

This question paper contains 3 printed pages.

3099

Your Roll No.

MEE

J

Paper – EE.505

COMPUTATIONAL OPTIMIZATION THEORY

Time : 3 hours

Maximum Marks : 100

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

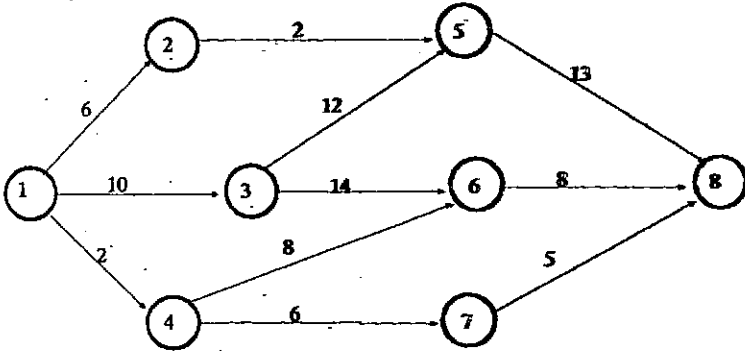
*Attempt any five questions.
All questions carry equal marks.*

1. (a) What do you understand by optimization? Give some examples of optimization in nature. 10
- (b) Give a brief description of historical development of optimization techniques. 10
2. (a) Explain what you understand by the term 'Unimodality'. What is its importance in optimization practice? 10
- (b) Compare the ratios of interval of uncertainty (L_n/L_0) obtainable in the following methods for $n=2, 3, \dots, 10$:
 - (i) Exhaustive search
 - (ii) Dichotomous search with $\delta=10^{-4}$
 - (iii) Fibonacci method

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- (iv) Golden section method. 10
3. Find the value of x in the interval $(0, 1)$ which maximizes the function
- $$f=x(1.5-x)$$
- to within ± 0.05 by Fibonacci method. 20
4. Explain 'quadratic interpolation method' and write down an algorithm to implement this method. 20
5. (a) Explain any *one* direct root method for optimizing a one dimensional function. 10
- (b) Find the minimum of the function:
- $$f=\lambda^5-5\lambda^3-20\lambda+5$$
- by quadratic interpolation method. 10
6. (a) Explain Powell's method for optimizing a multidimensional function. 10
- (b) Minimize $f=4x_1^2+3x_2^2-5x_1x_2-8x_1$, starting from the point $(0, 0)$ using Powell's method. 10
7. (a) Explain the steepest descent method of optimization. Also write an algorithm to implement the same. 10

- (b) Find the critical path in the network shown below. Determine the total slack and free slack for each of the activities. 10



8. Write notes on any *two* of the following:

- (i) Interior penalty function methods
- (ii) Multi-objective optimization
- (iii) Genetic algorithm.

20