



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

Faculty of Engineering & Technology

DEPARTMENT OF MECHANICAL & AUTOMOTIVE ENGINEERING

DIPLOMA IN MECHANICAL ENGINEERING (PLANT OPTION)

[Institutional Based Programmes]

EPL 2306: PLANT THEORY

END OF SEMESTER EXAMINATION

SERIES: AUGUST 2012

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

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)

- a) State and explain the **EIGHT** rules of lubrication in the industry.
- b) State any **FOUR** functions of lubricants. (20 marks)

Question Two (20 marks)

- a) State **SIX** conditions that a machine foundation should meet for satisfactory performance both for static and dynamic loads.
- b) State and label **THREE** different types of machine foundations. (20 marks)

Question Three (20 marks)

- a) A Generator is mounted on a foundation and when operating its found to perform simple harmonic motion described by the following equation.

$$X = A \sin(\omega t + \phi)$$

Where:

A is the amplitude

ω

is the natural frequency

ϕ

is the phase angle.

$$\omega = 50 \text{ rads/sec and } \phi = \pi/8 \text{ radian}$$

Given A = 20mm,

Calculate:

- a) The frequency
- b) The periodic time

$$t = T/4$$

- c) The displacement, velocity and acceleration when $t = T/4$. (20 marks)

Question Four (20 marks)

- a) State the **SEVEN** benefits of accurate machine alignment.
- b) As a technician in the industry, state **THREE** things that you need to know to correctly align rotating machinery. (20 marks)

Question Five (20 marks)

- a) A spring of stiffness 2KN/m is suspended vertically and two equal masses of 4kg of these masses is suddenly removed and the system oscillates. Calculate:-
 - i) The amplitude and frequency of vibration.
 - ii) The velocity and acceleration of the mass when passing through the half amplitude position.
 - iii) The energy of vibration. (20 mark)

