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

B.Tech. Civil (Construction Management) / B.Tech. Civil (Water Resources Engineering)
Term-End Examination
June, 2019

00552

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

Time : 3 hours   *Maximum Marks : 70*

*Note : All questions are **compulsory**. Use of scientific calculator is allowed. Each and every notation should be elaborated. Assume missing data, if any suitably.*

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

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

   (b) Explain human temperature regulation with the help of a block diagram.

   (c) With the help of examples, differentiate between causal and non-causal systems.

   (d) With the help of examples, describe Mathematical Model and Physical Model of any system.

(e) What do you understand by Electric Power Generation System ? With the help of block diagram, describe an Electric Power Generation System.

(f) DC motor is the most suitable motor for variable speed drives. State the reasons for your agreement or disagreement.

(g) What are the two basic types of control systems ? Give at least two examples of each type.

(h) Explain Kirchhoff's law for any electrical network with the help of a suitable diagram.

2. Answer any *two* of the following : 2×10=20

(a) A company has 5 jobs to be done on 5 machines. Any job can be done on any machine. The cost of doing the jobs on different machines are given below. Assign the jobs for different machines to minimize the total cost :

Machines

	A	B	C	D	E
1	13	08	16	18	19
2	09	15	24	09	12
3	12	09	04	04	04
4	06	12	10	08	13
5	15	17	18	12	20

Jobs (label for rows 1–5)

(b) Find the initial basic feasible solution for the following transportation problem with the help of Vogel's Approximation Method. Also obtain the solution by least cost method and compare both solutions.

		Destination				
		D_1	D_2	D_3	D_4	Supply
Origin	O_1	11	13	17	14	250
	O_2	16	18	14	10	300
	O_3	21	24	13	10	400
	Demand	200	225	275	250	

(c) A company has A and B as its products with profit margin ₹ 2 and ₹ 1 per unit respectively. The table below indicates the labour, equipment and material requirement to produce each product per unit :

	Product A	Product B	Total Available
Labour (Man hours)	3·0	2·0	12·0
Equipment (Machine hours)	1·0	2·3	6·9
Material (Unit)	1·0	1·4	4·9

Formulate the above linear programing problem to maximize the profit without exceeding the various levels of resources.

3. Answer any *two* of the following : *2×10=20*

(a) A car manufacturing company has decided to redesign its fuel pump for their new car model. The project involves several activities which are listed in the following table :

Activity	Description of Activity	Predecessor Activity	Time Estimate (Weeks)
A	Evolve the pump design	–	5
B	Develop marketing strategy	A	4
C	Design manufacturing process	A	7
D	Sales advertising media	B	8
E	Initial production run	C	9
F	Release fuel pump to market	D, E	4

Draw the network diagram for the project. Find out the total project duration. Compute total float, free float and independent float for each activity. Identify critical path. Show calculations properly.

(b) A TV repairman finds that the time spent on his jobs is an exponential distribution with mean 30 minutes. He repairs sets in the order in which they arrive. If the arrival of sets is approximately Poisson distribution with an average rate of 10 per 8 hours in a day, what is the repairman's expected idle time each day ? How many jobs are ahead of the average set just brought in ?

(c) Write short notes on any *four* of the following : $4 \times 2\dfrac{1}{2} = 10$

(i) Functions of Inventory Control

(ii) Characteristics of Waiting Line Models

(iii) Deterministic Single Item Inventory Model

(iv) First and Second Order Systems

(v) Electromechanical Systems

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