



**TECHNICAL UNIVERSITY OF MOMBASA**  
***Faculty of Business & Social Studies***

DEPARTMENT OF BUSINESS STUDIES

UNIVERSITY EXAMINATIONS FOR  
MASTERS IN BUSINESS ADMINISTRATION

**BMS 5201: INTRODUCTION TO MANAGEMENT SCIENCE**

END OF SEMESTER EXAMINATIONS

**SERIES:** APRIL 2015

**TIME:** 3 HOURS

**INSTRUCTIONS:**

- Attempt question **ONE (Compulsory)** and any other **THREE** questions
- Do not write on the question paper.

*This paper consists of Four printed pages*

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**QUESTION 1 (Compulsory)**

- a) “Operation Research is an aid for the executive in making his decisions based on scientific methods analysis”. Discuss the above statement in brief. **(8 marks)**
- b) Narrate the benefits of an effective inventory control system to business and industrial units. **(6 marks)**
- c) Explain **TWO** significance of PERT to a manager. Also point out **TWO** limitations of this technique. **(4 marks)**
- d) Describe the duality concept in linear programming and give its economic importance. **(7 marks)**

## QUESTION 2

- a) Explain how the profit maximization transportation problem can be converted to an equivalent cost minimization transportation problem. **(12 marks)**
- b) Explain how to transform an unbalanced transportation problem into a balanced transportation where the demand of warehouse is satisfied by the supply of factories. **(3 marks)**
- c) Consider the following jobs (four) to be assigned to five machines

|   | Machine |    |    |    |    |
|---|---------|----|----|----|----|
|   | 1       | 2  | 3  | 4  | 5  |
| 1 | 10      | 11 | 4  | 2  | 8  |
| 2 | 7       | 11 | 10 | 14 | 12 |
| 3 | 5       | 6  | 9  | 12 | 14 |
| 4 | 13      | 15 | 11 | 10 | 7  |

Find an optimal assignment of jobs to machines which will minimize the total set up time.

**(10 marks)**

## QUESTION 3

- a) Write short notes on the following:
- The value of a game
  - Zero-sum and non-zero sum game
  - Concept of dominance
- b) An admission tutor has analysis the following states
- State 1 : has not applied to TUM
  - State 2: has applied to TUM
  - State 3: has applied to TUM and has been interviewed
  - State 4: has applied to TUM and has been rejected
  - State 5: has applied to TUM and has been made an offer

**(5 marks)**

The states are presented by the following matrices

$$\begin{matrix} & 1 & 2 & 3 & 4 & 5 \\ \begin{matrix} 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{matrix} & \begin{bmatrix} 0.95 & 0.05 & 0 & 0 & 0 \\ 0 & 0.20 & 0.7 & 0 & 0.1 \\ 0 & 0 & 0.3 & 0 & 0.1 \\ 0 & 0 & 0 & 1 & 0 \end{bmatrix} \end{matrix}$$

**Required:**

- i) What % of potential students will have been offered places after 3 months have elapsed.
- ii) Is it possible to work out a long-run system state or not.

**(20 marks)**

**QUESTION 4**

- a) Define queuing theory and explain at least **FIVE** application. **(9 marks)**
- b) Discuss human behaviour associated with queuing theory. **(8 marks)**
- c) Indicate any **SIX** shortcomings of taking a simulation approach to solve an OR problem. **(8 marks)**

**(8 marks)**

**QUESTION 5**

- a) How would you deal with the assignment problem, where:
  - i) The objective function is to be maximized. **(10 marks)**
  - ii) Some assignments are prohibited.
- b) Describe the steps needed to solve a problem by simplex method. **(15 marks)**

**(15 marks)**

**QUESTION 6**

- a) State the Bayes theorem. **(2 marks)**
- b) ABC Ltd produces RL brand of cars. It is contemplating launching a new model , the GG. There are several possibilities that could be opted for.
  - Continue producing RL which has profits declining at 10% p.a on a compounding basis. Last year, its profit was Ksh. 60,000.
  - Launch GG without any prior market research. If sales are high annual profit is put at sh. 90,000 with a probability which from past data is put at 0.7. low sales have 0.3 probability and estimated profit of shs. 30,000.
  - Launch GG with prior market research costing shs. 30,000 the market research will indicate whether future sales are likely to be ‘good’ or ‘bad’. If the research indicates ‘good’ then the management will spend shs. 35,000 more on capital equipment and this will increase annual profits to shs. 100,000 if sales are actually high. If however sales are actually low, annual profits

will drop to shs. 25,000. Should market research indicate ‘good’ and management not spend more on promotion the profit levels will be as for 2 scenario above.

- If the research indicate ‘bad’ then the management will scale down their expectations to give annual profit of shs. 50,000 when sales are actually low, but because of capacity constraints if sales are high profit will be shs. 70,000.

Past history of the market research company indicated the following results.

|             |      | Actual sales |     |
|-------------|------|--------------|-----|
|             |      | High         | Low |
| Predicted   | Good | 0.8          | 0.1 |
| Sales level | Bad  | 0.2          | 0.9 |

**Required:**

Use time horizon of 6 years to indicate to the management of the company which option theory should adopt.

Hint: Draw the decision tree diagram and apply Bayes theory.

- c) State **THREE** advantages and **THREE** disadvantages of using decision trees. **(6 marks)**