M.E. First Semester (Electrical (E.P.S.)) (Full Time) (Old)

# 13299 : Power System Optimization : 1 SEPS 1

P. Pages : 2

Time : Three Hours

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**AW - 3656**

Max. Marks : 80

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Notes :
1. Answer **two** question from Section A and **two** question from Section B.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. Diagrams and chemical equations should be given wherever necessary.
5. Retain the construction lines.
6. Illustrate your answer necessary with the help of neat sketches.
7. Use of pen Blue/Black ink/refill only for writing the answer book.

## SECTION - A

**1.** a) What is operation research? and also mention engineering application of optimization. **6**

b) Determine the maximum and minimum values of the function. **6**

$f(x) = 12x^5 - 45x^4 + 40x^3 + 5$.

c) Find the dimension of a cylindrical tin (with top and bottom) made up of sheet metal to maximize its volume such that the total surface area is equal to $A_0 = 24\pi$. Consider $x_1$ and $x_2$ denote the radius of the base and length of the tin respectively. **8**

**2.** a) Minimize **10**

$f = 2x_1 + 3x_2 + 2x_3 - x_4 + x_5$

subject to the constraints

$3x_1 - 3x_2 + 4x_3 + 2x_4 - x_5 = 0$

$x_1 + x_2 + x_3 + 3x_4 + x_5 = 2$

$x_i \geq 0 \qquad i = 1 \text{ to } 5$

Solve by Two phase simplex method.

b) Enumerate the limitations of Fibonacci method and show that the method obtains a reduction ratio: **10**

$\frac{L_n}{L_o} = \frac{1}{F_n}$.

**3.** a) Explain briefly the Modified Distribution (MODI) method or the u-v method for checking the solution of optimality in transportation problems. **10**

b) Describe a general transportation problem explain how to determine an initial basic feasible solutions to the problem using Vogel's Method. **10**

## SECTION - B

**4.** a) Solve the following LP problem by dynamic programming **10**

$f(x_1, x_2) = 50x_1 + 100x_2$

subject to

$10x_1 + 5x_2 \leq 2500$

$4x_1 + 10x_2 \leq 2000$

$x_1 + 1.5x_2 \leq 450$

and $x_1 \geq 0;\ x_2 \geq 0$

b) What are the basic operations used in Genetic algorithm? What is fitness function in Genetic algorithm. **10**

**5.** a) Derive the recursive relationship [Function Equation] for n stage multi decision process. **6**

b) Explain any two applications of dynamic programming. **5**

c) Explain how genetic algorithm can be applied for reactive power optimization in Electrical Power System. **9**

**6.** a) Explain briefly 'CPM' and 'PERT'. **8**

b) Explain how conversion of final value problem into an initial value problem is done. **6**

c) Explain the terms related to PERT. **6**

i) Optimistic time
ii) Pessimistic time
iii) Most likely time
iv) Expected time

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