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University Examinations 2023/2024

SECOND YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF
BACHELOR OF COMMERCE

BFC 3277: BUSINESS CALCULATIONS II

DATE: APRIL 2024

TIME: 2 HOURS

INSTRUCTIONS: Answer question *one* and any other *two* questions

QUESTION ONE (30 MARKS)

A company produces inexpensive tables and chairs. The production process for each is similar in that both require a certain number of hours of carpentry work and a certain number of labour hours in the painting department. Each table takes 4 hours of carpentry and 2 hours in the painting shop. Each chair requires 3 hours of carpentry and 1 hour in painting. During the current production period, 240 hours of carpentry time are available and 100 hours in painting time are available. Each table sold yield a profit of \$7 and each chair produced is sold for a \$5 profit. Formulate this problem in a linear programming problem to determine as to how many tables and chairs should be produced so that the firm can maximize the profit. Assume that there are no marketing constraints so that all that is produced can be sold. (8 marks)

b) A project has the following activities and duration

ACTIVITY	PRECEDING ACTIVITY	DURATION DAYS
A	-	4
B	-	8

C	A	5
D	A	9
E	B,C	5

Required:

- i. Draw the network diagram (6 marks)
- ii. Determine the critical path and duration (2 marks)

- c) Write short notes on the following terms as used in business calculations
 - i. Unboundedness (3 marks)
 - ii. Redundancy (3 marks)
 - iii. Infeasibility (3 marks)
- d) Explain the assumptions of linear programming (5 marks)

QUESTION TWO (20 MARKS)

- (a) Distinguish between assignment and transportation problems. (4 marks)
- (b) Excel Industries has four subsidiary companies whose accounts are to be audited. The company has short-listed five audit firms that can be assigned any of the audit tasks.

The table below shows the fees charged by the audit firms to audit the accounts of the respective subsidiary companies.

Audit firm	Subsidiary companies			
	Mayfair (Sh.million)	Agrotech (Sh. million)	Metro (Sh. million)	Davtech (Sh. million)
AB	5	10	16	10
CD	18	14	12	16
EF	10	13	14	12
GH	13	6	10	16
JK	14	11	8	13

Required:

- (i) The assignment Excel Industries would make to minimize the total cost of auditing the subsidiary companies. (12 marks)
- (ii) The audit firm which will not be assigned any task. (1 mark)
- (iii) The minimum cost of auditing the subsidiary companies. (3 marks)

QUESTION THREE (20 MARKS)

Consider a project which has been modeled as follows:

Activity	Immediate Predecessor (s)	Completion Time (hours)
A	-	7
B	-	10
C	A	4
D	A	30
E	A	7
F	B, C	12
G	B, C	15
H	E, F	11
I	E, F	25
J	E, F	6
K	D, H	21
L	G, J	25

Required:

- (a) Determine the project's expected completion time and its critical path. (12 marks)
- (b) Can activities E and G be performed at the same time without delaying the completion of the project? (2 marks)
- (c) Can one person perform A, G and I without delaying the project? (2 marks)
- (d) By how much time can activities G and L be delayed without delaying the entire project? (2 marks)
- (e) By how much time would the project be delayed if activity G were delayed by 3 hours and activity L by 4 hours? Explain. (2 marks)

QUESTION FOUR (20 MARKS)

- a. Mr. Jadong motor garage is able to install new car silencers at an average rate of one every 20 minutes. Customers requiring this service arrive at the garage on an average of two customers per hour. The owner of the garage did a study on the queuing model relating to the garage services realized that they were single channel, single phase system

Required: determine

- i. The average number of customers in the system (4 marks)

- ii. The average time spent by a customer in the system (4 marks)
- iii. The average number of customer in the queue (4 marks)
- iv. The utilization factor of the service facility (3 marks)
- b. Explain the limitations of game theory (5 marks)

QUESTION FIVE (20 MARKS)

In the context of game theory, explain the following statement: “winning isn’t everything; it is the only thing” (3 marks)

- (b) The optimal solution of a two-person zero-sum game always represents a saddle point regardless of whether the players use pure or mixed strategies. Explain. (5 marks)
- (c) Joseph Njau and Anne Wairimu can use one strategy some of the time and the other strategy the rest of the time. Consider the following case of player one (Joseph Njau) and the opponent (Anne Wairimu). Joseph Njau has two strategies A and B whereas the opponent, Anne Wairimu has strategies X and Y. Utilities have been assigned as indicated below:

		Anne	Wairimu
		X	Y
	A	1	- 2
Joseph Njau			
	B	- 1.5	2

Required:

Determine the percentage time Joseph Njau should play strategy A and strategy B. Also determine the percentage time that Anne Wairimu should play strategy X and strategy Y.

(12 marks)