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FACULTY OF MANAGEMENT AND FINANCE	No. of Questions: 06
	Total Marks :70

BBA 2104 – Operations Research	Academic Year 2021/2022

BACHELOR OF BUSINESS ADMINISTRATION HONOURS DEGREE	*Three Hours*
2000 LEVEL FIRST SEMESTER END EXAMINATION – OLD SYLLABUS- SEPTEMBER 2022	

Instructions

➡ Answer five (5) questions only.

Question 01

I. Briefly explain the importance of operations research study.

(02 Marks)

II. A furniture manufacturing company is manufacturing chairs and tables. The profit from each product as calculated by the accounting department is Rs. 200 per chair and Rs, 300 per table. Resources required to produce one unit of each product is given in the table below.

Resources	Requirement per unit of product		Available Resources
	Chair	Table	
Timber (square meters)	3	3	36
Labour (Hours)	5	2	50
Steel (meter)	2	6	60

You are required to,

a) Develop a linear programming (LP) model.

(02 marks)

b) Convert linear programming model into standard form of simplex method.

(01 mark)

c) Solve the linear programming model by using the simplex method.

(08 marks)

d) How many units of each kind should be produced so as to have maximum profit.

(01 mark)

(Total 14 marks)

Question 02

I.   What are the special cases in transportation problems?

(03 marks)

II.   Lanka manufacturing company has three plants W, X and Y with capacities 35, 40, and 40
      units of a single product per month. It markets its products through three warehouses A, B,
      and C with requirements of 45, 50, and 20 units per month respectively

      The cost of transporting one unit of the product from plants W, X and Y to the ware houses A,
      B, and C is given in the following table.

Plants	Ware houses		
	A	B	C
W	5	10	10
X	20	30	20
Y	5	8	12

a) Find out the initial solution using North-West corner method.

(03 marks)

b) Determine the optimum production and distribution plan to minimize the total cost by
   using stepping stone method.

(08 marks)

(Total 14 marks)

Question 03

There are different activities in a construction project. Those activities are inter-related and after completing an activity, next activity is to be started. Each activity and time duration are given in the following table.

Activity	Preceding activities	Expected completion time (In weeks)
A	-	5
B	-	2
C	-	6
D	A	12
E	A, B	10
F	C	9
G	D, E, F	5
H	D, E, F	9
I	G	1
J	G, H	2
K	I, J	3

I.   Draw a project network diagram for the above data.

(06 marks)

II.   State the critical path.

(02 marks)

III.   What is the expected completion time?

(02 marks)

IV.   Find the floats (Total slack time and free slack time) for all activities.

(04 marks)

(Total 14 marks)

Question 04

I. Briefly explain the decision theory elements.

(03 marks)

II. Nihal's Bike Shop is considering three options for his facility next year. He can expand his current shop, move to a larger facility, or make no change. Following table shows the payoffs of these alternative options in three economic conditions.

Decision alternatives	States of nature (Market)		
	Favorable	Average	Unfavorable
Expand	56,000	21,000	-29,000
Move	70,000	35,000	-45,000
No change	30,000	10,000	5,000

You are required to recommend Mr. Nihal to select one alternative for his facility under,

a) Maximax criterion
b) Maximin criterion
c) Minimax criterion
d) Laplace criterion
e) Hurwicz criterion (Assume alpha value as 0.6)

(08 marks)

III. Determine the best decision using expected opportunity loss if the probability of a favorable market is 25%, the probability of an average market is 45%, and the probability of an unfavorable market is 30%.

(03 marks)

(Total 14 marks)

Question 05

I. Distinguish Assignment problem and Transportation problem.

(06 marks)

II. The captain of a cricket team has to allot five middle batting positions to five batsmen. The average maximum runs scored by each batsman at these positions are as follows:

Batsman	Batting Positions				
	I	II	III	IV	V
P	40	40	35	25	50
Q	42	30	16	25	27
R	50	48	40	60	50
S	20	19	20	18	25
T	58	60	59	55	53

Using Hungarian method decide the schedule for the allocations of batsman to maximize the average runs to complete the task.

(08 marks)

(Total 14 marks)

Question 06

I. Briefly explain the steps in Dynamic programming.

(06 Marks)

II. Biscuit manufacturing company is using television, radio and newspapers for their advertising activities. Based on the pre-tested data, the following table depicts the sales income that earned from each advertising activity in relation to the number of advertisements.

No: of advertisements (monthly)	Sales (units)		
	Television	Radio	News papers
1	-	170	80
2	150	200	100
3	400	500	300
4	500	600	400
5	750	700	500

The following table shows the maximum and minimum number of advertisements and cost per one advertisement in accordance with company policies.

	Television	Radio	News paper
Maximum number of advertisements	4	5	5
Minimum number of advertisements	2	1	-
Cost per one advertisement (Rs)	20,000	10,000	10,000

Rs.100, 000 has been allocated from the budget to the advertising activities per month.

Allocate Rs.100, 000 among these three-advertising medium to maximize the profit using the Dynamic Programming technique?

(08 Marks)

(Total 14 marks)

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