



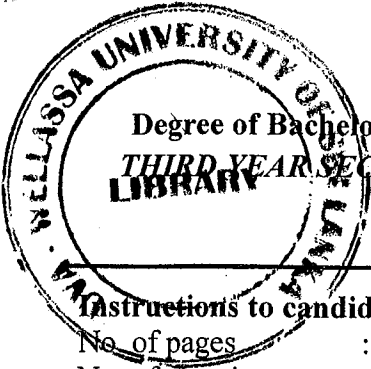
**Uva Wellassa  
University**

**Uva Wellassa University  
Faculty of Management**

**Degree of Bachelor of Business Management in Entrepreneurship and Management**

**THIRD YEAR SECOND SEMESTER EXAMINATION - AUGUST/SEPTEMBER 2011**

**EMG 374 -3 Scientific Decision Making**

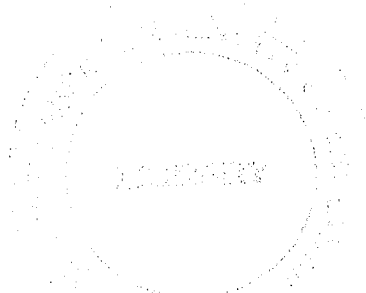


**Instructions to candidates:**

- No. of pages : Seven (07)  
No. of questions : Five (05) Structured Essay  
                              : Three (03) Essay  
Time allocation : Two (02) Hours and Thirty (30) Minutes  
Marks allocated : 80 Marks  
Question paper is not to be removed from examination hall.

Index Number:

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### Part C – Essay Questions

Answer only two (02) questions from Part C including question 1.

Marks allocation: 50 Marks

01.

- a) The business development manager of Synergy PLC is planning to develop three business proposals to be presented to Board of Directors of the company. The manager has identified three business analysts who are capable of developing such proposals and he has estimated the time (no. of days) 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 <sub>1</sub>	170	160	150
A <sub>2</sub>	140	150	170
A <sub>3</sub>	180	200	180

- i. Find how the business analysts should be assigned to the business proposals  
(10 marks)
- ii. If the standard costs per day for the three analysts are Rs.6000, Rs.8,500 and Rs.7,000 for A<sub>1</sub>, A<sub>2</sub> and A<sub>3</sub> respectively,
- A. Calculate the total cost of these three assignments if assigned as above.  
(3 marks)
- B. Show the initial matrix of the assignment of business analysts that would minimize the total cost of developing the business proposals.  
(2 marks)



b) Badulla Urban Council (BUC) is considering developing a seven (7) acre land for residential use, which is approved by the Board of Investment (BOI). Town planning consulting group of the BUC has proposed to construct two different types of houses Town Model (T) and Rural Model(R).

The BOI agreement contains following conditions;

1. The density of model R is five (5) units per acre.
2. The density of model T is ten (10) units per acre.
3. Total investment for this housing project should be Rs.21 million
4. The total number of houses that could be constructed on this land should not exceed forty (40)
5. There must be at least five (5) units of each model.

The costs of construction are estimated by the engineer of the BUC as follows.

Rs.350,000 for each unit of Model R

Rs.600,000 for each unit of Model T

Further, the engineer estimated the rateable value of a Model R house is Rs.1,000,000 and of a Model T is Rs.600,000.

**You are required to;**

- i. Formulate a linear programming model to control the mixture of house Model R and T to provide the maximum rateable value for the BUC  
(6 marks)
- ii. Graph the constraints that showing the region of feasible solutions  
(6 marks)
- iii. Find the optimal solution by **iso** profit line method  
(3 marks)

(Total -30 Marks)

02. The following set of activities, precedence relationships and activity times have been predicted with respect to a project.

Activity	Immediate predecessors	Time Estimates (weeks)		
		Optimistic time	Most Likely time	Pessimistic time
A	-	6	8	10
B	-	13	16	19
C	F,D	4	6	8
D	B	8	12	24
E	-	10	14	18
F	A	18	32	34
G	B	16	24	32
H	G	16	20	24
I	K	10	14	18
J	E	14	16	30
K	G,J	18	22	26

The project is complete when activities C,H,I are complete.

**You are required to;**

- Compute the expected activity time  
(3 marks)
  - Draw the network diagramme for this project  
(12 marks)
  - Determine the total floats of each activity  
(3 marks)
  - Show the critical path for the project  
(2 marks)
- (Total -20 Marks)

03. Princes PLC presently manufactures electric irons for export. An export order has been received for 50,000 irons and has to be supplied to the buyer within the specified time frame. If Princes PLC fails to supply within the time frame a penalty of Rs.4,000,000, is payable and the order rejected. Princes PLC in the past has faced many problems of manufacturing on time due to union actions of the employees and it is estimated that for any order there will be 30% probability that the order will not be executed in time due to union actions. Such union action will result in a loss by not having production to absorb the



relevant fixed costs for the order as well. If there is no any union actions, then the products will be manufactured and supplied without delay. Manufacturing irons inhouse is also subject to unforeseen cost escalations and it is estimated that variable cost of production will increase by 10% per order and the relevant fixed cost will increase by 15% both the increase having a probability of 25% to occur when manufacture is proceeding. At present variable cost per iron is Rs.525 and fixed costs per order is Rs.5,000,000 .

The company is presently exploring the possibility of subcontracting the manufacture of irons. There will not be a delay in making the order ready in time, but the problem here is quality, which is not a problem in case of in-house manufacture. It is also noted that subcontracting will not take away the fixed costs of an order. It is estimated that Princes PLC will be able to supply irons by subcontracting manufacture with a probability of 80% success, where it will be shipped in time without any quality problems. If a quality problem occurs then the whole order will be rejected and Princes PLC will have to bear the cost of Rs.4,000,000 and in addition will have to sell 50,000 irons locally below cost, at Rs.500 each. Princes PLC is entitled to deduct only Rs.75 per iron from the subcontract price on account of any quality problems from the agreed subcontract price of Rs.600.00 per iron delivered to factory. Princes PLC has decided to price the order keeping a 30% margin on total expected cost of producing each order.

**You are required to;**

a) Calculate the order price for in-house manufactured product

(5)

b) Advise the management of Princes PLC whether manufactures in-house is preferable to subcontracting by using a decision tree and expected values.

(15)

(Total -20)