

Reg.No.: 

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VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN  
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]  
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

**Question Paper Code: 20005**

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – JAN. 2026

Fourth Semester

Computer Science and Engineering

U19MA405 – STATISTICS AND NUMERICAL METHODS

(Common to IT & CST)

(Regulation 2019)

Time : Three Hours

Maximum : 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

**STATISTICAL TABLES MAY BE PERMITTED**

**PART – A**

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Recall the Students 't' test statistics for difference of mean.	2	K1	CO1
2.	List the applications of Chi-square test.	2	K1	CO1
3.	Outline the assumptions involved in Analysis of variance (ANOVA).	2	K2	CO2
4.	Classify the principles of design of experiments.	2	K2	CO2
5.	What is the order of the convergence and convergence condition for Newton Raphson method.	2	K1	CO3
6.	Compare Gauss Jacobi with Gauss Jordan method.	2	K2	CO3
7.	Apply the Lagrange's interpolation to find the polynomial through (0,0), (1,1) and (2,4).	2	K2	CO4
8.	Apply the Trapezoidal rule to evaluate $\int_0^1 \frac{dx}{1+x^2}$ with h=0.2 hence obtain an approximate value of $\pi$ .	2	K2	CO4
9.	Apply Euler's method to find value of y(0.01) , given $y' = y$ and y(0)=1.	2	K2	CO5
10.	Recall the Adam Bash forth predictor corrector formula for solving initial value problem in first order differential equation.	2	K1	CO5

PART – B

(5 x 16 = 80 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	i. Build and test if the difference in the means is significant for the following data:	8	K3	CO1

Sample I:	76	68	70	43	94	68	33	-
Sample II:	40	48	92	85	70	76	68	22

- ii. An automobile company gives you the following information about age groups and the liking for particular model of car which it plans to introduce. On the basis of this data can it be concluded that the model appeal is independent of the age group. 8

( $\chi^2_{0.05}(3) = 7.815$ )

Persons who:	Below 20	20-39	40-59	60 and above	Total
Liked the car:	140	80	40	20	280
Disliked the car:	60	50	30	80	220
Total	200	130	70	100	500

(OR)

- b) i. 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. 8 K3 CO1

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

Build and test the hypothesis that the samples have come from populations with equal variances at 5% level of significance.

- ii. Time taken by workers in performing a job are given below: 8

Type I	21	17	27	28	24	23	-
Type II	28	34	43	36	33	35	39

Test whether there is any significant difference between the variances of time distribution.

12. a) A Completely Randomized design experiment with 10 plots and 3 treatments gave the following results: 16 K3 CO2

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

Construct the results for treatment effects.

(OR)

- b) In a Latin square experiment given below are the yields in quintals per acre on the paddy crop carried out for testing the effect of five fertilizers A,B,C,D,E. Construct the data for variations. 16 K3 CO2

B 25	A 18	E 27	D 30	C 27
A 19	D 31	C 29	E 26	B 23
C 28	B 22	D 33	A 18	E 27
E 28	C 26	A 20	B 25	D 33
D 32	E 25	B 23	C 28	A 20

13. a) i. Construct the real positive root of  $3x - \cos x - 1 = 0$  by Newton's method correct to 6 decimal places. 8 K3 CO3  
 ii. Solve by Gauss Seidal method:

$$6x + 3y + 12z = 35; \quad 8x - 3y + 2z = 20; \quad 4x + 11y - z = 33$$

8

(OR)

- b) i. Solve the following system using Gauss Jordan method 8 K3 CO3  
 $2x - y + 3z = 8; \quad -x + 2y + z = 4; \quad 3x + y - 4z = 0$   
 ii. Construct the numerically largest Eigen value of 8

$$A = \begin{pmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & -4 \end{pmatrix}$$

and the corresponding eigenvector.

14. a) i. From the following table of half yearly premium for policies maturing at different ages, estimate the premium for policies maturing at age 46 and 63 8 K5 CO4

Age $x$ :	45	50	55	60	65
Premium $y$ :	114.84	96.16	83.32	74.48	68.48

- ii. Evaluate  $I = \int_0^6 \frac{1}{1+x^2} dx$  by Trapezoidal rule. Verify the answer with direct integration. 8

(OR)

- b) i. Given the following data, determine  $y'$  (6) and the maximum value of  $y$ . 8 K5 CO4

$x$ :	0	2	3	4	7	9
$y$ :	4	26	58	112	465	922

- ii. Evaluate  $I = \int_0^1 \int_1^2 \frac{2xy}{(1+x^2)(1+y^2)} dx dy$  by Trapezoidal rule with  $h = k = 0.25$ . 8

15. a) i. Apply the Taylor's method to compute  $y(0.2)$  and  $y(0.4)$  correct to 8 K3 CO5  
4 decimal places given  $\frac{dy}{dx} = 1 - 2xy$  and  $y(0) = 0$ .

ii. Apply the 4<sup>th</sup> order Runge-Kutta Method to solve 8  
 $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ ,  $y(0) = 1$  for  $x = 0.2$  and  $x = 0.4$  with  $h = 0.2$ .

(OR)

b) i. Solve by Eulers method the equation and compute  $y(0.4)$  and  $y(0.6)$ . 8 K3 CO5  
 $\frac{dy}{dx} = x + y$ ,  $y(0) = 0$ , choose  $h = 0.02$

ii. Apply the Milne's method to obtain the solution of 8  
 $\frac{dy}{dx} = x - y^2$ , at  $x = 0.8$ , given  $y(0) = 0$ ;  $y(0.2) = 0.02$ ,  
 $y(0.4) = 0.0795$ ,  $y(0.6) = 0.1762$ .