



B.E DEGREE EXAMINATIONS: MAY 2017

(Regulation 2014)

Sixth Semester

ELECTRONICS AND COMMUNICTAION ENGINEERING

U14GST004: Operation Research

COURSE OUTCOMES

- CO1:** Apply linear programming model and assignment model to domain specific situations
CO2: Analyze the various methods under transportation model and apply the model for testing the closeness of their results to optimal results.
CO3: Apply the concepts of PERT and CPM for decision making and optimally managing projects
CO4: Analyze the various replacement and sequencing models and apply them for arriving at optimal decisions
CO5: Analyze the inventory and queuing theory and apply them in domain specific situations.

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Matching type item with multiple choice code

CO4 [K₁]

List I	List II
A. Making sound decisions under conditions of certainty, risk and uncertainty	i. Network Analysis
B. Network of events and activities , resource allocation, network paths and critical paths	ii. Theory of replacement
C. Prediction of replacement costs and determination	iii. Decision Theory
D. Linear Programming that includes an evaluation of relative risks and uncertainties	iv. Probabilistic and Stochastic Programming

- | | A | B | C | D |
|----|-----|----|-----|----|
| a) | ii | i | iii | iv |
| b) | iii | iv | ii | i |
| c) | ii | iv | iii | i |
| d) | iii | i | ii | iv |

10. Which variables are fictitious and cannot have any physical meaning? CO5 [K₁]
- a) Optimal variable b) Decision variable
 c) Artificial variable d) Normal variable

PART B (10 x 2 = 20 Marks)
(Answer not more than 40 words)

11. List the phases of operation research. CO1 [K₁]
12. Why is a simplex method a better technique than graphical for most real case? CO1 [K₂]
13. Distinguish between a balanced and unbalanced transportation problem. CO2 [K₂]
14. Enumerate the methods to find initial basic feasible solution for transportation models. CO2 [K₁]
15. Define crash time. CO3 [K₁]
16. List the steps involved in critical path method. CO3 [K₁]
17. Why do equipments need replacement? CO4 [K₂]
18. What is reorder level? CO4 [K₁]
19. Give Kendall's notation of a Queue. CO5 [K₁]
20. Give examples for single and multichannel models of queues. CO5 [K₁]

Answer any FIVE Questions:-
PART C (5 x 14 = 70 Marks)
(Answer not more than 300 words)

Q.No. 21 is Compulsory

21. i) List and explain the steps in conducting an operations research study. (7) CO1 [K₂]
- ii) Solve the following LP problem by Big-M method. (7) CO1 [K₃]

Maximize $Z=2x_1+3x_2+4x_3$
 Subject to $3x_1+x_2+4x_3 \leq 600$
 $2x_1+4x_2+2x_3 \geq 480$
 $-8x_1+4x_2+3x_3 = 8$
 $x_1, x_2 \geq 0, x_3$ unrestricted in sign.

22. The transportation costs per truck load of cement in hundreds of rupees from each plant to each project site are as follows. 14 CO2 [K₃]

		Project Sites				Supply
		1	2	3	4	
Factories	1	2	3	11	6	6
	2	1	0	6	1	1
	3	5	8	15	9	10
		7	5	3	2	17
		Demand				

Determine the optimal distribution for the company so as to minimize the total transportation cost.

23. R and D activity has 7 activities for which the three time estimates are given below along with its preceding activity.

CO3 [K₃]

Activity	Preceding Activity	Optimistic Time (a)	Most likely time (m)	Pessimistic time (b)
A	-	4	6	8
B	A	6	10	12
C	A	8	18	24
D	B	9	9	9
E	C	10	14	18
F	A	5	5	5
G	D,E,F	8	10	12

- i) Draw PERT network.
- ii) Find EST, LST and slack for each node.
- iii) Find the critical path and expected project duration.

24. A company currently replenishes its stock of a certain item by ordering enough supply to cover one month demand. The annual demand of the item is 1500 units. It is estimated that its costs Rs. 20/every time an order is placed. The holding cost per unit per month is Rs. 2/- and not shortage is allowed. Determine the optimal order quantity and the time between orders. Also find the difference in annual inventory costs between the optimal policy and the current policy of ordering one month supply 12 times a year.

CO5 [K₃]

25. Briefly explain queuing system and its characteristics with examples.

CO5 [K₂]

26. Explain the concept of individual and group replacement policies with the help of examples.

CO4 [K₂]

27. Explain the procedure to find the solution for travelling salesman problem by Hungarian method.

CO4 [K₂]
