Register Number: ………………………..

M.E DEGREE EXAMINATIONS: JUNE 2012

Second Semester

POWER ELECTRONICS AND DRIVES

PED505: Operations Research

Time: Three Hours   **Maximum Marks: 100**

Answer all Questions:-

PART A (10 x 2 = 20 Marks)

1. Define the term 'Surplus Variables'.

2. Give different practical application of transportation problem.

3. How is pivot column selected in a linear programming problems?

4. How do you find out whether a solution is optimal or not?

5. What is minimum spanning problem?

6. What is the shortest path problem?

7. Distinguish the advantages between the individual replacement policy and group replacement policy.

8. Define the term crashing in PERT.

9. State the assumption made while solving n jobs through 3 machines.

10. State the Kendall's notation of queuing models.

PART B (5 x 16 = 80 Marks)

11. a) Solve the following AP:

	A	B	C	D
J_1	18	26	17	11
J_2	13	28	14	26
J_3	38	19	18	15
J_4	19	26	24	10

(OR)

b) A firm has three factories X Y Z with and Five retail stores A, B C D and E. The number of units of a product available at factories X Y and Z are 100, 125 and 75 respectively while demanded at retail stores are 100, 60,40,75 and 25 respectively. Rather than shipping directly from sources to destinations, it is decided to investigate the possibility

of trans-shipment. Find the optimal shipping schedule. The transportation costs in rupees per unit are given below.

	A	B	C	D	E
X	3	2	3	4	1
Y	4	1	2	4	2
Z	1	0	5	3	2

12. a) Solve the following linear programming problem using Revised simplex method.

$$\text{Maximize} \quad Z = 3X_1 + 5X_2$$
$$\text{Subject to} \quad X_1 \leq 4$$
$$X_2 \leq 6$$
$$3X_1 + 2X_2 \leq 18$$
$$X_1 \ \& \ X \geq 0$$

(OR)

b) Consider the LPP

$$\text{Maximize } Z \leq 3X_1 + 5X_2$$
$$\text{Subject to } 3X_1 + 2X_2 \leq 18$$
$$X_1 \leq 4$$
$$X_2 \leq 6$$
$$X_1 \ \& \ X \geq 0$$

And explain the impact of adding a new constraints into the Existing model.

$$2X_1 + X_2 \leq 8$$

13. a) Find the Shortest Route from Node 1 to Node 9 of the distance network shown below
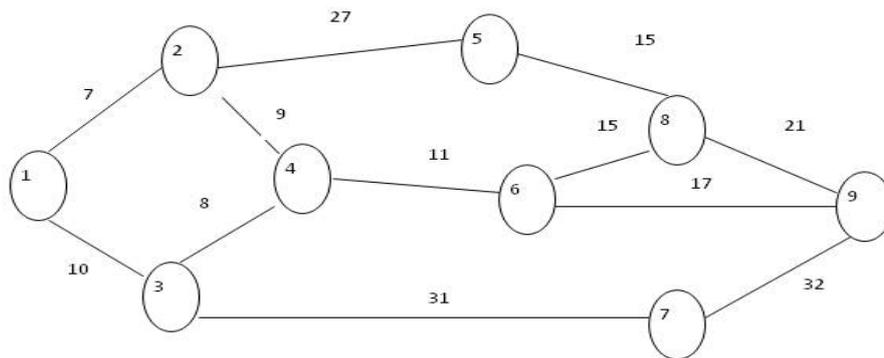
(OR)

b) Consider the network scheduling problem as shown in the following table. Construct the project network and find the critical path and find the crash project completion time.

Activity	Predecessor	Duration		
		a	m	b
A	-	3	5	8
B	-	6	7	9
C	A	4	5	9
D	B	3	5	8
E	A	4	6	9
F	C,D	5	8	11
G	C,D,E	3	6	9
H	F	1	2	9

14. a) Find the least cost schedule for the following project by systematic crashing of the activities.

Activity	Normal		Crash	
	Time	Cost	Time	Cost
A	2	100	1	150
B	6	200	4	400
C	3	200	1	300
D	4	500	2	700
E	2	400	1	550
F	8	200	5	450
G	5	300	3	500

A < D; B<F;C<E: D<G;E<F

(OR)

b) Find the cost per period of individual replacement policy of an installation of 300 light bulbs, given the following:

(i) Cost of replacing an individual bulb is Rs. 2.

(ii) Conditional probability of failure is given below:

Week no. Conditional   :   0   1   2   3   4

Probability of failure   :   0   0.1   0.3   0.7   1.0

Also calculate the number of light bulbs fails during each of the four weeks.

14. a) Determine the sequence which minimizes the total processing time for five jobs on three machines A, B and C. The following table gives the processing times

JOB	1	2	3	4	5
Machine X	8	10	6	7	11
Machine Y	5	6	2	3	4
Machine Z	4	9	8	6	5

(OR)

b) In a telephone booth, the arrivals follow Poisson distribution with an average of 9 minutes between two consecutive arrivals. The duration of a telephone call is expected with an average of 3 min.

(i) Find the probability that a person arriving at the booth has to wait.

(ii) Find the average queue length.

(iii)Find the fraction of the day, the phone will be in use.

(iv)The company will install a second booth if a customer has to wait for phone , for at least 4 minute. If so find the increase in the flow of arrivals in order that another booth will be installed.

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