**KCB S.5 PHYSICS P510/1 TEST TIME: 1 HOUR 22/OCT/2014**

(i) In numerical work, use g = 9.81 ms-2. (ii) Attempt **all** the questions.

1. (a) (i) Define **moment of a force** and state the **principle of moments**. (2)

(ii) A wheel of radius 0.84 m is pivoted at its centre. A tangential force of 80 N acts on the wheel so that the wheel rotates with uniform velocity. Find the work done by the force to turn the wheel through 18 revolutions. (4)

(b) The engine of a 5 tonne lorry can develop 30 kW and its maximum speed on level road is 90 kmh-1. Assuming that the frictional resistance is constant, calculate the greatest speed at which the lorry can climb a hill of 1 in 25. (4)

(c) Define the terms **angular velocity** and **centripetal acceleration**. (2)

(d) The period of oscillation of a conical pendulum is 2.0 seconds. If the string makes an angle of 600 to the vertical at the point of suspension, calculate the:

(i) vertical height of the point of suspension above the circle. (3)

(ii) velocity of the mass attached to the string. (1)

(e) Using the molecular theory, describe the **laws of friction**. (3)

2. (a) Describe briefly how heat transfer by **conduction** takes place. (3)

(b) (i) State **Stefan’s law**. (1)

(ii) The element of a 1.0 kW electric heater is 30.0 cm long and 1.0 cm in diameter. If the temperature of the surroundings is 200C, estimate the working temperature of the element. (3)

(Stefan’s constant, )

(c) (i) State **Dalton’s law of partial pressures** and **Avogadro’s hypothesis**. (2)

(ii) Two containers A and B of volumes 3 x 103 cm3 and 6 x 103 cm3

respectively contain helium gas at a pressure of 1.0x103 Pa and temperature 300K. Container A is heated to 373 K while container B is cooled to 273 K. Find the final pressure of the Helium gas. (5)

(d) (i) State **Charles’s law** . (1)

(ii) With aid of a labeled diagram, describe an experiment to verify Charles’s law. (5)