Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 95399

5 Year M.Sc. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Fifth Semester

Computer Technology/Information Technology

XCS 351/10677 SW 501 — OPERATIONS RESEARCH

(Common to 5 Year M.Sc. Software Engineering)

(Regulation 2003/2007/2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Define artificial variable.
2. Interpret primal LPP as a dual LPP.
3. What is the difference between transportation and transshipment problem?
4. Differentiate assignment problem from transportation problem.
5. What is dummy arrow? Why is it used?
6. Define
   (a) Optimistic time
   (b) Pessimistic time.
7. Inventory is necessary Why?
8. Define shortage cost.
9. State Little's formula for single server, queueing system with infinite capacity.
10. Distinguish between transient and stead state queueing system.

PART B — ($5 \times 16 = 80$ marks)

11. (a) Use two–phase simplex method to solve

Maximize $z = 5x_1 - 4x_2 + 3x_3$

Subject to

$2x_1 + x_2 - 6x_3 = 20$

$6x_1 + 5x_2 + 10x_3 \leq 76$

$8x_1 - 3x_2 + 6x_3 \leq 50$

$x_1, x_2, x_3 \geq 0$ (16)

Or

(b) Prove using duality theory that the following LPP is feasible but has no optimal solution.

Min $Z = x_1 - x_2 + x_3$

Subject to

$x_1 - x_3 \geq 4$

$x_1 - x_2 + 2x_3 \geq 3$ and

$x_1, x_2, x_3 \geq 0$ (16)

12. (a) Five operators are to be assigned to five machines. The assignment costs are given in Table 12(a). Find the assignment of operators to machines so that the total cost is minimized. (16)

	1	2	3	4	5
1	10	5	13	15	16
2	3	9	18	3	6
3	10	7	2	2	2
4	5	11	9	7	12
5	7	9	10	4	12

Table 12(a)

Or

(b) Solve the given transportation problem given in Table 12 (b) to minimize the total cost. (16)

Origin	Destination 1	2	3	4	Supply
A	40	25	22	33	30
B	44	35	30	30	50
C	38	38	28	30	40
Demand	30	20	40	30	

Table 12(b)

13. (a) (i) Determine the shortest route between node 1 and every other node in the network of figure 13(a) (i). (8)

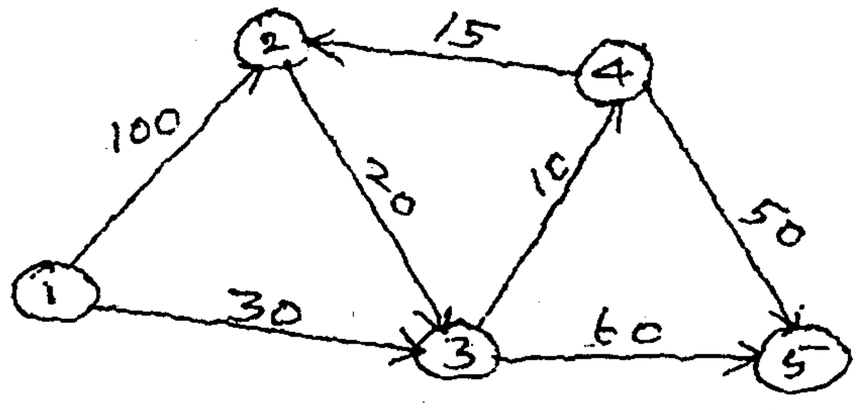

Figure 13(a) (i)

(ii) A small maintenance project consists of 12 activities which take place according to the following conditions:

Activity	B,C,D	E,F	G	H	I	J	K	L
Preceding Activity:	A	B	E	F	G,H	G,H,C,D	D	I,J,K

The time taken to complete each activity (in hours) is as follows

Activity:	A	B	C	D	E	F	G	H	I	J	K	L
Time:	3	4	5	6	2	1	7	4	3	5	6	2

Draw a project network and indicate the critical path. (8)

Or

(b) A small project consists of seven activities, the details of which are given below:

		Duration (in days)		
Activity	Immediate Predecessor	Most likely	Optimistic	Pessimistic
A	–	3	1	7
B	A	6	2	14
C	A	3	3	3
D	B,C	10	4	22
E	B	7	3	15
F	D,E	5	2	14
G	D	4	4	4

(i) Draw the network, find the critical path, and the expected project completion time. (8)

(ii) What project duration will have 95% confidence of completion? (8)

14. (a) (i) A manufacturer has to supply his customer with 600 units of his product per year. Shortages are not allowed and storage cost amounts to 60 paise per unit per year. The set up cost is Rs. 80. Find EOQ, minimum average yearly cost, the optimum number of order per day and the optimum period of supply per optimum order. (8)

(ii) The probability distribution of monthly sales of an item is as follows:

Sales Unit:	0	1	2	3	4	5	6
Probability	0.01	0.06	0.25	0.30	0.22	0.10	0.06

The cost of carrying inventory (unsold during month) is Rs. 30 per month and cost of unit shortage is Rs. 70. Determine optimum stock to minimize expected cost. (8)

Or

(b) (i) Demand of an item is uniform at a rate of 25 units per month. The fixed cost is Rs. 30 each time a production is made, the production cost is Rs. 2 per unit and the inventory carrying cost is 50 paise per unit per month. If the shortage cost is Rs. 3 per item per month, determine how often to make, a production run and of what size? (8)

(ii) An item is produced at the rate of 50 items per day. The demand occurs at the rate of 25 items per day. If the set up cost is Rs. 100 per set up and holding cost is Re.0.01 per unit of item per day, find the economic lot size for one run, assuming that shortages are not permitted. Also find the time of cycle and minimum total cost for one run. (8)

15. (a) On average 96 patients per 24 hour day require the service of an emergency clinic. Also on average, a patient requires 10 minutes of active attention. Assume that the facility can handle only one emergency at a time, Suppose that it costs the clinic Rs. 100 per patient treated to obtain an average serving time of 10 minutes, and that each minute of decrease in this average time would cost Rs. 10 per patient treated How much would have to be budgeted by the clinic to decrease the average size of the queue from 1 1/3 patients to ½ patient? (16)

Or

(b) (i) Explain the assumptions of the birth-and-death process. (8)

(ii) Explain:

(1) Queue Discipline

(2) Markovian Queuing Models. (8)