDANDAM, TIRUCHIRAPPALLI - 620
012 DEPARTMENT OF MATHEMATICS
ACADEMIC YEAR 2022 - 2023 (EVEN SEMESTER)
STUDENT MARK STATEMENT - CO BASED
RETEST

SUBJECT CODE & TITLE: MA3251 - STATISTICS & NUMERICAL METHODS

YEAR/SEM: I/II

MONTH & YEAR: JULY/2023


S.NO	REGNO	STUDENT NAME	CO1	CO2	TOTAL(50)	TOTAL(100)
1.	811222243007	BALA SUBHIKSHA B	25	15	40	80
2.	811222243026	RUBAVATHI G	22	10	32	64

MARKS RANGE:

<20	20-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
0	0	0	0	0	1	1	0	0

Total No. of Candidates Present	2
Total No. of Candidates Absent	0
Total No. of Students Pass	2
Total No. of Students Fail	0


STAFF IN CHARGE


HoD/S & H


PRINCIPAL


Dr. G. Balakrishnan
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.



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INDRA GANESAN COLLEGE OF ENGINEERING
 IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu - 620 012, India
 (Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

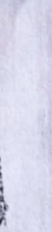
DEPARTMENT OF MATHEMATICS

ROOT CAUSE ANALYSIS

Name of the Faculty : **Dr. A. Iravithulal Paulim**
 Degree & Program : **B. E / B. Tech**
 IA Test : **1 / U / II / Model**
 Target : **85 %**

Course Code & Name : **MA3551 Statistics & Numerical work**
 Semester & Section : **2, A, B, C, D, E**
 University Exam / Month & Year : **Aug / 2022**
 Achieved : **76 %**

S.NO	REG.NO	NAME OF THE STUDENT	CAUSES FOR FAILURE	CORRECTIVE ACTION TAKEN	PREVENTIVE ACTION TAKEN
1.	P1122220904	Allwin .Y	Health issue	Re-test	Advised to take course
2.	P1122220504	Brundha .P	Family issue	Re-test	Advised to take course
3.	P1122220523	Hosini .T	Health issue	Re-test	Advised to take course & take leave
4.	P1122221104	Ramachandran .S	Irregular	Re-test	Advised to take course & college regular
5.	P1122221004	Ramash .P	Health issue	Re-test	Advised to take course & take leave
6.	P1122221048	Geopala Krishnan .D	Health issue	Re-test	Advised to take course
7.	P1122221068	Shaktanya .T	Health issue	Re-test	Advised to take course
8.	P1122221054	Analakrushi .S	Family issue	Re-test	Advised to take course
9.	P1122221047	Krishnaveni .S	Irregular	Re-test	Advised to take course & take leave
10.	P1122221047	Rhoshini .M	Irregular	Re-test	Advised to take course & take leave
11.	P1122221047	Mahamed Sathivalath .S	Irregular	Re-test	Advised to take course & take leave
12.	P1122221047	Rubavathy .G	Health issue	Re-test	Advised to take course & take leave
13.	P1122221047	Saravani .A	Health issue	Re-test	Advised to take course & take leave
14.	P1122221047	Saravani .A	Health issue	Re-test	Advised to take course & take leave
15.	P1122221047	Saravani .A	Health issue	Re-test	Advised to take course & take leave

Signature of the Faculty Member


Signature of the Faculty Member


Dr. G. Balakrishnan, M.E., Ph.D.,
 Principal
 Indra Ganesan College of Engineering
 IG Valley, Madurai Main Road
 Manikandam, Trichy-620 012



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IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu - 620 012, India
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IQAC Academic Audit Form

ACADEMIC YEAR: 2022-2023 ODD / EVEN SEMESTER

Name of Department : MATHS Year / Sem / 2 No. of Students Registered : 234
Sec :

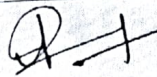
Details of Examination : IA Test -1 / IA Test -2 / IA Test -3 / Model Test

S.No.	Course Code	List of Reg.No Verified	Course Log Book Verified (Y/N)	Course File Verified (Y/N)	No of students Attended	No of Absentees	No of Failures	Pass %	Remarks
1	MA3251	(CSE) 811222205009, 811222205014, 811222205023	Y	Y	56	2	15	69%	-
2	MA3251	(Mech) 811222214004, 8112222105004	Y	Y	4	1	2	50%	-
3	MA3251	(ECE) 8112222106031, 8112222106010	Y	Y	36	2	5	82%	-
4	MA3251	(Agri) 811222225006, 811222225221	Y	Y	36	-	7	79%	-
5	MA3251	(IT) 811222264030, 811222243026	Y	Y	56	5	13	72%	-
6	MA3251	(AIAS) 811222243027, 811222243028	Y	Y	38	-	9	76%	-

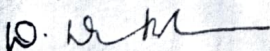
Verified by

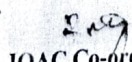
External Member Name and Signature:

Internal Member Name and Signature:

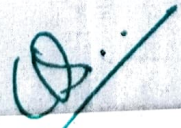
 Dr. A. Ivanthul Basire

Overall Remarks:


HoD/HRS


IQAC Co-ordinator


Principal


Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.