Register Number……

M.E. DEGREE EXAMINATIONS: MAY / JUNE 2010

Second Semester

POWER ELECTRONICS AND DRIVES

PED505: Operation Research

Statistical Table are Permitted

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

Answer All the Questions:-

PART A (10 x 2 = 20 Marks)

1. State any two limitations of the graphical method of solving a LPP.
2. What is the Difference between the transportation problem and the assignment Problem?
3. Define integer programming problem.
4. Formulate the dual of the following LPP

   Maximize z = $5x_1 + 3x_2$

   Subject to the constraints $3x_1 + 5x_2 \le 15,\ 5x_1 + 2x_2 \le 10,\ x_1 \ge 0$ *and* $x_2 \ge 0$
5. Construct the network for the project whose activities and their relationships are as given below

   Activities: A, D, E can start simultaneously

   Activities: B, C>A, G, F>D,C, H>E, F
6. Define Independent float.
7. Define parallel critical path.
8. Define updating.
9. what is the formula for length of queue, waiting time in the system under (M/M/I:∞/FIFO)
10. What is meant by “no passing rule” in a sequencing problem?

PART B (5 x 16 = 80 Marks)

11. (a) Use Simplex Method to solve the LPP

    Maximize z =$15x_1 + 6x_2 + 9x_3 + 2x_4$

    Subject to: $2x_1 + x_2 + 5x_3 + 6x_4 \le 20$

    $3x_1 + x_2 + 3x_3 + 25x_4 \le 24$

    $7x_1 + x_4 \le 70$, $x_1, x_2, x_3 x_4 \ge 0$

(OR)

(b) (i) The Processing time in hours for the jobs when allocated to the different machines are indicated below. Assign the machines for the jobs so that the total Processing time is Minimum

		Machines				
		M_1	M_2	M_3	M_4	M_5
	J_1	9	22	58	11	19
Jobs	J_2	43	78	72	50	63
	J_3	41	28	91	37	45
	J_4	74	42	27	49	39
	J_5	36	11	57	22	25

(8)

(ii) Find the initial basic feasible solution for the following transportation problem by VAM Method

		Distribution centers				
		D_1	D_2	D_3	D_4	Availability
	S_1	11	13	17	14	250
Origin	S_2	16	18	14	10	300
	S_3	21	24	13	10	400
Requirements		200	225	275	250	

(8)

12. (a) Find the optimum integer solution to the following LPP

Maximize $z = x_1 + 4x_2$

Subject to $2x_1 + 4x_2 \le 7$

$5x_1 + 3x_2 \le 15$

$x_1, x_2, \ge 0$ and are integers

(OR)

(b) Use duality to solve the following LPP

Maximize $z = 2x_1 + x_2$

Subject to $x_1 + 2x_2 \le 10$

$x_1 + x_2 \le 6$

$x_1 - x_2 \le 2$, $x_1 - 2x_2 \le 1$, $x_1, x_2 \ge 0$

13. (a) A small Project is Composed of seven activities whose time estimates are listed in the table as follows

Activity	a	m	b
1 – 2	1	1	7
1 – 3	1	4	7
1 – 4	2	2	8
2 – 5	1	1	1
3 – 5	2	5	14
4 – 6	2	5	8
5 – 6	3	6	15

(i) Draw the project net work.

(ii) Find the expected duration and Variance of each activity. What is the expected Project length?

(iii) Calculate the variance and standard deviation of project length. what is the Probability that the project will be completed

(i) At least 4 weeks earlier than expected?

(ii) No more then 4 weeks later then expected?

(OR)

(b) For the following project, draw the network and find the critical path, Also Calculate the earliest, latest and slack times for all events

Activity	1 – 2	2 – 3	2 – 4	2 – 5	3 – 5	4 – 6	5 – 7	6 – 7
Performance time	5	8	7	5	2	9	6	3

14. (a) The following data is pertaining to a project with normal time and crash time

	Normal		Crash	
Jobs	Time	Cost	Time	Cost
1 - 2	8	100	6	200
1 - 3	4	150	2	350
2 - 4	2	50	1	90
2 - 5	10	100	5	400
3 - 4	5	100	1	200
4 - 5	3	80	1	100

(i) If the indirect cast is Rs.100 per day find the least cost schedule (optimum duration)

(ii) What is the Minimum duration?

(OR)

(b) The following failure rates have been observed for certain items

End of month:	1	2	3	4	5
Probability of failure to date:	0.10	0.30	0.55	0.85	1

The cost of replacing an individual item is Rs.1.25. The decision is made to replace all items simultaneously at fixed intervals and also replace individual items as they fail. If the cost of group replacement is 50 paise, what is the best interval for group replacement? At what group replacement per item, would a policy of strictly individual replacement become preferable to the adopted policy?

15. (a) Arrivals at a Telephone booth are considered to be Poisson with an average Time of 10 minutes between one arrival and next. The duration of the phone call is assumed to be exponentially distributed with mean 3 minutes.

(i) What is the probability that a person arriving at the booth will have to wait?

(ii) The telephone Department will install a second booth when convinced that an arrival would expect waiting for atleast 3 minutes for phone. By how much should the flow of arrivals increase in order to justify the Second booth?

(iii) Find the average number of units in the system

(iv) Estimate the fraction of the day that the phone will be in use.

(v) What is the probability that it will take more than 10 minutes altogether to Wait for phone and complete the call?

(OR)

(b) Find the sequence that minimizes the total elapsed time required to complete the following jobs on machines M_1, M_2 and M_3 in the order M_1, M_2, M_3.

Task	A	B	C	D	E	F
M_1	8	3	7	2	5	1
M_2	3	4	5	2	1	6
M_3	8	7	6	9	10	9

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