Exam.Code:1016
Sub. Code: 7777

1079

M.E. (Mechanical Engineering)

Third Semester

MME-302(e): Optimization Techniques

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, selecting atleast two questions from each Section.

x-x-x

Question No.	SECTION-A	Marks
1 (a)	Write in brief on historical development of optimization and mention a few applications of Optimization?	5
(b)	A coal grassfire can use three grades of coal to produce quality K and M of producer gas. There are two processes (i.e. old and new) available to use the blended coal. For each production run the old process uses 10, 14 and 4 units of coal A, B and C to produce 12 units of K and 10 units of M.' The new process uses 6, 18 and 8 units of coal A, B and C to produce 10 units of quality K and 14 units of M. Due to prior commitments, the gassi-fire plant must produce at least 1000 and 1600 units of K and M respectively for the next month. It has available 2000, 2500 and 1500 units of coal A, B and C respectively. For each unit of K a revenue of 3000 and for each unit of M, 4000 are received. Formulate this as LP problem so as to maximize the revenue.	5
2	Solve the following LPP using simplex method. Max Z = X1 2x2+ 3x3 S.T. x1+ 2x2+ 3x3 < 10 x1, x2 ≤5 X1 ≤ 1, x1, X2≥ 0 Find the alternate optimal solution if it exists.	10
3 (a)	Briefly explain about linear programming in two dimensional space.	5
(b)	Briefly explain about standard form of a linear programming problem.	5
4	Solve the following problem using Kuhn-tucker conditions: Maximize $f(x_1, x_2) = 2x_1 + x_2 - x_1^2$ Subject to $2x_1 + 3x_2 \leq 6$ $2x_1 + x_2 \leq 4$ $x_1, x_2 \geq 0$	10
	SECTION-B	
5	Find the optimal solution for the following transportation problem. The cell entries represent the unit transportation cost in rupees from each source to each destination.	10

		To				
						Supply
From	3	4	6	8	9	20
	2	10	1	5	8	30
	7	11	20	40	3	15
	2	1	9	14	16	13
Demand	40	6	8	18	6	

P.T.O.

6	A truck can carry a total of 10 tonnes of product three types of products are available for shipment. Their weights & values are tabulated. Assuming that at least one each type must be shipped; determine the loading which will maximize the total value Product type | Value (Rs) | Weight tonnes) A | 20 | 1 B | 50 | 2 C | 60 | 3	10
7 (a)	A d.c generator has internal resistance of R ohms and develops an open circuit voltage of 'V' volts. Find the value of load resistance 'r' for which the power developed by generator will be maximum.	5
(b)	What elementary operation can be used to transform $2x_1 + x_2 + x_3 = 9$ $x_1 + x_2 + x_3 = 6$ $2x_1 + 3x_2 + x_3 = 13$ into $x_1 = 3$ $x_2 = 2$ $x_1 + 3x_2 + x_3 = 13$ Find the solution of this system by reducing into canonical form.	5
8 (a)	Explain the computational procedure used in Dynamic programming.	5
(b)	Write short notes on : (any two) (a) Population based Optimization techniques (b) Applications of Genetic Algorithm in optimization (c) Descent methods	5

x-x-x