



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

((A Constituent College of JKUAT)

(A Centre of Excellence)

**Faculty of Engineering &
Technology in Conjunction with
Kenya Institute of Highways and
Building & Technology (KIHBT)**

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

HIGHER DIPLOMA IN BUILDING ECONOMICS

EBE 3207: MECHANICAL PLANT TO EQUIPMENT II

END OF SEMESTER EXAMINATION

SERIES: AUGUST 2012

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*
- *Drawing Instruments*

This paper consists of **FIVE** questions

Answer any **THREE** questions

Maximum marks for each part of a question are as shown

This paper consists of **TWO** printed pages

Question One (20 Marks)

With the aid of sketches describe the operation of two stroke engine. **(20 marks)**

Question Two (20 marks)

- a) Using sketches, describe the following types of cranes:-
- i) Guy derrick **(10 marks)**
 - ii) Climbing tower cranes **(10 marks)**

Question Three (20 marks)

- a) With the aid of a sketch, describe the **TWO** types of jibs. **(5 marks)**
- b) Using a sketch, briefly describe the operation of a mobile hoist. **(6 marks)**
- c) Explain the following engineering fundamentals of moving earth.
- i) Rolling resistance
 - ii) Grade resistance/assistance
 - iii) Traction **(9 marks)**

Question Four (20 marks)

- a) The following data was obtained from a manufacturer's specification for a scraper.
- Scraper capacity 8 tonnes
 - Haul speed (full) = 12km/hr
 - Haul speed (empty) = 17km/hr
 - Loading time = 4 minutes
 - Dumping time = 1.2 minutes
 - Accelerating/Decelerating = 0.9

If the length of haul road is 5km and the efficiency of the scraper is 93%,

- (i) Calculate the productivity for a 8 hour day of the scraper
 - (ii) The number of scraper required for the project. **(10 marks)**
- b) With the aid of a sketch, describe the operation of force shovel. **(10 marks)**

Question Five (20 marks)

- a) State **EIGHT** factors considered when selecting excavating plant. **(8 marks)**
- b) Soil is to be excavated from a trench 800m x 2m deep x 1m wide using an excavator with a bucket of 0.5m³ soil swell factor 1.5.
Cave in factor is 10 %
Bucket efficiency is 1.25
Machine works for 52 minutes in each hour. Excavator cycle time is 25 seconds. Calculate:-
- i) Volume of loose soil/material to be transported off-set
 - ii) Time to excavate trench

iii) Frequency at which trucks of 8m^3 capacity be available.

(12 marks)