MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)
University Examinations for 2015/2016 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF PHYSICAL SCIENCES

FIRST SEMESTER EXAMINATION FOR
CERTIFICATE IN ELECTRICAL ENGINEERING
CERTIFICATE IN BUILDING AND CIVIL ENGINEERING

EPC 101: PHYSICS

DATE: 3/8/2016   **TIME: 8:30 – 10:30 AM**

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INSTRUCTIONS: Answer question and any other two questions.

Use: g = 9.81 ms^{-2}

   Density of air = 1.26 kgm^{-3}

SECTION A

QUESTION ONE (30MARKS) (COMPULSORY)

a)   A 10 N weight is placed on 12 cm mark of a uniform meter rule. It balances an object X
        placed 90 cm mark. Calculate the weight of the object.   (5 marks)

 b)   i)   Define force   (3 marks)

        ii)   Force of 100 N is applied to an area of 2mm by 4mm. Calculate the greatest
                pressure exerted on the area in Nm^{-2}.   (5 marks)

c)   A body travelling at 40 kmh^{-1} accelerates uniformly at 1 m^{-2}; calculate its velocity in ms^{-1}
        after 10 seconds.   (4 marks)

d)   i)   Define work   (2 marks)

ii) By pulling a block of mass 30 kg through a distance of 30 m, a boy found out that he took 10 minute. Calculate the power he develops. (5 marks)

e) i) Define friction (2 marks)

ii) Draw a diagram to show the types of forces a body experiences when is placed on horizontal bench. (4 marks)

SECTION B

QUESTION TWO (20MARKS)

a) Distinguish between speed and velocity. (4 marks)

b) A car runs at a constant speed of 20 ms-1 for 100 s then accelerates uniformly to a speed of 25 ms^{-1} for 15 s. This speed is maintained for 200 s before it decelerates uniformly to rest in 30 s.

i) Draw a velocity- time graph for the journey. (5 marks)

ii) Calculate its average velocity (3 marks)

c) Give two examples each of a vector and scalar quantities. (4 marks)

d) A body moving at 20ms^{-1} accelerates at 2.5ms^{-2} for 30 seconds. Calculate the distance covered by the body. (4 marks)

QUESTION THREE (20 MARKS)

a) State the Principle of moments. (3 marks)

b) A 10 N weight placed on 20 cm mark of uniform meter-rule balances an object hanging from 70 cm mark. Calculate the weight of the object. (5 marks)
(Take moments about 50 cm mark)

c) What is meant by density of a substance (3 marks)

d) Calculate the mass of air in a room of floor dimension 10 mx10 m and height 4 m

(4 marks)

(Density of air = 1.26 kgm^{-3})

e) A uniform bar of 5 m long and mass 12 kg rests on two sharp edges placed at 50 cm and 150 cm respectively from the ends. Calculate the reaction forces at the edges. (5 marks)

QUESTION FOUR (20MARKS)

a)   Distinguish between work and energy   (4 marks)

b)   An engine raises a load of 200 kg from a mine which is 90 m deep. If the load is raised in 3 minutes, calculate the power of the engine.   (3 marks)

c)   Distinguish between static and dynamic friction   (3 marks)

d)   Name two devices for whose working friction is essential.   (4 marks)

e)   Sketch a diagram to show the friction force of a body placed on an inclined plane.

                                                                                                        (3 marks)

f)   Use a diagram to show the energy changes for a body falling freely.   (3 marks)

QUESTION FIVE (20 MARKS)

a)   State the law of conservation of energy   (3 marks)

b)   A body of mass is 2 kg is raised to a height of 10 m. It is then dropped to the ground. Calculate its velocity just before it strikes the ground.   (3 marks)

c)   A body of mass 60 kg is pulled up an inclined plane of length 5 m with a force of 100 N to a height of 10 m. Calculate:

    i)   Useful work done in raising the body.   (3 marks)

    ii)   Useful average power he develops   (4 marks)

d)   Distinguish between mass and weight   (4 marks)

e)   An object of mass 2 kg is moving with a velocity of 5 ms^{-1}. Calculate its kinetic energy.

                                                                                                        (3 marks)