



**SNS COLLEGE OF TECHNOLOGY**  
(An Autonomous Institution, Affiliated to Anna University)  
Coimbatore – 641 035.



**Model Examination**  
**Academic Year 2022-2023(Even)**  
**Fourth Semester**  
**19MAT202 – STATISTICS & NUMERICAL METHODS**  
**(REGULATION 2019)**  
**(Common to Agri, Auto, FT & Mech)**

TIME: 3 HOURS

MAXIMUM MARKS: 100

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

		CO	BL	
1.	Define critical region and acceptance region.	CO1	Rem	2
2.	Write the procedure for testing of hypothesis.	CO1	Und	2
3.	Define experimental error.	CO2	Rem	2
4.	List out the advantages of Latin square method	CO2	Und	2
5.	Evaluate $\sqrt{12}$ by applying Newton-Raphson formula.	CO3	Rem	2
6.	Is Gauss – Seidel method is better than Gauss – Jacobi method? Justify.	CO3	Und	2
7.	Write Newton’s forward interpolation Formula.	CO4	Rem	2
8.	What are the errors in Simpson’s rules of numerical integration?	CO4	Rem	2
9.	Write the merits and demerits of the Taylor method.	CO5	Und	2
10.	Is Milne’s a self – starting method? If not why?	CO5	Und	2

**PART B — (5 x 16= 80 Marks)**

11.	(a)	i)	A sample of heights of 6400 English men has a mean of 170 cm. and a SD of 6.4 cm, while a sample of height of 1600 Americans has a mean of 172 cm. and a SD of 6.3 cm. Do the data indicate that Americans are the average taller than the English men?	CO1	Ana	8
		ii)	A manufacturer claimed that atleast 95% of the equipments which he supplied to a factory conformed to specifications. An examination of a sample of 200 pieces of equipment revealed that 18 were faults. Test his claim at 5% LOS.	CO1	Ana	8
<b>(OR)</b>						
	(b)	i)	A random sample of 10 boys had the following IQ’s 70,120,110, 101,and 88,83,95,98,107,100. Do these data support the assumption of a population mean IQ’s of 100. Find a resolvable range in which most of the mean IQ’s value of sample 10 boys.	CO1	App	8

		<b>ii)</b>	On the basis of information noted below, Analyze the new treatment is comparatively superior to the conventional one	CO1	Ana	8																																	
			<table border="1"> <thead> <tr> <th></th> <th>Favourable</th> <th>Not Favourable</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>New</td> <td>60</td> <td>30</td> <td>90</td> </tr> <tr> <td>Conventional</td> <td>40</td> <td>70</td> <td>110</td> </tr> <tr> <td>Total</td> <td>100</td> <td>100</td> <td>200</td> </tr> </tbody> </table>		Favourable	Not Favourable	Total	New	60	30	90	Conventional	40	70	110	Total	100	100	200																				
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<b>12.</b>	<b>(a)</b>		A completely randomized design experiment with 10 plots and 3 treatments gave the following results, Analyze the significance difference between treatment and yield.	CO2	App	16																																	
			<table border="1"> <thead> <tr> <th>Plot no</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>9</th> <th>10</th> </tr> </thead> <tbody> <tr> <td>Treatment</td> <td>A</td> <td>B</td> <td>C</td> <td>A</td> <td>C</td> <td>C</td> <td>A</td> <td>B</td> <td>A</td> <td>B</td> </tr> <tr> <td>Yield</td> <td>5</td> <td>4</td> <td>3</td> <td>7</td> <td>5</td> <td>1</td> <td>3</td> <td>4</td> <td>1</td> <td>7</td> </tr> </tbody> </table>	Plot no	1	2	3	4	5	6	7	8	9	10	Treatment	A	B	C	A	C	C	A	B	A	B	Yield	5	4	3	7	5	1	3	4	1	7			
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<b>(OR)</b>																																							
	<b>(b)</b>		A Farmer wishes to test the effect of four different fertilizers A, B, C, D on the yield of wheat. In order to eliminate sources of error due to variability in soil fertility, he uses the fertilizers, in Latin square arrangement as indicated in the following table, where the numbers indicate the yield in bushels per unit area.	CO2	App	16																																	
			<table border="1"> <tbody> <tr> <td>A (18)</td> <td>C (21)</td> <td>D (25)</td> <td>B (11)</td> </tr> <tr> <td>D (22)</td> <td>B (12)</td> <td>A (15)</td> <td>C (19)</td> </tr> <tr> <td>B (15)</td> <td>A (20)</td> <td>C (23)</td> <td>D (24)</td> </tr> <tr> <td>C (22)</td> <td>D (21)</td> <td>B (10)</td> <td>A (17)</td> </tr> </tbody> </table> <p>Perform ANOVA to determine if there is a significant difference between the fertilizers at <math>\alpha=5\%</math> LOS.</p>	A (18)	C (21)	D (25)	B (11)	D (22)	B (12)	A (15)	C (19)	B (15)	A (20)	C (23)	D (24)	C (22)	D (21)	B (10)	A (17)																				
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<b>13.</b>	<b>(a)</b>	<b>i)</b>	Solve the equation $f(x) = 3x - \cos x - 1$ using Newton Raphson method.	CO3	App	8																																	
		<b>ii)</b>	Solve using Gauss Elimination method: $x + y + z = 9; 2x - 3y + 4z = 13; 3x + 4y + 5z = 40.$	CO3	App	8																																	
<b>(OR)</b>																																							
	<b>(b)</b>		Solve by Gauss Seidal and Gauss Jacobi method $x + y + 5z = 110; 27x + 6y - 5z = 85; 6x + 15y + 2z = 72$	CO3	App	16																																	
<b>14.</b>	<b>(a)</b>		Dividing the range into 10 equal parts, find the value of $\int_0^{\frac{\pi}{2}} \sin x \, dx$ by i) Simpson's 1/3 <sup>rd</sup> rule. ii) Trapezoidal Rule.	CO4	Ana	16																																	
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	<b>(b)</b>	<b>i)</b>	The Population of a certain town is given below.	CO4	App	8																																	
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		<b>ii)</b> Find the age corresponding to the annuity value 13.6. given table by using inverse Lagrange's interpolation.	CO4	App	8												
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Age(x)	30	35				40	45	50									
Annuity value(y)	15.9	14.9	14.1	13.3	12.5												
<b>15.</b>	<b>(a)</b>	<b>i)</b> Solve $y' = y^2 + x, y(0) = 1$ using Taylor series method and compute $y(0.1)$	CO5	App	8												
		<b>ii)</b> Using Euler's method solve $y' = x + y + xy, y(0) = 1$ . Compute $y$ at $x = 0.1$ by taking $h = 0.05$ .	CO5	App	8												
<b>(OR)</b>																	
	<b>(b)</b>	Given that $\frac{dy}{dx} = 1 + y^2, y(0.6) = 0.6841, y(0.4) = 0.4228, y(0.2) = 0.2027, y(0) = 0$ , find $y(-0.2)$ using Milne's method.	CO5	App	16												

**Blooms Taxonomy Abbreviations: Rem-Remembrance, Und-Understanding,  
App- Apply, Ana-Analyze, Eva-Evaluate, Cre-Create**

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**Prepared by**

**Verified By**

**Dean(S&H)**