FACULTY OF ENGINEERING
B.E. 4/4 (M/P / AE) I – Semester (New) (Suppl.) Examination, July 2014

Subject: Operations Research

Time: 3 Hours   **Max.Marks: 75**

Note: Answer all questions from Part A. Answer any five questions from Part B.
PART – A (10 x 2.5 = 25 Marks)

1   Briefly describe the scope of operations research.
2   State the applications of LP.
3   What is the test of optimality in case of simplex method?
4   Describe the mathematical formulation of an assignment model.
5   Define a queue. State the characteristics of waiting lines.
6   What is replacement problem? When does it arise?
7   Briefly explain the terms:
    (i)   Saddle point   (ii) Value of the game (iii) Pure and mixed strategies
8   State the assumptions made while dealing with sequencing problems.
9   What is multi-objective optimization?
10 What is sensitivity analysis? What does it signify?

PART – B (50 Marks)

11   A company produces two types of leather belts A and B. 'A' is of superior quality and 'B' is of inferior quality. The respective profits are Rs. 10/- and Rs. 5/- per belt. The supply of raw material is sufficient for making 900 belts per day. For belt 'A' special type of buckle is required and only 450 are available per day. There are 750 buckles available for belt 'B' per day. Belt 'A' needs twice as much time as that required for belt 'B' and the company can produce 500 belts if all of them were of type A. Find the optimal product mix and maximum profit.

12   Solve the following LPP by simplex method
    Maximize $Z = 4x_1 + 6x_2 + x_3$
    Subject to $2x_1 = x_2 + 3x_3 \leq 5$
                         $x_2 \leq 2$
                 $x_1, x_2, x_3 \geq 0$

13   The table below gives the supply, demand and unit transportation cost for a transportation problem.

		Destination			Supply
		X	X	Z	
	A	4	6	3	50
Source	B	2	5	8	160
	C	7	3	2	250
	D	4	5	6	140
Demand		100	300	200	

Determine the initial solution using VAM and check whether the obtained solution is optimal (or) not.

……2

14 a) Explain the graphical method of solving 2xn and mx2 games.
   b) Solve the following game

		B		
		I	II	III
	I	8	4	7
A	II	-3	-4	3
	III	6	8	10

15 The maintenance cost and resale value per year of a machine whose purchase price is Rs. 6000 is given below.

Year	1	2	3	4	5	6	7	8
Maintenance cost (Rs)	900	1200	1600	2100	2800	3700	4700	5900
Resale value	4000	2000	1200	600	500	400	400	400

When should the machine be replaced?

16 Six jobs are to be processed on 3 machines A, B and C in the order of BAC. The time taken by each job on the three machines is given below. Determine the optimum sequence for the jobs and makespan.

Job	1	2	3	4	5	6
A	30	40	20	10	50	35
B	50	80	90	70	60	75
C	40	80	70	60	20	45

17 a) People arrive at a hotel in a Poisson fashion with an arrival rate of 8 per hour. Service time is distributed exponentially with a mean time of 5 min. Calculate
   i) The mean number of customers in the waiting line
   ii) The mean waiting time in the queue
   iii) The utilization factor
   iv) The probability that the server is idle
   v) The probability of '3' customers in the system.

   b) Write short notes on genetic algorithm and its applications.

****