2014
B.E. (Mechanical Engineering)
Eighth Semester
MEC-801: Mechatronics

Time allowed: 3 Hours   Max. Marks: 50

NOTE: Attempt _five_ questions in all, including Question No. I which is compulsory and selecting two questions from each Section.

x-x-x

1	1. How directional control valve functions? 2. Draw the symbols of accumulator, pressure reducing valve, variable displacement pump and relief valve. 3. What is input / output interfacing? 4. Write the advantages of PLC. 5. Write different mechatronic elements used in Bath scale.	(05x02)
	Section-A	
2	a) Explain different elements of closed loop system b) How process control valve functions?	(05,05)
3	Explain the working of PID controller along with electronic implementation and taking one example.	(10)
4	a) Write a note on "Data acquisition system". b) Explain ladder programming with examples.	(05,05)
	Section-B	
5	a) Draw the pin diagram of 8085 microprocessor. b) What is the difference between microcontroller and microprocessor.	(05,05)
6	a) How can we convert digital to analog signals? b) What is serial communication interfacing?	(05,05)
7	a) Explain the working of microprocessor-based windscreen wiper motion. b) Write and explain different mechatronic elements of Pneumatic system.	(05,05)

x-x-x

2014
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Eighth Semester
MEC-802: Operation Research

Time allowed: 3 Hours   Max. Marks: 50

NOTE: Attempt <u>five</u> questions in all, including Question No. I which is compulsory and selecting two questions from each Part.   For any missing data, make the suitable assumptions.

x-x-x

1. (a) How Operations research is system oriented.
   (b) What are differences between deterministic models & probabilistic models.
   (c) What are Allocation models.
   (d) What is degenerate solution in LPP.
   (e) What are characteristics of standard form of LPP.
   (f) What is difference between primal and dual.
   (g) What is unbalanced transportation problem.
   (h) What is symmetrical Travelling salesman problem.
   (i) Write Kendall's notation for representing queuing models.
   (j) What is Looping & Dangling in PERT.

                                                        (1*10= 10)

PART-A

2. (a) Discuss the steps used for Constructions of models in OR.

   (b) Discuss in brief the Methodology used in solving an OR Problem.   (5, 5)

3.   A plant manufactures two products A and B. The profit contribution of each product has been estimated Rs 20 for product A and Rs 24 for product B. Each product passes through three departments of the plant. The time required for each product and total time available for each department is as follows:

Department	Hours required		Available hours during the month
	Product A	**Product B**	
1	2	3	1500
2	3	2	1500
3	1	1	600

The company has a contract to supply at least 250 units of product B per month. Formulate the problem as linear programming model and solve the problem using graphical method.

                                                        (10)

                                                        P.T.O.

4. Solve the Linear programming problem to

Maximize $\qquad$ $Z = 3x_1 + 2x_2 + 2x_3$

Subject to: $\qquad$ $5x_1 + 7x_2 + 4x_3 \le 7$
$4x_1 - 7x_2 - 5x_3 \le 2$
$3x_1 + 4x_2 - 6x_3 \ge 3$
$x_1, x_2, x_3 \ge 0$

(10)

PART-B

5. (a) Four different jobs are to be done on four different machines. The set –up and production times are prohibitively high for changeover. Table given below indicates the cost of producing job i on machine j in rupees.

JOBS	Machines			
	A	B	C	D
I	5	7	11	6
II	8	5	9	6
III	4	7	10	7
IV	10	4	8	3

Assign jobs to different machines so that the total cost is minimized.

(b) Distinguish between transportation model and assignment problem. $\qquad$ (8, 2)

6. (a) Describe the role of branch & bounding to solve the traveling salesman Problem.

(b) A library wants to improve its service facilities in terms of the waiting time of its borrowers. The library has two counters at present and borrowers arrive according to Poisson distribution with arrival rate 1 every 6 minutes and service time follows exponential distribution with a mean of 10 minutes. The library has relaxed its membership rules and a substantial increase in the number of borrowers is expected. Find the number of additional counters to be provided if the arrival rate is expected to be twice the present value and the average waiting time of the borrower must be limited to half the present value.

(5,5)

7. A project has the following time schedule:

Activity	1-2	1-3	2-4	3-4	3-5	4-9	5-6
Time in weeks :	4	1	1	1	6	5	4
Activity	5-7	6-8	7-8	8-9	8-10	9-10	
Time in weeks :	8	1	2	1	8	7	

Construct network & compute
(i) TE & TL (earliest occurrence and latest occurrence) times for each event.
(ii) Float for each activity
(iii) Critical path and its duration

x-x-x