

9. Find $y(0.01)$ by using Euler's method, given that $\frac{dy}{dx} = -y, y(0) = 1$.

10. Write the finite difference approximation for the equation $\frac{d^2y}{dx^2} = x + y$.

PART B — (5 × 16 = 80 marks)

11. (a) (i) The mean height of two samples of 1000 and 2000 members are respectively 67.5 and 68.0 inches. Can they be regarded as drawn from the same population with standard deviation 2.5 inches at 5% level of significance? (8)
- (ii) A random sample of 10 boys has the following IQ's 70, 83, 88, 95, 98, 100, 101, 107, 110 and 120. Do these data support the assumption of a population mean IQ of 100 at 5% level of significance? (8)

Or

- (b) (i) Pumpkins were grown under two experimental conditions. Two random samples of 11 and 9 pumpkins show the sample standard deviations of their weights as 0.8 and 0.5 respectively. Assuming that the weight distributions are normal, test the hypothesis that the true variances are equal, against the alternative hypothesis that they are not at the 10% level of significance. (8)
- (ii) Using the data given in the following table to test at the 0.01 level of significance whether a person's ability in Mathematics is independent of his/her interest in Statistics. (8)

		Ability in Mathematics		
		Low	Average	High
Interest in Statistics	Low	63	42	15
	Average	58	61	31
	High	14	47	29

12. (a) The following data represent a certain person to work from Monday to Friday by four different routes.

		Days				
		Mon	Tue	Wed	Thu	Fri
Routes	1	22	26	25	25	31
	2	25	27	28	26	29
	3	26	29	33	30	33
	4	26	28	27	30	30

Test at the 0.05 level of significance whether the differences among the means obtained for the different routes are significant and also whether the differences among the means obtained for the different days of the week are significant. (16)

Or

(b) The following is the Latin square layout of a design when 4 varieties of seeds are tested. Set up the ANOVA table and state your conclusions. (16)

A18	C21	D25	B11
D22	B12	A15	C19
B15	A20	C23	D24
C22	D21	B10	A17

13. (a) (i) Using Gauss-Jordan method, find the inverse of

$$A = \begin{pmatrix} 3 & -1 & 1 \\ -15 & 6 & -5 \\ 5 & -2 & 2 \end{pmatrix}$$

(8)

(ii) Solve, by Gauss-Seidel method, the system of following equations correct to three decimal places $x + 3y + 10z = 24$, $28x + 4y - z = 32$, $2x + 17y + 4z = 35$. (8)

Or

(b) (i) Solve, by Gauss-Elimination with partial pivoting method, the system of following equations correct to three decimal places

$$2x + y + z = 10, 3x + 2y + 3z = 18, x + 4y + 9z = 16. \quad (8)$$

(ii) Solve, by Gauss-Jacobi method, the system of following equations correct to three decimal places

$$x + y + 54z = 110, 27x + 6y - z = 85, 6x + 15y + 2z = 72. \quad (8)$$

14. (a) (i) Use Lagrange's interpolation formula to find $f(10)$ from the following data: (8)

$$x: 5 \quad 6 \quad 9 \quad 11$$

$$f(x): 12 \quad 13 \quad 14 \quad 16$$

(ii) Find the value of $\cos(1.74)$ using suitable formula from the following data: (8)

$$x: 1.7 \quad 1.74 \quad 1.78 \quad 1.82 \quad 1.86$$

$$\sin x: 0.9916 \quad 0.9857 \quad 0.9781 \quad 0.9691 \quad 0.9584$$

Or