



SOUTH EASTERN KENYA UNIVERSITY

UNIVERSITY EXAMINATIONS 2017/2018

SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF COMMERCE/PROCUREMENT AND SUPPLY CHAIN MANAGEMENT

DMS 312: OPERATIONS RESEARCH FOR MANAGEMENT II

DATE: 13TH APRIL, 2018

TIME: 1.30-3.30PM

INSTRUCTIONS

1. The paper contains 5 Questions
2. Question ONE is compulsory
3. Answer Any other TWO questions

Question One

- a) Outline the Objectives of inventory control **(2 Marks)**
- b) Explain the following concept/terms as used in queuing theory
- i. Balking **(2 Marks)**
 - ii. Reneging **(2 Marks)**
 - iii. Jockeying **(2 Marks)**
 - iv. Customer **(2 Marks)**
- c) Explain the following features of the game as used in game theory *Players, Rules, Feasible strategy set, Outcomes or consequences, Payoffs* **(10marks)**
- d) Consider the following all integer linear program.
- $$\begin{array}{ll} \text{Max} & 1x_1+1x_2 \\ \text{s.t} & \\ & 4x_1+6x_2\leq 22 \\ & 1x_1+5x_2\leq 15 \end{array}$$

$$2x_1 + 1x_2 \leq 9$$

$$X_1, X_2 \geq 0 \text{ and integer}$$

- i) Graph the constraints for this problem. Use dots to indicate the feasible integer solutions. **(3 marks)**
- ii) **What is LP relaxation** **(2 marks)**
- iii) Solve the LP relaxation of this problem. **(3 marks)**
- iv) Find the optimal integer solution **(2 marks)**

Question Two

The annual demand per item is 6400 units. The unit cost is £ 12 and the inventory carrying charges 25% per annum. If the cost of procurement is £ 300 determine:

- i) EOQ **(5 Marks)**
- ii) No. of orders per year **(5 Marks)**
- iii) Time between 2 consecutive orders **(5 Marks)**
- iv) Optimal cost **(5 Marks)**

Question Three

At a currency exchange bureau, on average a customer arrives every 5 minutes and takes 4 minutes to be served. Considering the assumptions of a single channel queuing model, determine the following:

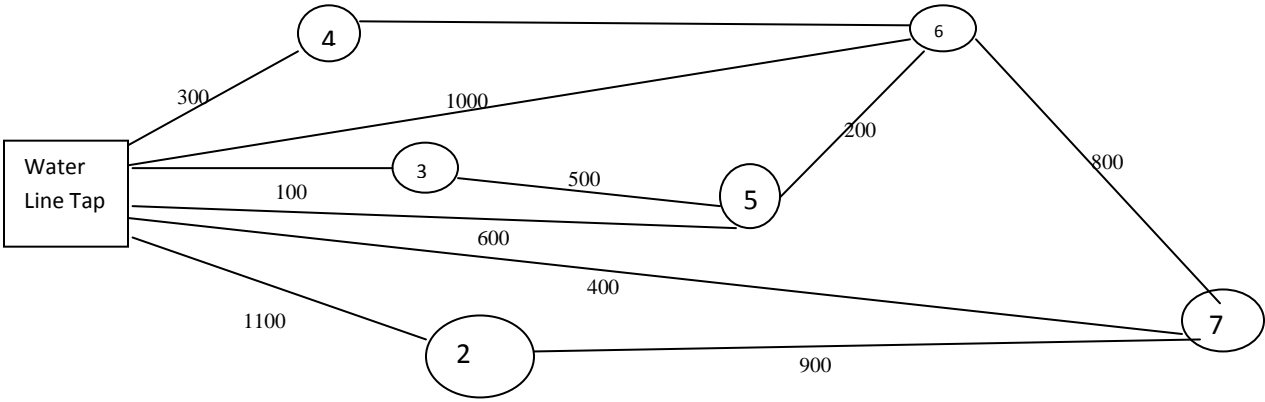
- a) Average no. of arrivals per minute (λ) **(2 Marks)**
- b) Service rate (μ) **(2 Marks)**
- c) The traffic intensity **(2 Marks)**
- d) Fraction of the time the service point/cashier is busy **(2 Marks)**
- e) The probability the cashier is busy **(2 Marks)**
- f) Expected no. of customers in the system **(2 Marks)**
- g) The average length of the queue (no. of customers waiting in the queue) **(2 Marks)**
- h) The mean time a customer spends in the system **(2 Marks)**
- i) The mean time a customer spends in the queue **(2 Marks)**

Question Four

Jeremy a real estate developer has just planned a small subdivision of rural home, each quite some distance from the other. Jeremy is planning the water system for his development, and at this stage he is not obliged to lay water lines besides the road, in fact, after he eliminates routes which would cross streams and those that would involve considerable tunneling, the routes open to him for his water lines are as shown below.

Calculate the length of water line required by John to connect all homes in his development plan.

(20 marks)



Question Five

The “Three mines co. ltd” owns two different mines that produce an ore, which, after being crushed, is graded into three classes: high, medium and lowgrade. The company has contracted to provide a smelting plant with 12 tons of high-grade, 8 tons of medium-grade and 24 tons of low-grade ore per week. The two mines have different operating characteristics as detailed below.

Mine	Cost per Day	Production Tonnes/Day		
		High	Medium	Low
X	180	6	3	4
Y	160	1	1	6

How many days per week should each mine be operated to fulfil the smelting plant contract. Formulate the above as a Linear Goal Programming Equation to aid solve the issue. Assume Two Mines Company can work no more than five days per week on each mine. **(20 marks)**