Code No. : 5206/S

FACULTY OF ENGINEERING
B.E. 4/4 (M/P) I Semester (Suppl.) Examination, July 2012
OPERATIONS RESEARCH

Time: 3 Hours] [Max. Marks : 75

***Note** : Answer **all** questions of Part **A**. Answer **five** questions from Part **B**.*

PART – A **(25 Marks)**

1. Discuss the significance and scope of Operations Research in modern management. **2.5**
2. Explain the following terms : **2.5**
   i) Multiple solution
   ii) Unbounded solution.
   iii) Infeasible solution.
3. Explain the application of 'Artificial variable technique' in LPP. **2.5**
4. Define the 'duality concept' and explain the primal dual relationship. **2.5**
5. How the problem of degeneracy arises in a transportation model ? Explain how does one overcome it. **2.5**
6. Elucidate 'Saddle point' with a suitable example. **2.5**
7. What do you understand by **2.5**
   i) Input process
   ii) Queue discipline
   iii) Balking
   iv) Jockeying.
8. What are the assumptions made in sequencing models ? **2.5**
9. Discuss the reasons for replacement. **2.5**

10. At a cash counter, cashier can serve 10 customers in 5 min. On an average 15 customers arrive every 10 min. If the arrival rate follows Poisson distribution and service follows exponential distribution. What is the probability that the cashier would be idle ? **2.5**

PART – B **(50 Marks)**

11. Two products A and B are to be machined on three machine tools P, Q and R. Product A takes 10 hrs. on machine 'P', 6 hrs. on machine 'Q' and 4 hrs. on machine 'R'. The product 'B' takes 7.5 hrs. on machine P, 9 hrs. on machine 'Q' and 13 hrs. on machine R. The machining time available on these machine tools P, Q, R are respectively 75 hrs., 54 hrs. and 65 hrs. per week. The producer contemplates profit Rs. 60 per product 'A' and Rs. 70 per product 'B'. Formulate LP model for the above problem and show the feasible solutions to the above problem ? Determine the optimum product mix.

12. Using simplex method to solve the following LP

Maximize $z = 4x_1 + 10x_2$

Subject to $2x_1 + x_2 \leq 50$, $2x_1 + 5x_2 \leq 100$, $2x_1 + 3x_2 \leq 90$

$x_1, x_2, x_3 \geq 0$.

13. The table below gives the supply, demand and unit transportation problem :

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

Find the optimal transportation cost.

14. Given the revenue and cost data below, obtain which product each plant should produce to maximize profit. Sales revenue and production cost matrices are as follows :

Sales Revenue

Plant	1	2	3	4
A	50	68	49	62
B	60	70	51	74
C	55	67	53	70
D	58	65	54	69

Production Cost

Plant	1	2	3	4
A	49	60	45	61
B	55	63	45	69
C	52	62	49	68
D	55	64	48	66

15. a) Explain the failure mechanism of items with suitable examples. 3

b) A fleet owner finds from his past records that the costs per year of running a truck whose purchase price is Rs. 5,000 are as given below :

Year	1	2	3	4	5	6	7
Running cost (Rs.)	1,000	1,200	1,400	1,800	2,300	2,800	3,400
Re-Sale Value (Rs.)	3,000	1,500	750	375	200	200	200

Determine at what age is the replacement due.

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

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

Determine the optimum make span (in minutes).

17. A train reservation facility has 5 counters, each capable of handling 20 requests/hour. The persons coming for reservation arrive at a mean rate of 90/hr. Assume that each person come with one request only. Calculate :

i) The mean number of persons at any time at this facility.

ii) The mean time a person spends at the facility.

iii) The average length of queue at each counter.

iv) What would happen to the queue, if the arrival rate was to reach 105/hr ? **10**