Total No. of Questions : 12]

SEAT No. :

P1094

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B.E. (Petrochemical Engineering)
a: OPTIMIZATION TECHNIQUES FOR PROCESS INDUSTRIES
(2008 Pattern) (Elective - II) (Semester - I)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer three questions from section I and three questions from section II.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of electronic pocket calculator is allowed.***
6) ***Assume suitable data if necessary.***

SECTION - I

Q1) What is the key characteristic of optimization problems? Explain model based optimization. **[16]**

OR

Q2) Note the various options for solving model based optimization. Explain them in brief. **[16]**

Q3) In a refinery, a crude distillation unit is to be optimized. Explain the optimization strategy for optimizing economics using plant design and plant operations.**[18]**

OR

Q4) Explain the Newton's method of Unidimensional Search for single variable optimization. **[18]**

Q5) Minimize $f(x) = 2x_1^2 + x_2^2 - 3$ starting at $(x^0)^T = [1\ 1]$ with the initial direction being $S^0 = [-4\ -2]^T$. Find a conjugate direction to the initial direction S^0.**[16]**

OR

Q6) Explain with graphical representation the steepest descent method of optimization. **[16]**

P.T.O.

SECTION - II

Q7) Transform the following linear program into standard form:

Minimize : $f = x_1 + x_2$

Subject to : $2x_1 + 3x_2 \leq 6$

$x_1 + 7x_2 \geq 4$

$x_1 + x_2 = 3$

$x_1 \geq 0$, x_2 unconstrained in sign. **[16]**

OR

Q8) Describe the optimization solution methodology for network flow problems. **[16]**

Q9) Using Lagrange multipliers, solve:

Minimize : $f(x) = 4x_1^2 + 5x_2^2$

Subject to : $h(x) = 0 = 2x_1 + 3x_2 - 6$. **[18]**

OR

Q10) Explain methodology of optimization using penalty functions. **[18]**

Q11) Enlist opportunities and process of optimizing waste heat recovery for power generation using light hydrocarbons in a refinery. **[16]**

OR

Q12) With neat sketch and enlisting known and unknown parameters, explain optimization in a multiple effect evaporator. **[16]**