

Register No.

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SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore - 641 107

AN AUTONOMOUS INSTITUTION



Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai
INTERNAL ASSESSMENT EXAMINATION - II

Fourth Semester

B.E - MECH/MCT (AM)

19MA407 - Statistics and Numerical Methods

Regulations 2019

Duration : 1 Hours 30 Minutes

Date : 24.04.2023

Session : FN

Maximum: 50 Marks

Answer ALL questions

PART A - (5 X 2 = 10 marks)

Question	Marks	CO	BL
Discuss the advantages and disadvantages of Randomized block design.	2	CO-2	L-1
What is meant by Latin square?	2	CO-2	L-1
Using Newton-Raphson method, find the iteration formula to compute \sqrt{N}	2	CO-3	L-1
Compare Gauss Jordan and Gauss Seidel methods.	2	CO-3	L-1
Solve the following system of equations by Gauss-Seidel method $5x+4y=15$, $3x+7y=12$	2	CO-3	L-1

PART B - (2 X 13 = 26 marks)

(a) 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:

	Engine 1	Engine 2	Engine 3	Total
Detergent A	45	43	51	139
Detergent B	47	46	52	145
Detergent C	48	50	55	153
Detergent D	42	37	49	128
Total	182	176	207	565

$10 = 12, \quad \frac{1}{N} = 102.08$
 $TSS = 264.92,$
 $SSC = 135.17$
 $SSR = 110.91$
 $SSE = 18.84$

$= 21.52$
 $= 11.77$
 $(2,6) = 10.92$
 $(3,6) = 9.78$

13 CO-2 L-3
 $MSC = 67.585$
 $MSP = 36.97$
 $MSE = 3.14$

Perform the ANOVA and test at 0.01 level of significance, whether there are differences in the detergents or in the engines.

OR

(b) Using Newton-Raphson method solve the equation $3x - \cos x - 1 = 0$ to find a positive root.

13 CO-3 L-2

0.871
 0.5178

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7. (a) Using Gauss Jordan method, find the inverse of $A = \begin{pmatrix} 3 & 1 & 2 \\ 2 & -3 & -1 \\ 1 & 2 & 1 \end{pmatrix}$

$A^{-1} = \frac{1}{8} \begin{bmatrix} -3 & 1 & 1 \\ -1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$

OR

(b) Solve the following system equations by Gauss Seidel method

$27x + 6y - z = 85, x + y + 54z = 110, 6x + 15y + 2z = 72$

$x = \frac{1}{54}(85 - 6y + z)$
 $y = \frac{1}{15}(72 - 6x - 2z)$

$z = \frac{1}{54}(110 - x - y)$

$x = 2.426, y = 3.573, z = 1.922$

PART C - (1 x 14 = 14 Marks)

8. (a) A variable trial was conducted on wheat with 4 varieties in Latin Square design. The plan of the experiment and per plot yield are given below:

$N = 16$
 $T = -12$

$MSC = 2.5$
 $MGR = 15.5$
 $MST = 16.17$
 $MSE = 1.75$

C(25)	B(23)	A(20)	D(20)
A(19)	D(19)	C(21)	B(18)
B(19)	A(14)	D(17)	C(20)
D(17)	C(20)	B(21)	A(15)

$TSS = 113$
 $RSS = 7.5$
 $SSR = 46.5$
 $SST = 48.5$
 $SS E = 10.5$

Analyze the data.

$F_C = 1.43, F_R = 8.86, F_D = 9.24$

(b) Using power method find the dominant Eigen values of $A = \begin{pmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{pmatrix}$

$E.V = 4$
 $E.V = \begin{bmatrix} 1 \\ 0.5 \\ 0 \end{bmatrix}$

D. Srinivas
 21/4/23
 Faculty Incharge

21/4/23

3x2x1
 40x