

**PAN AFRICA CHRISTIAN UNIVERSITY
BACHELORS OF INFORMATION COMMUNICATION TECHNOLOGY
END OF TERM EXAMINATION**

DEPARTMENT: COMPUTING & INFORMATION TECHNOLOGY
COURSE CODE: DICT0124
COURSE TITLE: OPERATION RESEARCH
CAMPUS: ROYSAMBU
EXAM DATE: FRIDAYXXXXX/APRIL
TIME: START HOUR – 2.00PM-4.00PM

INSTRUCTIONS

- This exam carry a total of SIX Questions of [10 Marks Each]
- Section One (I) is compulsory.
- Answer any 3(Three) Questions from Section Two (II)
- Read all questions carefully before attempting.

SECTION A
(Answer ALL questions in this section)

QUESTION ONE (10 Marks)

- a) Discuss two applications of operations research. (2 marks)
- b) Distinguish between PERT and CPM. (2 Marks)
- c) Describe two characteristics of a queuing system. (2 Marks)
- d) The footings of a building can be completed in four consecutive sections. The activities for each section include (1) digging, (2) placing steel, and (3) pouring concrete. The digging of one section cannot start until that of the preceding section has been completed. The same restriction applies to pouring concrete. Develop the project network.
(2 Marks)

SECTION B
((Answer any THREE (3) questions in this section)

QUESTION TWO (10 Marks)

- a) Explain the circumstances where CPM is a better technique of project management than PERT.
(2 Marks)
- b) Using an appropriate example, explain degeneracy in transportation problem.
(4 Marks)
- c) Two players A and B match coins. If the coins match, then A wins one unit of value; if the coins don't match, then B wins one unit of value. Determine the optimum strategies for the players and the value of game.
(4 marks)

QUESTION THREE (10 marks)

- a) PAC Sacco plans to open a single-server drive- in banking hall at a part at their main branch. It is estimated that 28 customers will arrive each hour on average. On

average, 2 minutes are required to process a customer's transaction. Assuming Poisson arrivals and exponential service, determine,

- i) The probability that a customer arriving at the facility will have to wait. (2 Marks)
- ii) The proportion of time the server will be idle, (2 Marks)
- iii) On average, how long a customer will have to wait for service, (3 Marks)
- iv) The average time a customer spends in the system. (3 Marks)

QUESTION FOUR (10 marks)

a) Define the following terms.

- i. Inventory control (1 mark)
- ii. Economic order quantity (1 mark)
- iii. Order cycle (1 mark)

b) Find the initial feasible solution to the transportation problem below using Vogels approximation method. (7 marks)

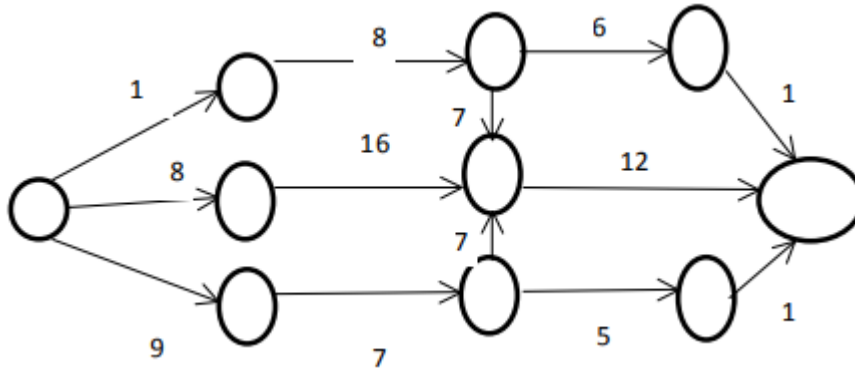
Destination source	1	2	3	4	Supply
A	2	5	3	4	100
B	4	2	2	4	60
C	5	1	1	3	120
Demand	70	50	100	60	

QUESTION FIVE (10 Marks)

- a) Explain any two advantages and two limitations of Simulation. (4 Marks)

b) Discuss how PERT technique help a business manager in decision-making. (3 Marks)

c) Determine the critical path from the following network diagram. (3 marks)



QUESTION SIX (10 Marks)

a) State the duality principle. (2 marks)

b) Distinguish between feasible and optimal solution as used in linear programming. (2 marks)

c) Write the dual of following LPP 1. (6 marks)

$$\text{minimize } z = 20x_1 + 40x_2$$

$$\text{s.t. } 36x_1 + 6x_2 \geq 108,$$

$$3x_1 + 12x_2 \geq 36,$$

$$20x_1 + 10x_2 \geq 100 \text{ and}$$

$$x_1 \geq 0, x_2 \geq 0$$

EOF