UNIVERSITY OF KELANIYA – SRI LANKA

Centre for Distance and Continuing Education

FACULTY OF COMMERCE & MANAGEMENT STUDIES

Bachelor of Commerce (Special) Degree Third Year Examination (External) – 2016

May 2022

BCOM E3055 – Operations Research

No. of questions: Five (05)   **Time: 03 hours**

Answer any four (04) Questions

Question No. 01

a). List down steps required for the analysis of a problem under Operations Research.

(05 Marks)

b). Explain Operations Research with the role of Operations Research techniques in business and industry.

(08 Marks)

c). Jill Computers produce Microchips and RAM cards with using plastics and carbon as materials. To produce microchips, need 56 mg of plastics and 29 mg of carbon, a RAM card need 27 mg of plastics and 38 mg of carbon. Also, company must produce minimum 35 microchips. Company expect Rs: 19 and Rs: 28 profit from microchips and RAM cards respectively and they have only 2620 mg of plastics and 1922 mg of carbons. Find the optimum solution for maximize profits using graphical method.

(12 Marks)

(Total 25 Marks)

Question No. 02

a). Define what is linear programming with the purpose of management science techniques.

(05 Marks)

b). Following table shows details regarding manufacturing of three products using three types of resources. Calculate number of units to be produced in order to maximize the profit using Simplex method.

Resources	Product 1	Product 2	Product 3	Resources (Quantity)
Labor (hrs)	4	8	3	1420
Material (Kg)	6	9	4	7120
Machine time (hrs)	9	3	5	2125
Profit (Rs:)	53	42	58	

(20 Marks)

(Total 25 Marks)

Question No. 03

a). Explain the following in the context of assignment problem

i). Balanced assignment problem

ii). The Hungarian method

(05 Marks)

b). Beta Ltd has three machines to do three jobs.Each jobs can be assigned to one and only one machine.The cost of each job on each machine is given in the following table.

Job	Machine		
	P	Q	R
A	17	23	28
B	8	13	16
C	10	15	18

What are the job assignments which will minimize the cost?

(08 Marks)

c). ABC company is attempting to minimize total inventory cost. The cost of each unit is Rs.4.25. The cost of capital is 14% and the physical cost of maintaining this inventory is currently running at 6%. The purchasing officer can place an order in 25 minutes with materials and overhead cost of Rs.9 per order. The purchase officer is currently paid Rs.24 per hour. Records show, average weekly sales to be 14,000 units.   (52 weeks per year)

i). How many units should ABC order?

ii). How often should ABC place each order?

(12 Marks)

(Total 25 Marks)

Question No. 04

a). What is Critical Path Method?

(05 Marks)

b). Discuss the importance of Network analysis for work in a unstable economy like Sri Lanka.

(05 Marks)

c). You are a Project Manager of the following scheduled construction project of ABS Construction Company. Management of the company expecting your suggestions for the following situations because the client is not happy with the critical time of this project. The time estimates obtained for each activity of the project in the table given below.

Activity	Immed. Predec.	Optimistic (Weeks)	Most Likely (Weeks)	Pessimistic (Weeks)
A	....	2	5	8
B	....	4	5	12
C	....	4	2	6
D	C	2	3	10
E	B, D	8	10	24
F	A	2	9	10
G	F	1	3	11
H	G, E	3	10	11
I	H	8	15	16
J	H	2	4	12
K	I, J	1	8	9

i). Draw a Network Diagram with representing arrows as activities and relationships.

(06 Marks)

ii). Identify the all the paths with highlighting critical path(s).

(02 Marks)

iii). Find the time durations of the all paths.

(02 Marks)

3

iv). If you are informed Activity E and G gets its minimum time to finish because of the unavoidable circumstances what will be the effect on project time or diagram?

(05 Marks)

(Total 25 Marks)

Question No. 05

a). Explain transportation problem giving examples.

(05 Marks)

a). Explain stepping stone method for checking the solution for optimality in transportation problem.

(07 Marks)

b). Alfa Ltd has four factories supplying a product to four warehouses. Each shop has a specific production capacity and each warehouse has certain amount of requirement. The unit transportation costs are given below:

Factories	Warehouse				Supply
	A	B	C	D	
P	2	3	11	7	600
Q	1	2	6	1	100
R	5	8	15	9	1000
Demand	700	500	300	200	1700

Deternmind an intial basic solution to the above transportation problem using

i). North west coner rule

ii). minimum cost method

iii). Vogel's Approximation method

(13 Marks)

(Total 25 Marks)