BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: ME **SEMESTER : II**
BRANCH: AMS **SESSION : SP/18**

SUBJECT: MPE2011 OPTIMIZATION TECHNIQUES

TIME: 3 HOURS **FULL MARKS: 60**

INSTRUCTIONS:
1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a) What is optimization techniques? Discuss the application of optimization techniques to managerial decision making. [4]

Q.1(b) A company produces two types of hats. Each hat of first type requires twice as much labour time as the second type. If all hats are of the second type only, the company can produce a total of 500 hats a day. The market limit daily sales of the first and second type to 150 and 250 hats. Assuming that the profits per hat are Rs. 8 for type A and Rs.5 for type B, formulate the problem as a linear programming model in order to determine the number of hats to be produced of each type so as to maximize the profit. [8]

Q.2(a) Define (i) A Feasible Solution (ii) A Feasible region (iii) An unbounded Solution (iv) A Redundant Constraint. [4]

Q.2(b) Solve the following LP problem graphically: [8]
Maximize $Z=8000\ x_1+7000x_2$
Subject to the constraints:
$3x_1+ x_2\leq 66$
$x_1+ x_2\leq 45$
$x_1\leq 20$
$x_2 \leq 40$, and $x_1, x_2 \geq 0$

Q.3(a) Explain the term 'Artificial Variable' and its use in linear programming. [2]

Q.3(b) Solve the LP problem by using Big-M-method: [10]
Maximize Z = -2x - y
Subject to:

$$3x + y = 3$$
$$4x + 3y \geq 6$$
$$x + 2y \leq 4$$
$$x, y \geq 0$$

Q.4(a) Write down the dual of the following problem: [6]
Maximize $Z=3X_1+X_2 + X_3 -X_4$
$X_1+5\ X_2 + 3X_3 + 4\ X_4 \leq 5$
$X_1+ X_2 \leq -1$
$X_3 - X_4 \leq -15$
X_1, X_2 , X_3, and $X_4 \geq 0$

Q.4(b) Show how the following problem can be made separable.
Minimize $Z = e^{2x_1+x_2^2} + (x_3 - 2)^2$
Subject to $x_1 + x_2 + x_3 \leq 6$
$x_1, x_2, x_3 \geq 0$ [6]

Q.5 Find the minimum of $f = X\ (X - 1.5)$ in the interval (0.0, 1.00) to within 10% of the exact value by using dichotomous search method. [12]

Q.6(a) Describe the main features for a dynamic programming model with the help of an example. [6]

Q.6(b) Define meta-heuristic. Discuss about various meta-heuristics as optimization tools. [6]

Q.7(a) Describe any one of the population based evolutionary algorithm for optimization. [6]

Q.7(b) Explain about Markovian decision process along with its four main defining features. [6]

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