Uva Wellassa University
Faculty of Management
Degree of Bachelor of Business Management in Entrepreneurship and Management
THIRD YEAR SECOND SEMESTER EXAMINATION – JANUARY/FEBRUARY 2016
EMG 374 -3 Scientific Decision Making

Instructions to candidates:
No. of pages : Six (06)
No. of questions : Seven (07) Essay
Time allocation : Three (03) Hours
Marks allocated :100 Marks
Answer six (**06**) questions **including question number one (01).**
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) Dunhinda Manufacturing PLC produces two (02) types of products, Product A and Product B using three (03) distinct processes, mixing, producing and finishing. The estimated times required in hours for each product in each process are summarized below.

	Product A	**Product B**
Mixing	5	4
Producing	10	3
Finishing	2	2

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

	Product A (Rs. Per unit)	Product B (Rs. Per unit)
Selling price	4,000	6,000
Variable cost	3,250	4,500

The fixed production overhead of the quarter will be Rs.50,000. The production manager has identified that the total time available for the period considered will be 2,400 hours of mixing 3,000 hours of producing and 1500 hours of finishing for both the products.

21

Further, to satisfy the established customers' requirements at least 50 units of each product should be manufactured in a quarter.

You are required to;

a) determine the optimal production plan using the linear programming technique. [use graphical method] (15 Marks)

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

c) calculate the shadow prices of binding constraints and comment on the usefulness of shadow price in decision making. (05 Marks)

ii) 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

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

b) 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 (a) above (03 Marks)

c) 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 (b) above. (06 Marks)

(Total Marks - 40)

02. You are given the following transportation problem. The table shows the quantity demanded by each destination and the quantity supplied by each origins and the respective cost of transporting one unit from each origin to each destinations.

		Destination				
		D_1	D_2	D_3	D_4	Supply
Source	O_1	5	3	9	3	**1200**
	O_2	6	5	4	8	**1000**
	O_3	10	10	20	7	**600**
	Demand	**400**	**1000**	**1100**	**900**	

You are required to determine the number of units to be transported from each supply origin to the demand destinations in order to minimize the transportation cost. (Use the North West Corner Rule for determining the initial basic solution and test the optimality using the stepping stone method) (12 Marks)

03. The marketing department of Dedunu Enterprise has five (05) sales representatives to cover five (05) sales Districts. The Districts have different sales potentials and the sales representatives have different marketing capabilities. Considering the capabilities of the sales representatives and the nature of the demand of the different districts, the following estimates of monthly sales (in 1000 rupees) of each representative in each district have been provided to you.

		District				
		A	**B**	**C**	**D**	**E**
Sales Representative	**I**	285	260	265	195	150
	II	320	230	190	150	170
	III	340	230	180	140	160
	IV	270	190	90	150	180
	V	180	190	210	220	180

The marketing manager of Dedunu Enterprise is seeking your advice on assigning the sales representatives to the districts in order to maximize the monthly sales revenue. Advise the marketing manager providing the optimal assignment of sales representatives. (12 Marks)

21

04. The new Sinha Manufacturers private limited is a newly established business which manufactures and delivers office furniture. The chairman of this business faced with the problem of deciding the size of the delivery vehicle to be purchased to use in the company's operations. The vehicle is needed to collect raw materials and to make deliveries to customers during the forthcoming year. The chairman's decision will depend on the extent of demand for the products during the next year. If the demand is low, purchasing a large vehicle would mean blocking a huge sum of money unproductively and on the other hand if the demand is large, a smaller vehicle would not be able to cope up with the requirements. The chairman has identified three (03) types of vehicles, a Double Cab, a medium size Lorry and a Truck. One out of three should be purchased immediately. Considering the future demand conditions, the chairman has developed following profit payoff table (in Rs. million) for three (03) types of vehicles.

	Poor demand	Low demand	Medium demand	High demand
Double Cab	6	6	6	6
Medium size Lorry	2	5	4.5	4.5
Truck	-6	-1	5	10

i) Find out the appropriate decision to be taken by the Chairman of the new Sinha Manufacturers private limited if he/she is an optimistic decision maker. (03 Marks)

ii) State whether you accept the answer to part (i) above if the chairman is a conservative decision maker. (03 Marks)

iii) State your decision if the probability information of future demands are estimated as follows.

	Poor demand	Low demand	Medium demand	High demand
Probability	0.1	0.3	0.4	0.2

(06 Marks)

(Total Marks - 12)

05. Ease life PLC is a diversified business organization, now considering on expanding its business to agricultural insurance policy in Uva province. At the moment, the company has two (02) courses of actions open to it, to conduct a market survey to test the feasibility of introducing new insurance policy to Uva province or to terminate the temporary staff to reduce the staff cost. If the company conducts the marketing survey, it will cost Rs.40,000 and the market response could be positive or negative with probabilities of 0.6 and 0.4, respectively.

If the market response is positive, the company could either introduce new insurance policy or terminate the service of temporary staff. If the company introduces the insurance policy, the outcome might be low, moderate or high demand and the respective net payoffs would be Rs. 50,000, Rs.150,000 and Rs.500,000. The probability of having a high, moderate and low demand would be 0.3, 0.5 and 0.2, respectively.

If the response of marketing survey is negative, the company can either introduce the new insurance policy or not. If the company goes ahead and introduces new policy to Uva province with negative response, the estimated losses would be Rs.100,000. If the company does not introduce the new agricultural insurance policy at any point the company can save Rs.75,000 by terminating the temporary staff. All the relevant financial values have been discounted to the present.

You are required to identify what decision should be taken by the company. (Use decision tree diagram) (12 Marks)

06.

i) Distinguish 'Deterministic Inventory Model' and 'Probabilistic Inventory Model' in terms of the nature of demand (06 Marks)

ii) The quarterly requirement for a particular raw material is 1250 units, costing Rs.20 each to a manufacturer. The ordering cost is Rs.100 per order and the carrying cost is 5% per annum of the average inventory value. Find the Economic Order Quantity (EOQ) and total inventory cost per annum. (06 Marks)

(Total Marks -12)

21

07. 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 yet 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;

i) Draw the project network diagram (04 Marks)

ii) Calculate the earliest starting time, the earliest finishing time, the latest starting time and the latest finishing time of each activity (04 Marks)

iii) Calculate the total float of each activity (02 Marks)

iv) Determine the critical path and normal project duration (02 Marks)

(Total Marks -12)