



MACHAKOS UNIVERSITY

University Examinations for 2020/2021

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

..... EXAMINATION FOR

DIPLOMA IN BUILDING TECHNOLOGY AND CIVIL ENGINEERING

STRUCTURES 1

DATE:

TIME:

INSTRUCTIONS

ANSWER ALL QUESTIONS

1. Define the following terms
 - i) Tensile stress
 - ii) Compressive stress
 - iii) Shear stress
 - iv) Modulus of elasticity
 - v) Modulus of rigidity
 - vi) Poisson ratio(20marks)
 - vii) Hooke's law
 - viii) Composite bar
 - ix) Factor of safety
 - x) Modulus of toughness
2. a) **The figure 1** shows a composite bar. If a tensile force p is applied at the two ends, derive,
 - i) Compatibility equation
 - ii) Equilibrium equation(10 marks)

- b) With the aid of diagram, describe the four types of supports to a beam. (10 marks)
3. a) Illustrate the stress – strain curve for mild steel showing the showing points.
- i) Proportionality limit
 - ii) Elastic limit
 - iii) Upper yield point
 - iv) Lower yield point
 - v) Ultimate stress
 - vi) Breaking point or rapture (15marks)
- b) Explain the following
- i) Strain energy
 - ii) Resilience (5 marks)
4. a) A cantilever beam of length 2m carries the point loads as showing the **Figure**.
2. Draw the shear and bending moment for the beam. (10 marks)
- b) A cantilever 1.5M long is loaded with a uniformly distributed load of 2KN/M run over a length of 1.25m from the free end. It also carries a point load of 3KN at a distance of 0.25M from the free end. Draw the Shear force and bending moment diagram of cantilever. (10 marks)
5. a) A simply supported beam of length 6M carries point load of 3KN and 6KN at a distance of 2M and 4M from the left end. Draw the shear force and bending moment diagram of the beam (10 marks)
- b) Draw the shear force and bending moment diagram for a simply supported beam of length 9M and carrying a uniformly distributed load of 10KN/M for a distance of 4m as show in the **figure 3** (10 marks)