# KENYATTA UNIVERSITY

## UNIVERSITY EXAMINATIONS 2010/2011

**FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER ENGINEERING**

**SCE 215: MECHANICAL ENGINEERING PRINCIPLES**

**DATE**: Thursday 25th November, 2010 **TIME:** 11.00 a.m. – 1.00 p.m.

**INSTRUCTIONS**

- You should have the following for this examination:
  Answer sheet
  Drawing instruments
  Calculator
- This paper contains **FIVE (5)** questions.
- All questions carry equal marks.
- Attempt question any **THREE (3)** questions.

1. (a) (i) Define Stress as used in strength of materials giving mathematical expression and the units.

(5 marks)

(ii) By the use of simple diagrams describe the **TWO** most important types of tensile stresses

(4 marks)

(b) Considering a body subjected to a tensile stress. From the mathematical expressions of both stress and strain, derive an expression for the deformation of the body.

(3 marks)

(c) A steel plate of 20 mm thickness tapers uniformly from 100 mm to 50 mm in a length of 400 mm. What is the elongation of the plate, if a axial force of 80 kN acts on it? Take E = 200 Gpa.

(8 marks)

2. (a) Name 5 types of beam. (2.5 marks)

(b) Briefly define the following:
(i) Shear force
(ii) Bending moment
(4 marks)

(c) State 5 assumptions made in the theory of Simple bending.
(5 marks)

(d) A simply supported beam 6 m long is carrying a uniformly distributed load of 5 kN/m over a length of 3 m from the right end.

(i) Draw the Shear Force and Bending Moment diagrams for the beam
(6 marks)

(ii) Calculate the maximum Bending Moment on the section.
(2.5 marks)

3. (a) State 5 advantages of a gear drive. (5 marks)

(b) With the help of a diagram explain the following terminologies as used in gears:
(i) Pitch Circle
(ii) Addendum circle
(iii) Face width of the tooth
(iv) Dedendum circle
(5 marks)

(c) With the aid of diagrams describe the following types of gears:
(i) External gears
(ii) Internal gears
(iii) Rack and Pinion
(7.5 marks)

(d) In a spur gear arrangement, the driver has 100 teeth of 40 mm pitch. Find the power , if it can transmit a tangential force of 100 N on the follower. Take speed of driver as 225 r.p.m
(2.5 marks)

4. (a) By the use of diagrams describe the following types of pumps:
(i) Air lift pump
(ii) External Gear Pump
(8 marks)

(b) Describe Spring element pressure gauge.
(4 marks)

(c) Name the 3 basic designs of power – transmission chains which are in common use today. (3 marks)

(d) Compare Chain to belt drives. (5 marks)

5. (a) Explain the importance of Alignment of drives. (10 marks)

(b) With the aid of diagrams describe the principle of operation of the reciprocating compressor. (10 marks)