Uva Wellassa University

Faculty of Management

Degree of Bachelor of Business Management in Entrepreneurship and Management

THIRD YEAR SECOND SEMESTER EXAMINATION –DECEMBER/JANUARY 2017

EMG 374 -3 Scientific Decision Making

Instructions to candidates:

No. of pages : Six (06)
No. of questions : Six (06) Essay
Time allocation : Three (03) Hours
Marks allocated :100 Marks
Answer **all** questions.
You may state clearly the assumptions made if any
Question paper is not to be removed out from the examination hall.

Index Number:

01.

i) Buwaneka Private limited, a manufacturing company produces two (02) types of products, Alpha and Beta using three (03) distinct processes, producing, assembling and finishing. The estimated times required in hours for each product in each process are summarized below.

	Alpha	**Beta**
Producing	10	4
Assembling	4	5
Finishing	1	2

The fixed production overhead of the quarter will be Rs.20,000. The production manager has identified that the total time available for the period considered will be 6,000 hours of producing, 3000 hours of assembling and 1500 hours of finishing for both the products. The marketing manager has requested to produce at least 100 units from Alpha to satisfy the established customers' needs. Further, the marketing manager requested not to produce more than 200 units from Beta as there is a limited market demand for the Beta.

The selling price and the variable cost of producing each type of products for the next quarter have been estimated as follows.

	Alpha (Rs. Per unit)	Beta (Rs. Per unit)
Selling price	300	500
Variable cost	200	300

You are required to;

a) formulate this production problem as a linear programming model (07 Marks)

b) determine the optimal production plan using graphical method of solving linear programming problems (08 Marks)

c) calculate the expected profit for the next quarter (05 Marks)

(Total Marks- 20)

02.

i) You are given the following linear programming problem.

Maximize; $Z = 3X_1 + 2X_2 + 6X_3$

Subject to; $6X_1 + 4X_2 + 2X_3 \leq 480$

$3X_1 + 6X_2 + 2X_3 \leq 420$

$3X_1 + 6X_2 + 2X_3 \leq 280$

$X_1, X_2, X_3 \geq 0$

a) Setup the initial simplex tableau to solve the above linear programming problem.

(05 Marks)

b) State whether the answer to part (a) abovc is providing the optimal solution to the given problem. (05 Marks)

ii) Briefly explain the three (03) commonly used criteria for decision making when the probability information regarding the likelihood of the states of nature is unavailable

(06 Marks)

(Total Marks-16)

03.

i) What is meant by a Balanced Transportation problem? (04 Marks)

ii) You are given the following transportation problem. The table shows the quantity demanded for each destination and the quantity supplied by each origins and the respective costs (in Rupees) of shipment of one unit from each origin to each destinations.

		Destination				
Source		D_1	D_2	D_3	D_4	Supply (Units)
	O_1	5	3	9	3	1300
	O_2	6	5	4	8	950
	O_3	10	10	20	7	450
	O_4	8	22	24	4	700
	Demand (Units)	400	1000	1100	900	

You are required to;

a) determine the number of units to be transported from each supply origin to each demand destination in order to minimize the transportation cost. (Use the North West Corner Rule) (06 Marks)

b) test whether the answer given to part (a) above is providing an optimal solution to the given transportation problem (Use the stepping stone method) (06 Marks)

(Total Marks -16)

04. The business development manager of Synergy PLC is planning to develop three (03) business proposals to be presented to the Board of Directors of the company. The manager has identified four (04) business analysts who are capable of developing such proposals and he has estimated the time (no. of hours) required by each business analyst to develop each of the business proposals as shown in the following matrix.

Business Analyst	Business Proposals		
	I	II	III
A_1	175	160	150
A_2	200	190	170
A_3	180	210	180
A_4	170	180	140

i) Find how the three (03) business analysts should be assigned to develop the three (03) proposals within minimum time duration (06 Marks)

ii) If the standard costs per hour for the four (04) analysts are Rs.150, Rs.120, Rs.125 and Rs.140 for A_1, A_2 A_3 and A_4 respectively, calculate the total cost of these three assignments if assigned as part (i) above (04 Marks)

iii) Show the initial matrix of the assignment of business analysts that would minimize the total cost of developing the business proposals using the standard cost of each analyst given in part (ii) above. (06 Marks)

(Total Marks - 16)

05.

i) State the basic rules to be followed when constructing a project network diagramme which depicts the predecessor relationship. (04 Marks)

ii) Queen Beauty Cosmetics PLC has just received CDDRA (Cosmetics, Devices and Drug Regulatory Sri Lanka) approval to market a new fairness cream. The research, including the laboratory testing has been already completed. In order to introduce the product, the company must deal with matters relating to production and marketing. Production and Marketing managers have listed eleven (11) activities which must be performed before introducing the product to the market.

These eleven (11) activities have been listed in the following table along with other information.

Activity	Description of the Activity	Immediate predecessor	Time (Weeks)
A	Quality Control System	None	12
B	Raw material acquisition	None	4
C	Production facility set up	None	8
D	Compile the cosmetic sales information	None	10
E	Test the production	B,C	8
F	Full production of a batch	A,E	10
G	Prepare advertising program	D	3
H	Update sales people	D	9
I	Advertising contracts	A,E,G	3
J	Initial Advertising	I	8
K	Ship to pharmacies	F	5

You are required to;

a) draw the project network diagram (04 Marks)

b) calculate the earliest starting time, the earliest finishing time, the latest starting time and the latest finishing time of each activity (04 Marks)

c) calculate the total float of each activity (02 Marks)

d) determine the critical path and normal project duration (02 Marks)

(Total Marks -16)

06.

i) An optimum inventory decision is one which minimizes the sum of the costs associated with inventory. List three (03) types of costs of inventories (03 Marks)

ii) A company buys PVC pipes from a manufacturer and distributes to retailers. The company is considering reducing its inventory cost by applying economic order quantity technique in purchasing PVC pipes. The semi-annual demand for PVC pipes is 490,000 units, the ordering cost is Rs.1,000 per order and the carrying cost per annum is 10% on purchase price. The purchase price of each PVC pipe is Rs.100.

You are required to;

a) calculate the Economic Order Quantity (EOQ) (04 Marks)

b) determine the optimum number of orders to be placed in a year (02 Marks)

c) calculate the time duration between two consecutive orders (02 Marks)

d) graphically illustrate the EOQ for above data (05 Marks)

(Total Marks -16)