| ET-301(A)/ET-534(B) |

B.Tech. Civil (Construction Management) / B.Tech. Civil (Water Resources Engineering)

Term-End Examination

00766   **June, 2015**

ET-301(A)/ET-534(B) : SYSTEMS METHODS

Time : 3 hours   *Maximum Marks : 70*

Note : *All questions are* **compulsory.** *Use of scientific calculator is permitted.*

1. Answer any *six* of the following questions :   *6×5=30*

   (a) Describe the term 'system' with the help of suitable examples.

   (b) What are the peculiar characteristics of process control systems ?

   (c) What is a Computer Numeric Control (CNC) system ? Explain in brief.

   (d) What is electrical analogue model ? Why do we think of electrical analogue of physical system ?

   (e) What are the different types of air and water pollutants coming out from the construction industry ?

(f) Explain how the thermostat of a refrigerator works.

(g) What are the causal and non-causal systems ? Cite at least two examples of each.

(h) Why is the DC series motor selected for electric traction ?

2. Answer any *two* of the following :

(a) A firm makes two types of furniture — chairs and tables. The contribution for each product as calculated by the accounting department is ₹ 20 per chair and ₹ 30 per table. Both products are processed on three machines M_1, M_2 and M_3. The time required in hours by each product and total time available in hours per week on each machine are as follows :

Machine	Chair	Table	Available Time
M_1	3	3	36
M_2	5	2	50
M_3	2	6	60

How should the manufacturer schedule his production in order to maximize total contribution ? *10*

(b) A company has three factories at F_1, F_2 and F_3, which supply warehouses at W_1, W_2 and W_3 respectively. Weekly factory capacities are 200, 160 and 90 units respectively. Weekly warehouses requirements are 180, 120 and 150 units respectively. Unit shipping costs (in ₹) are as follows :

		Warehouses			Supply
		W_1	W_2	W_3	
	F_1	16	20	12	200
Factories	F_2	14	8	18	160
	F_3	26	24	16	90
	Demand	180	120	150	

Determine the optimal distribution for this company to minimize shipping costs. *10*

(c) Five men are available to do five different jobs. From past records, the time (in hours) that each man takes to do each job is known and given in the following table :

Job

		I	II	III	IV	V
	A	2	9	2	7	1
	B	6	8	7	6	1
Man	C	4	6	5	3	1
	D	4	2	7	3	1
	E	5	3	9	5	1

Find the assignment of men to jobs that will minimize the total time taken in doing the jobs. *10*

3. Answer any *two* of the following questions : *10*

(a) A contractor has to supply 10,000 bearings per day to an automobile manufacturer. He finds that when he starts a production run, he can produce 25,000 bearings per day. The cost of holding a bearing in stock for a year is ₹ 2 and the set-up cost of a production run is ₹ 1,800. How frequently should production runs be made ?

(b) A project has the following time schedule :

Activity	Time (in months)	Activity	Time (in months)
1 – 2	2	3 – 7	5
1 – 3	2	4 – 6	3
1 – 4	1	5 – 8	1
2 – 5	4	6 – 9	5
3 – 6	8	7 – 8	4
		8 – 9	3

Construct a CPM network and compute : *10*
   (i) Critical path and its duration
   (ii) Total float for each activity

(c) Write short notes on any *two* of the following : *5+5*
   (i) Dynamic Programming Applications
   (ii) Queueing Problem
   (iii) Duality in Linear Programming
   (iv) Transhipment Problem