B.E. Electrical (Electronics & Power) Engineering (Model Curriculum) Semester-VII
HSMC-3-1 : Operations Research and Management

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Notes : 1. All questions carry marks as indicated.
2. Assume suitable data wherever necessary.
3. Illustrate your answers wherever necessary with the help of neat sketches.
4. Use of non programmable calculator is permitted.
5. Use of normal standard of distributed table is permitted.
6. Attempt Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, Q. 7 or Q. 8, Q. 9 or Q. 10.

1. a) Explain various Phases of OR in detail. **8**

b) Define OR. What are its advantages? Explain scope of OR. **8**

OR

2. Solve the L.P problem by simplex method. **16**
Max $Z = 3x_1 + 5x_2$

Sub to $2x_1 + 6x_2 \le 50$

$\qquad 3x_1 + 2x_2 \le 35$

$\qquad 5x_1 - 3x_2 \le 10$

$\qquad 0x_1 + x_2 \le 20$

$\qquad x_1, x_2 \ge 0$

3. A product is produced by four factories A, B, C and D. The unit production costs in them **16**
are Rs. 2, Rs. 3, Rs. 1 and Rs. 5 respectively. Their production capacities are, factory
A– 50 units, B – 70 units, C – 30 units And D – 50 units. These factories supply the product
to four stores, demand of which are 25, 35, 105 and 20 units respectively. Unit transport
cost in rupees from each factory to each store is given in the table below. Determine the
extent of deliveries from each of the factories to each of the stores so that the total
production and transportation cost is minimum.

	1	2	3	4
A	2	4	6	11
B	10	8	7	5
C	13	3	9	12
D	4	6	8	3

OR

4. Production cost of product P1, P2 & P3 per unit manufactured on machined M1, M2, M3 **16**
& M4 are tabulated in the table. Sales price per unit P1 = 70Rs/Unit, P2=85Rs/Unit &
P3=60Rs/Unit.

Machine / Product	M1	M2	M3	M4
P1	40	50	30	25
P2	30	20	30	30
P3	30	35	25	35

Decide product machine combination for maximization of total profit.

5. A project has following characteristics. **16**

Activity	Depends on	to	tm	tp
A	-	1	2	3
B	A	1	2	3
C	A	1	3	5
D	B	3	4	5
E	C	2	3	4
F	C	3	5	7
G	D, E	4	5	6
H	F	6	7	8
I	G, H	2	4	6
J	G, H	4	6	8
K	I	1	2	3
L	J	3	5	7

Construct the network and find:
i) Critical path.
ii) The probability to complete the project with in 30 weeks.
iii) Time in which the project can be completed with a probability of 90%.

OR

6. Following table gives activity in construction project and other relevant data. **16**

Activity	Depends on	Normal Time (Days)	Normal Cost (Rs)	Crash Time (Days)	Crash Cost (Rs)
A	-	20	600	17	720
B	-	25	200	25	200
C	A	10	300	8	440
D	A	12	400	6	700
E	B, C	5	300	2	420
F	D, E	10	300	5	600

Indirect cost = 60 RS/Day
a) Draw the activity network of project.
b) Find the critical path and duration,.
c) What is the normal duration and cost of project.
Find out optimum duration and minimum project cost.

7. a) What is the necessity of maintaining inventory? What are the causes of poor inventory control? **8**

b) A stockiest has to supply 400 units of a product every Monday to his customers. He gets the product at Rs. 50 per unit from the manufacture. The cost of ordering and transportation from the manufacture is Rs. 75 per order. The cost of carrying inventory is 7.5% per year of the cost of product. Find **8**
i) The economic lot size,
ii) The total optimal cost (including the capita cost).

OR

8. a) What is Inventory? Explain various inventory carrying cost. **8**

b) A particular item has a demand of 9,000 units / year. The cost of one procurement is Rs. 100 and the holding cost per unit is Rs. 2.40 per year. The replacement is instantaneous and no shortages are allowed. Determine. **8**
   i) The economic lot size,
   ii) The number of orders per year.
   iii) The time between orders.
   iv) The total cost per year if the cost of one unit is Rs. 1.

9. a) Explain in detail various steps involved in Decision Theory. **6**

b) A manufacturing company processes 6 different jobs on two machines A and B. Numbers of units of each job and its processing times on A and B are given in given table. Find the optimal sequence, the total minimum elapsed time and idle time for each machine. **10**

Job No.	No. of units of each job	Processing time	
		Machine A (minutes)	Machine B (minutes)
1	3	5	8
2	4	16	7
3	2	6	11
4	5	3	5
5	2	9	7.5
6	3	6	14

OR

10. a) Explain in detail situation under which sequencing problems are classified. **6**

b) There are seven jobs, each of which has to go through the machine A and B in the order AB. Processing times in hours are given as **10**

Job:	1	2	3	4	5	6	7
Machine A:	3	12	15	6	10	11	9
Machine B:	8	10	10	6	12	1	3

Determine a sequence of these jobs that will minimize the total elapsed time T.

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