Quarterly Examination 2017-2018

Std. : X **Full Marks : 80**

Subject : PHYSICS **Time : 2hrs.**

Section A (40 Marks)

(Attempt all question)

Q1. a) Name the physical quantities for the following units —

(i) eV (ii) gf.cm (iii) GW (iv) J/s [2]

b) State the condition when on applying a force, the body has —

(i) the translational motion (ii) the rotational motion [2]

c) Derive the relationship between kilowatt hour and joule. [2]

d) How much work is needed to be done on a ball of mass 50g to give to a momentum of 5kg m/s ? [2]

e) A body falls freely under gravity from rest. Name the kind of energy it will posses —

(i) at the point from where it falls. (ii) while falling.

(iii) on reaching the ground.

Q2. a) State the kind of lever which always has the mechanical advantage greater than 1. Give reason for your answer. [2]

b) A crow bar 2m long is pivoted about a point 10 cm from its tip. Calculate the mechanical advantage of the crowbar. [2]

c) A bulb of power 40 w is used for 12.5 h each day for 30 days. Calculate the electrical energy consumed. [2]

d) Name any two factors on which the heat produced in a wire depends when current is passed in it, and state how does it depend on the factors. Stated by you. [2]

e) A single movable pulley system is considered to be superior to single fixed pulley system. Why? [2]

Q3. a) Name any two electromagnetic waves which have a frequency. lower than that of infra-red light. State one use of each. [2]

b) State the energy changes taking place —

(i) When a flash light is switched on (ii) in an electromagnet

c) The wavelengths for the light of red and blue colours are roughly 7.8×10^{-7}m and 4.8×10^{-7}m respectively. [2]

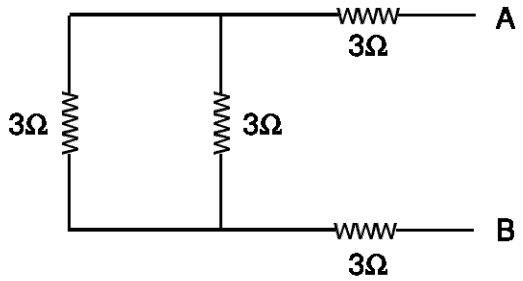
(i) which colour has the greater speed in vacuum.

(ii) which colour has the greater speed in glass & why ?

d) Name any two factors which affect the specific resistance and state how does it affect. [2]

e) Name the materials used for — (1) making a fuse (2) wire (ii) heating element of a room heater. Give one reason for each.

Q4. a) Find the equivalent resistance for the given circuit — [2]



b) An electromagnetic wave has a frequency of 500MHz. and a wavelength of 60 cm. [2]

(i) Calculate the speed of the wave.

(ii) Name the medium through which it is travelling

c) Can a concave lens form an image of size two times that of the object ? Give reason. [2]

d) Derive the relationship between mechanical advantage velocity ratio and efficiency. [2]

e) A beam of light incident on a convex lens parallel to its principal axis converges at a point F on the principal axis. Name the point F. Draw a ray diagram to show it. [2]

Section B (40 Marks)
(Answer any four)

Q5. a) A uniform meter rule of mass 100g is balanced at mark 40cm by suspending an unknown mass m at the mark 20 cm. [3]

(i) Find the value of m.

(ii) To which side the rule will tilt if the mass m is moved to the mark 10 cm ?

(iii) what is the resultant moment now ?

b) A uniform circular motion is an accelerated motion. Explain it state whether the acceleration is uniform or variable ? Name the force responsible to cause this acceleration. What is the direction of force at any instant ? [3]

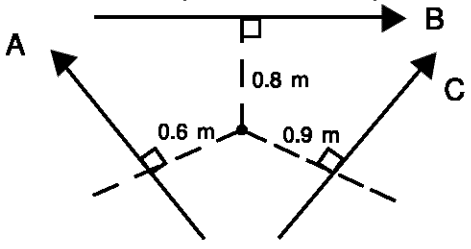
c) I) What is the position of centre of gravity of a [2]

i) triangular lumina (ii) cylinder

II) A, B and C are the three forces each of magnitude 4N acting in the plane of paper.[2]

i) Which force has the least moment about O ?

ii) What is the resultant torque about the point O ?



Q6. **a)** A boy of mass 80 kg runs. upstairs measuring 20 cm each. If the number of stairs are 50 and he reaches the top floor in 40s. Calculate (i) Force of gravity acting on the boy (ii) work done by him against the gravity (iii) Power developed by the boy. [3]

b) (i) State the work - energy theorem. [1]

(ii) State the energy changes in the following cases. While in use — [2]

(i) washing machine (ii) bio-gas burner

c) (i) When a body moves in a circular path, how much work is done by the body ? Give reason. [2]

(ii) Calculate the power of an engine required to lift 10^5 kg of coal per 30 min from a mine 360m deep. ($g = 10 m/s^2$) [2]

Q7. **a)** A block and tackle system has the velocity ratio 3. Draws a labelled diagram of the system indicating the points of application and the directions of load and effort. A man can exert a force of 200 kgf. (i) what is the maximum load he can raise with this pulley system if its efficiency is 60% ? (ii) If the effort end moves a distance 60 cm, what distance does the load move ? [3]

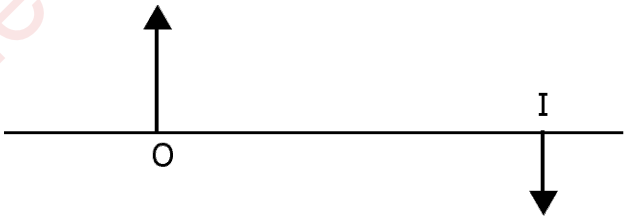
b) i) Name the type of a single pulley that has an ideal mechanical advantage equal to 2. [1+2]

ii) Name the pulley which has no gain in mechanical advantage. Explain why is such a pulley then used ?

c) i) The efficiency of a movable pulley is always less than 100%. Give reason.

ii) A ball of mass 0.20 kg is thrown vertically upwards with initial velocity 30 m/s. Calculate the maximum potential energy it gains as it goes up.

Q8. **a)** Complete the diagram and name the type of lens and write the characteristics of the image formed. [3]



b) (i) State the condition when (i) a lens is called an equi-convex or equi-concave. [2+1]

(ii) a lens has both its focal lengths equal.

(iii) Differentiate convex and concave lens on the basis of their action on the incident light.

c) i) State the position of the object and name the type of lens when image formed is magnified, virtual and upright by a lens. Write one application of this type of formation of image. [2]

ii) A lens forms the image of an object placed at a distance of 45 cm from it on a screen placed at a distance 90 cm on other side of it. Name the kind of lens find the focal length of lens, and (ii) the magnification of image. [2]

Q9. **a)** Write any three properties of infrared radiations similar to the visible light. [3]

b) Arrange the following radiations in the order of their increasing wavelength :— [3]

x-rays, infrared rays, radio waves, gamma rays, and micro waves.

(i) Name the radiation which is used for satellite communication.

(ii) Which has highest penetrating power.

(iii) Write one application of it.

c) i) Which colour of white light is scattend the least and why ? [2]

ii) How does the intensity of scattered light depend on the wavelength of incident light ? State conditions when does this dependence hold. [2]

Q10. **a)** An electric bulb is rated '250W, 230V'

Calculate — (i) the energy consumed in one hour (ii) the time in which the bulb will consume 1.0 kwh energy when connected to 230V.

b) What do you mean by power rating of an electrical appliance ? How do you use it to calculate—

(i) the resistance of the appliance, and (b) the safe limit of current in it, while in use ?

c) i) State two differences between e.m.f. and terminal voltage of a cell. [2]

ii) a wire of resistance 3Ω and length 10 cm is stretched to length 30 cm. Assuming that it has a uniform cross-section, what will be its new resistance ? [3]