



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) – 2014/15

August 2020

BCOME 3055 – Operations Research

No. of Questions: Five (05)

Time : Three Hours (03)

Answer any four (04) questions.

Question No. 01

a). Define operations research and describe the relationship with other subject disciplines.

(08 Marks)

a). A manufacturing company is expected to provide limited resources to maximize profits and determine how much of each two different products should be produced. Labor and material requirements and the contribution to profit for each of the two products are as follows.

Resources	Resource requirement		Availability
	Product 01	Product 02	
Labour (hr/Units)	4	6	560 hrs
Material (gram/Units)	8	6	710 grams
Profit Rs.	15	10	

Calculate how many of each type of product that needs to be produced in order to maximize overall profit.

(17 Marks)

(Total 25 Marks)

Question No. 02

a). Introduce the Linear Programming method and explain its contribution to the subject of complex research.

(05 Marks)

- b). A fruit drink company produces three special flavored milk drinks by mixing fresh milk, apple and pineapple juice. All the details are in the following table.

Type of Juice	Products			Quantity
	Drink 1	Drink 2	Drink 3	
Fresh Milk	80 ml	60 ml	90 ml	15,000
Apple Juice	70 ml	40 ml	50 ml	10,000
Pine-apple	50 ml	100ml	60 ml	15,000
Profit (Rs.)	50	60	70	

Find the maximum profit using and specify each type of drink and quantity to be produced for it using simplex method?

(20 Marks)

(Total 25 Marks)

Question No. 03

You are the Project Manager for the following construction projects at ABS Construction Company. Since the client is not happy about the critical time of this project, the management of the organization expects your suggestions for the following situations. The time estimates obtained for each activity of the project are given in the table below;

Activity	Immediate Predecessor	Time duration (Weeks)
A		8
B		12
C		6
D	C	10
E	B, D	24
F	A	10
G	F	11
H	G, E	11
I	H	16
J	H	12
K	I, J	9

- a). Draw a network diagram illustrating Activity on Arrow.
(12 Marks)
- b). Identify all the paths highlighting the critical path.
(04 Marks)
- c). The F activity here requires an extra 7 weeks due to a material delay in pandemic situation. Discuss how does this affect the project?
(05 Marks)
- d). Submit your proposals to complete the project in 5 weeks rather than the time required by the client.
(04 Marks)
- (Total 25 Marks)**

Question No. 04

- a). Explain the importance of transport models with examples.
(04 Marks)
- b). "Different methods are used in building basic solutions for a transport model". Briefly explain the three techniques basically use.
(06 Marks)
- c). Beta Ltd has three factories, P, Q and R which supply to three distribution centers namely D1, D2 and D3. The table below gives the transportation cost per unit, the factory annual capacities and predicted annual demands at different distribution centers in terms of thousands of units.

Distribution centers Factories	D1	D2	D3	Supply
P	30	15	8	225
Q	9	16	27	150
R	3	24	18	375
Demand	300	180	270	

Based on the above information, find initial basic feasible solution to the above transportation problem using;

- i). North west corner method
- ii). Minimum cost Method
- iii). Vogel's approximation method (VAM).

(15 Marks)

(Total 25 Marks)

Quesion No. 05

- a). State the common and distinguishing features of assignment and transportation models.

(06 Marks)

- b). Briefly explain what an assignment model is and how it can be used for business decision making.

(07 Marks)

- c). Alfa requires three of its employees to be assigned to three production tasks. These three individuals can perform any of those three tasks. But there is a difference in the cost estimates for each of the three individuals. The cost of deploying each of these three individuals is shown in the table below.

Duties	J ₁	J ₂	J ₃	Supply
Workers				
W ₁	70	30	50	1
W ₂	80	90	20	1
W ₃	90	60	80	1
Demand	1	1	1	

Find out which job be assigned to which operator in order to minimize the total cost.

(12 Marks)

(Total 25 Marks)