



- Notes :
1. All question carry equal marks.
 2. Due credit will be given to neatness and adequate dimensions.
 3. Assume suitable data wherever necessary.
 4. Illustrate your answer necessary with the help of neat sketches.
 5. Use of pen Blue/Black ink/refill only for writing the answer book.

1. a) Explain with example. 6
i) Absolute error ii) Relative error
iii) Percentage error

- b) Explain Bisection method and find a real root of the equation $x^3 - x - 1 = 0$ 7

OR

2. a) Use bisection method to find root of the equation $x^3 - 4x - 9 = 0$, correct to two decimal places. 6

- b) Explain Regula - Falsi method with suitable example. 7

3. a) Fit a straight line to the data given below : 7

x	1	2	3	4	5
y	10	12	8	10	14

- b) Explain Gauss Jordan method. 6

OR

4. a) Solve by Gauss Seidal method the following system. 7

$$\begin{aligned} 28x + 4y - z &= 32 \\ x + 3y + 10z &= 24 \\ 2x + 17y + 14z &= 35 \end{aligned}$$

- b) Explain matrix inversion method with example. 6

5. 14

Solve $\int_0^6 \frac{dx}{1+x^2}$ using -

- i) Trapezoidal ii) Simpson 1/3
iii) Simpson 3/8 rule

Derive the interval into 6 subintervals. Compare the result with actual value. Find the error.

OR

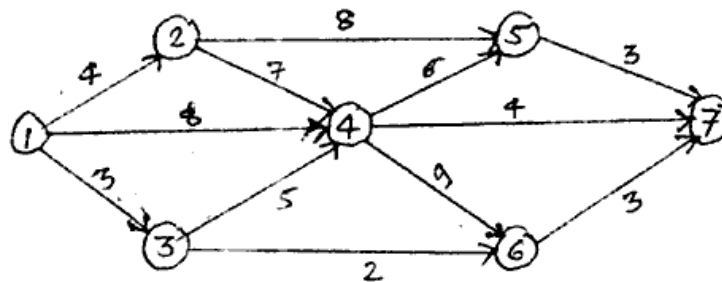
6. a) Evaluate $\int_{0.5}^{0.7} x^{1/2} \cdot e^{-x} dx$, approximately using Simpson 1/3 rule and at least five points. 7

- b) From the following data estimate number of students who obtained marks between 40 & 45 7

Marks	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80
No. of students	31	42	51	35	31

7. a) Explain equipment replacement problem with suitable example. 6

- b) Find the maximum path of following network. 7



OR

8. a) Define following terms : 8
 i) Principle of optimality ii) Monotonic function
 iii) Separable function iv) Boundary value function
- b) Define operation research and discuss various phases of operation research's with example. 5
9. Solve the following assignment problem using Hungarian method also write down overall minimum effectiveness. 13

Person	Job			
	1	2	3	4
A	17	22	20	28
B	14	18	27	15
C	19	17	18	23

OR

10. a) In a company there are two machines & 5 jobs to be processed. Find out the optimal sequence, total elapsed time & idle time for Job in BA order. 7

Job	A	B
J ₁	3	4
J ₂	2	1
J ₃	9	7
J ₄	8	10
J ₅	5	2

- b) Explain methods for finding solution of transportation problem with example. 6
11. a) Explain Bayes decision procedure without data and minimax decision procedure. 7
- b) What is minimax action for the loss table given below : 7

State of Nature			
Action	θ_1	θ_2	θ_3
a_1	5	3	5
a_2	8	6	3
a_3	9	4	2
a_4	8	3	4
a_5	7	1	10

OR

12. a) Explain project evaluation & review techniques in detail. 7
- b) Explain minimax decision procedure with example. 7
