The LNM Institute of Information Technology, Jaipur
Department of Mechanical-Mechatronics Engineering

Mid-term Examination

Session : Odd Semester (2017-18) Subject: Operations Research (Open Elective)
Max. Marks : 50 Time : 90 mins
(Date: 29/09/2017: 4.30 PM to 5.00 PM)

Instructions :
i) All questions are compulsory. ii) Figures to right indicate full marks. iii) Use of Non-Programmable calculator is allowed. iv) Marks will given for final answer only. Intermediate correct steps will not be considered and will not be given any marks.

Q.1 An electronic company is engaged in the production of two components C1 and C2 used in ratio sets. Each unit of C1 costs the company Rs. 5 in wages and Rs. 5 in material, while each unit of C2 cost the company Rs. 25 in wages and Rs. 15 in material. The company sells both products on one-period credit term, but the company's labour and material expenses must be paid in cash. The selling price of C1 is Rs.30 per unit and of C2 is Rs. 70 per unit. Company can sell as many units as it produces. The company's production capacity is, however, limited by two considerations. First, at the beginning of period 1, the company has an initial balance of Rs. 4000 (cash plus bank credit plus collections from past sells). Second, the company has available in each period 2,000 hours of machine time and 1400 hours of assembly time. The production of C1 requires 3 hours of machine time 2 hours of assembly time and production of each unit of C2 requires 2 hours of machine time and 3 hours of assembly time. Formulate this problem as LP model so as to maximize the total profit to the company. (10)

Q.2 A company markets two kind of leather belts. Belt A is sold at profit Rs. 4 and B is at profit Rs. 3. The production of each type of belt A requires twice as much of B and if all belts were of type B, the company could make 1000 belts per day. The supply of leather is sufficient only for 800 belts per day (for both A and B). Belt A requires a fancy buckle which 400 are available per day. There are only 700 buckles a day available for belt B. What should be the daily production of each type of belt? Formulate this problem as LP and solve by simplex method. (20)

Q.3 The owner of a small machine shop has four mechanics available to assign jobs for the day. Five jobs are offered with expected profit for each mechanic on each job which is as follows. Find by assignment method, the assignments of mechanics to the job that will result in maximum profit. Which job should be declined? (10)

	J1	J2	J3	J4	J5
M1	62	78	50	111	82
M2	71	84	61	73	59
M3	87	92	111	71	81
M4	48	64	87	77	80

Q.4 Obtain the IBFS for following transportation problem using VAM. Obtain an optimal solution by MODI method (10

	D1	D2	D3	D4	Supply
S1	19	30	50	10	7
S2	70	30	40	60	9
S3	40	8	70	20	18
Demand	5	8	7	14	