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

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

Term-End Examination

ΟΟΖ3Β   **June, 2017**

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

Time : 3 hours   *Maximum Marks : 70*

Note : *All questions are **compulsory**. Use of scientific non-programmable calculator is allowed.*

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

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

    (b) What do you understand by 'Air pollution', 'Water pollution' and 'Ground pollution' ? Cite at least one example for each type.

    (c) Why is D.C. series motor selected for electric traction work ? Explain.

    (d) With the help of suitable examples, differentiate between a block diagram and an interconnection diagram.

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

(f) Explain Kirchhoff's law for any electric network.

(g) Write the characteristics of process control systems.

(h) Define 'social system'. What are the features of a social system ?

(i) Draw/write various energy conversion systems to obtain electrical energy.

2. Answer any *two* of the following :

(a) A company owns two flour mills, M and N, which have different production capacities for high, medium and low grade flour. The company has entered into a contract to supply flour to a firm every month with at least 18, 12 and 24 quintals of high, medium and low grade, respectively. It costs the company ₹ 20,000 and ₹ 18,000 per day to run the mills, M and N respectively. On a day, Mill M produces 2, 4 and 8 quintals of high, medium and low grade flour respectively. Mill N produces 2, 2 and 12 quintals of high, medium and low grade flour respectively. How many days per month should each flour mill be operated in order to meet the contract economically ? *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 warehouse requirements are 180, 120 and 150 units respectively. Unit shipping costs (in rupees) are as follows :

		Warehouses			Supply
		W_1	W_2	W_3	
Factories	F_1	16	20	12	200
	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) A company decides to make four sub-assemblies through four contractors. Each contractor is to receive only one sub-assembly. The cost (in hundreds of rupees) of each sub-assembly is determined by the bids submitted by each contractor and is shown in the following table. Assign the different sub-assemblies to the contractors so that the total cost gets minimized. *10*

		Contractors			
		1	2	3	4
Sub-assemblies	A	15	13	14	17
	B	11	12	15	13
	C	13	12	10	11
	D	14	17	14	16

3. Attempt any **two** of the following :

(a) A project comprises of eight activities. The precedence relationship and estimated duration of the eight activities are given as follows :

Activity	Immediate Predecessor	Expected time to complete
A	–	3
B	–	2
C	–	5
D	A	5
E	A	4
F	A	7
G	B, D	10
H	C, F	10

(i) Draw the project network and label the same.

(ii) Estimate the project duration.

(iii) Identify the critical activities and critical path.

(iv) Re-estimate the project duration, if the activity B gets delayed by 8 days.

3+2+2+3

(b) A booking counter takes 12 minutes to book a ticket for each customer. If the customers are arriving according to Poisson Distribution with a rate of 7 per hour, find out : 4+3+3

(i) Expected queue length

(ii) Expected waiting time of a customer in the queue

(iii) Expected time a customer spends in the system

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

(i) Economic Order Quantity

(ii) Kendall's Notation

(iii) Fulkerson's Rule

(iv) Duality in Linear Programming

(v) Transhipment Problem

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