THE OPEN UNIVERSITY OF SRI LANKA
BACHELOR OF MANAGEMENT STUDIES - LEVEL 06
ASSIGNMENT TEST 2009/2010
OPERATIONS RESEARCH – MCU 4202

DATE: 12/12/2009 **TIME: 02.00PM – 04.00 PM**

ANSWER ANY FOUR QUESTIONS ONLY.

Q1. Briefly explain how operational research techniques could be helpful in management decision making indicating their limitations and what precautions you need to take.

Q2. An assembly line consists of four Jobs J1, J2, J3 and J4 that are carried out sequentially. These four jobs can be performed by any one of the men M_1, M_2, M_3 and M_4. However the time they take to complete the jobs differ as explained in the table below.

TIME TAKEN TO COMPLETE JOB(HOURS)

MEN	JOBS			
	J_1	J_2	J_3	J_4
M_1	7	8	6	9
M_2	17	22	15	23
M_3	11	14	13	12
M_4	8	6	9	10

Find how these four men should be assigned to the four jobs so that the total time taken to complete all. Four jobs is a minimum (minimization problem)

Q3. A manager of a garment factory observes that any of the four operators M1, M_2, M_3 or M_4 could work on any of the four Juki Machines J1, J2, J3 or J4. But their daily output differs as explained in the table below.

DAILY OUT PUT (UNITS)

OPERATOR	JUKI - MACHINE			
	J_1	J_2	J_3	J_4
M_1	10	8	17	12
M_2	24	32	27	20
M_3	7	9	6	11
M_4	17	15	19	18

Use assignment theory to find how the operators should be assigned to the four Juki machines so as to maximize total daily output (Maximization Problem)

Q4. A project consists of five activities A, B, C, D and E whose precedence and durations are explained in the table below.

ACTIVITY	PRECEDANCE	DURATION (DAYS)
A	PROJECT START	7
B	PROJECT START	6
C	AFTER A	5
D	AFTER B, AND C	4
E	AFTER D	9

(i) Construct the network diagramme.
(ii) Time analyse the network and name the critical path
(iii) In respect of every activity find "EST", "EFT", "LFT" and "LST"
(iv) What is the earliest project completion date?

Q5. A project consists of seven activities A, B, C, D, E, F and G whose precedence and durations are explained in the table below.

ACTIVITY	PRECEDANCE	DURATION (DAYS)
A	PROJECT START	7
B	PROJECT START	9
C	PROJECT START	5
D	AFTER B	4
E	AFTER A	8
F	AFTER C	5
G	AFTER E,D AND F	3

a. (i) Construct the network diagramme.
(ii) Time analyse and name the critical path.

b. Six months later the following progress of the project was noted
Activity A complete
Activity C Complete
Activity E 50% complete
Draw the new network diagramme and find the new critical path.

Q6. a. Briefly explain the six factors that control the behaviour of a queuing system.

b. A bank has one Automatic Teller Machine (ATM) and customers arrive at the rate of 12 per hour. The (ATM) machine on the average takes 4 minutes to serve one customer. The (ATM) machine works 24 hours a day.
(i) What is the probability that the (ATM) machine is idle?
(ii) How many hours will the (ATM) machine idle per day.
(iii) On the average how many customers are. There at the (ATM) machine.
(iv) On the average how many customers are waiting to receive service.
(v) On the average how long will a customer have to wait at the (ATM) machine?