Mechanical Engineering Department

B Tech (6th sem.) CT-II MEU601 ORM Marks: 15 Time: 1Hr Date: 12/03/2015

Q1. (a) Write two uses of replacement model (1)

(b) An equipment which costs Rs 15,000/- has to be replaced with a new equipment. The Following data has been estimated:

Year	1	2	3	4	5	6	7	8
Resale value	12000	9500	7500	5700	420	3900	2900	2000
Maintenance cost	600	800	1050	1400	2100	3500	5000	6800

Determine optimum period for replacement. (4)

Q2. (a) State any two assumptions made in sequencing (1)

(b) Four jobs are to be processed on three machines in order ABC. Details are given below. Find optimum sequence, total elapsed time and idle time of each machine. (4)

Jobs	M/c A (min)	M/c B (min)	M/c C (min)
1	13	3	18
2	18	8	4
3	8	6	13
4	23	6	8

Q3. The following table gives the data for the activities of a small project

Activity	1-2	1-3	2-4	2-6	3-4	3-5	4-5	5-6
To	1	5	3	1	8	2	5	2
Tm	4	10	3	4	15	4	5	5
Tp	7	17	3	7	26	8	5	8

(i) Draw the network and Identify critical path

(ii) What is the prob. that it would take 5 days more than the expected duration? (5)

OR

Q4. The table gives the activities of the project along with normal duration and costs as well as crash duration and costs. The indirect cost is Rs 160 per day.

Activity	Normal		Crash	
	Duration	Cost	Duration	Cost
1-2	5	560	4	600
2-3	8	1640	6	1820
2-4	11	2360	7	2580
2-5	9	1320	7	1800
3-5	10	600	8	1000
4-5	7	1800	5	1970
5-6	5	680	4	960

(I) What is the total normal time and cost of the project?

(ii) Find the optimum duration and cost of the project (5)

MEU-601 ORM – Assignment – Any 3

[1] Discuss Hungarian method for solution of assignment problems with suitable case study.

[2] Discuss Fulkerson's rule of numbering the events in network analysis with suitable sketch.

[3] A batch of 4 axles is to be processed on the following 3 machines in the sequence : lathe [L], milling [M], and grinding [G]. Instead of working on these 4 axles first on lathe, then on milling and finally on grinding in this sequence, it is desired to process the first axle on the lathe and as and when it is processed, it is taken up on milling and the second axle on the lathe and so on. In other words, each of three activities L, M and G have been quartered for the sake of concurrent operations. Draw the network for the problem.

[4] The utility data for a network are given below. Determine the total free, independent and interfering floats and identify the critical path.

Activity	0-1	1-2	1-3	2-4	2-5	3-4	3-6	4-7	5-7	6-7
Duration	2	8	10	6	3	3	7	5	2	8

MEU 601- ORM , T-2 , Max Marks= 15, Max Time- 1 Hr 15th March 2018

Q.1 Solve the following problems by Simplex method:-

[A] Maximize $Z = X_1 + 2X_2 + 3X_3 - X_4$

Subject to $X_1 + 2X_2 + 3X_3 = 15,\ 2X_1 + X_2 + 5X_3 = 20,\ X_1 + 2X_2 + X_3 + X_4 = 10,\ X_1, X_2, X_3, X_4 >= 0$ **[8 marks]**

OR [B] Maximize $Z = 3X_1 - X_2$ ***Subject to*** $2X_1 + X_2 <= 2,\ X_1 + 3X_2 >= 3,\ X_2 <= 4,\ X_1, X_2 >= 0$ **[8 marks]**

Q.2 Solve by Vogel's approximation method the following transportation problem when cell entries are unit costs [7 marks]

	D1	D2	D3	D4	D5	Available
O1	68	35	4	74	15	18
O2	57	88	91	3	8	17
O3	91	60	75	45	60	19
O4	52	53	24	7	82	13
O5	51	18	82	13	7	15
Required	16	18	20	14	14	32/82

Govt. College of Engineering, Amravati

MEU601 Operation Research Management

CT-2 Exam Question Paper

Date: 16th March 2017, Time: 10:30 AM – 11:30 AM

Question 1(4 Marks): Estimated times (in weeks) for the jobs of a project are given below:

Job	A	B	C	D	E	F	G	H	I	J	K	L
Time	13	5	8	10	9	7	7	12	8	9	4	17

The constraints governing the jobs are as follows:
A & B are start jobs; A controls C, D & E; B controls F & J; G depends upon C; H depends on D; E & F control I & L; K follows J; L is also controlled by K; G, H, I & L are the last jobs. Draw the network, determine project duration and the critical path.

Question 2(4 Marks): A company is faced with the problem of assigning 4 machines to 5 different jobs. The profits are estimated as follows. Solve the problem to maximize the total profits.

3	7	3	6	5
6	1	8	4	2
2	4	5	3	4
6	4	8	7	3