

**ABA 315: QUANTITATIVE METHODS IN BUSINESS**

**KENDU CAMPUS**

**Question One (Compulsory) (30 Marks)**

- a. Explain the following terms as used in network analysis
- i. Total float (2 marks)
  - ii. An activity (2 marks)
  - iii. Network (2 marks)
- b. Explain the differences between fixed order quantity systems and periodic review systems (2 marks)
- c. Given the following information, calculate the Economic Order Quantity (3 marks)
- |                          |                     |
|--------------------------|---------------------|
| Total Annual Demand      | = 300 units         |
| Inventory Carrying Costs | = 20%               |
| Ordering Costs           | = Ksh. 20 per order |
| Cost/Price               | = Ksh. 15 per unit  |
- d. i. Distinguish between independent and mutually exclusive probability events (2 marks)
- ii. A bag contains six red and four black balls. Two balls are drawn one at a time without replacement.

Required:

- I. Probability table for the experiment (4 marks)
- II. Compute:
  - $P(B_2/B_1)$  (3 marks)
  - $P(R_2/B_1)$  (3 marks)
  - $P(R_2/R_1)$  (3 marks)

Where  $B_1$  and  $B_2$  are the 1<sup>st</sup> and 2<sup>nd</sup> black balls; and,  $R_1$  and  $R_2$  are the 1<sup>st</sup> and 2<sup>nd</sup> red balls.

- e. Company A is considering making a bid for company B. The anticipated net profits of Company B is given as a function of time in years as

$$y = 20 + 12x - x^2$$

The bid by company A is to be based on the total anticipated profits of company B during the second and sixth year after take over.

Required:

- The value of the bid (4 marks)

**Question Two (20 Marks)**

- a. State seven benefits of inventory control systems to an organization (7 marks)
- b. A firm can backorder, if out of stock, the demand of its customers. If the following facts are available from the firm;

Annual Demand	100 units
Ordering Cost	Ksh. 10 per order
Price	Ksh. 20 per unit
Carrying Costs	20%
Cost of backordering	Ksh. 5 per year

Required:

- i. Optimal Order Size (2 marks)
- ii. Amount backordered for each cycle (2 marks)

- c. Using relevant illustrations, discuss briefly ABC analysis as a technique of inventory classification (9 marks)

**Question Three (20 Marks)**

- a. Explain the main steps that a decision maker must carry out before deciding on an activity (10 marks)
- b. Discuss briefly the Laplace Criterion of decision making under uncertainty and highlight its steps (5 marks)
- c. A businesswoman wants to stock either commodity X or commodity Y. She can stock either but not both. If she stocks X and if it is a success, she can make Ksh. 2000 but if it is a failure, she will lose Ksh. 5000. If she stocks Y and if it is a success, she can make Ksh. 4000 but if it is a failure, she would lose Ksh. 3000. Given the probabilities as shown in the table, use a decision tree diagram to advise the businesswoman on the commodity to stock (5 marks)

Probability of	Commodity X	Commodity Y
Success	0.80	0.60
Failure	0.20	0.40

**Question Four (20 Marks)**

A project is composed of seven activities whose time estimates as given in the table below:

Activity		Name of the Activity	Time Required (Days)		
Event	Event		Optimistic	Most Likely	Pessimistic
1	2	A	6	6	24
1	3	B	6	12	18
1	4	C	12	12	30
2	5	D	6	6	6
3	5	E	12	30	48
4	6	F	12	30	42
5	6	G	18	30	54

Required:

- i. Expected duration and variance of each activity (14 marks)
- ii. Expected project length (3 marks)
- iii. Variance and standard deviation of the project length (3 marks)

**Question Five (20 Marks)**

- a. Weekly consumption of electric power in Kw hours for street lighting in a county for the first four months of the year 2015 were as given below( assuming 1month = 4 weeks)

Month	Week 1	Week 2	Week 3	Week 4
Jan	342	318	392	420
Feb	309	281	349	378
Mar	299	278	342	370
Apr	268	250	311	334

Using simple average method, calculate the seasonal variation in the consumption of electric power (4 marks)

- b. Apart from simple average method, state three other methods that can be used to measure seasonal variations in time series analysis (3 marks)
- c. Two factories manufacture the same machine part. Each part is classified as having either 0, 1, 2 or 3 manufacturing defects. The joint probability distribution is given as below:

Number of defects	0	1	2	3
Manufacturer A	0.1250	0.0625	0.1875	0.1250
Manufacturer B	0.0625	0.0625	0.1250	0.2500

- i. A part is observed to have no defects. Find the conditional probability that it was produced by manufacturer A. (2 marks)
- ii. A part is known to have been produced by manufacturer A. Find the conditional probability that the part has no defects. (2 marks)
- iii. A part is known to have two or more defects. Find the conditional probability that it was manufactured by A. (2 marks)
- iv. A part is known to have one or more defects. Find the conditional probability that it was manufactured by B (2 marks)