UNEB U.C.E PHYSICS (PAPER 1) 2016

SECTION A

Answer all the questions in this section

1.The energy stored in battery in a solar system is

A. solar energy
B. chemical energy
C. electrical energy.
D. nuclear energy

2. Loss of accommodation of one's eye is mostly due to

A. short eye ball
B. long eye ball
C. weak ciliary muscles
D. reduction in liquids in the eye.

3. Materials which stay permanently deformed even when the force is removed are said to be

A. elastic
B. ductile
C. brittle
D. plastic

4. An electric appliance is connected to earth in order to

A. increase the current entering the appliance
B. protect the appliance in case of too much current entering it
C. brittle
D. plastic

5. The temperature of steam above water boiling at normal atmospheric pressure is the

A. upper fixed point
B. lower fixed point
C. fundamental interval
D. absolute temperature

6. When the time-base of an CRO is on and no signal is connected on both the Y and X plates, the screen has a

A. bright spot at the centre
B. bright horizontal line
C. bright vertical line
D. bright sine wave.

7.Which one of the following is correct about pressure?

A. Pressure in fluids does not depend on the density of the fluid.
B. Pressure increase with the depth in a fluid.
C. Pressure in fluids depends on the area of cross section of the fluid
D. Pressure in fluids is independent of the acceleration due to gravity at a given place.

8. Soft iron is preferred to steel in making electromagnets because soft iron

A. is a good conductor of electricity compared to steel
B. allows current to pass through it easily compared to steel.

C. gains magnetism very fast and loses it very fast when current is switched on and off repeatedly, but steel does not lose magnetism.
D. gains magnetism very fast and loses it slowly when current is switched on and off repeatedly, but steel loses magnetism very fast.

9. A white dress viewed through a green glass will look green because the

A. glass absorbs all colors except green
B. green color is absorbed by the glass
C. green color is reflected onto the glass
D. glass adds green light to the light coming from the dress

10. What is observed in a smoke cell when it is placed on ice during Brownian motion experiment? The particles

A. move faster
B. slow down
C. stop moving
D. continue moving with the same speed

11. Which one of the following statements explains why beta particles are deflected more in an electric field than alpha particles? Beta particles

A. have a higher penetrating power than alpha particles
B. move at a lower speed than alpha particles
C. have less charge than alpha particles
D. have less mass than alpha particles.

12. The voltage output of a generator can be increased by

i. increasing the number of turns
ii. using a strong magnet
iii. using a.c instead of d.c

A. i) and ii) only
B. ii) and iii) only
C. i) and iii) only
D. i), ii) and iii)

13. Which one of the following radiations are arranged in order of increasing wavelength?

A. radio waves, infrared, X-rays, gamma rays
B. radio waves, X-rays, gamma rays, infrared
C. gamma rays, infrared, X-rays, radio waves
D. gamma rays, X – rays, infrared, radio waves.

14. Figure 1 shows a charged rod near an isolated metal sphere.

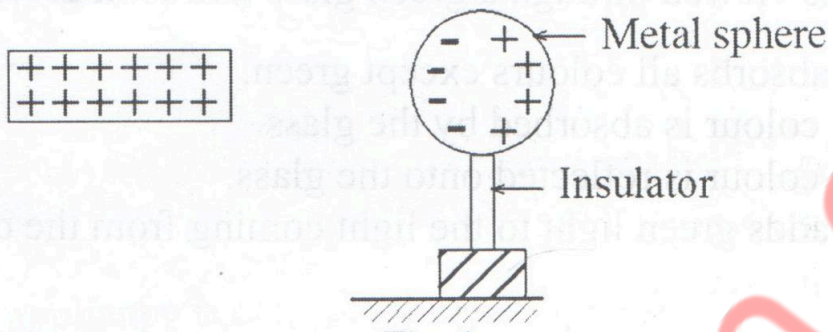

Fig. 1

Which one of the following statements is true about movement of charge when the metal sphere is earthed?

A. The sphere will lose all its charge
B. Negative charge in the metal sphere will be repelled to the earth
C. Electrons from earth neutralize the positive charge on the sphere
D. The positive charge on the sphere is repelled to earth

15.Figure 2 shows a ball falling vertically downwards

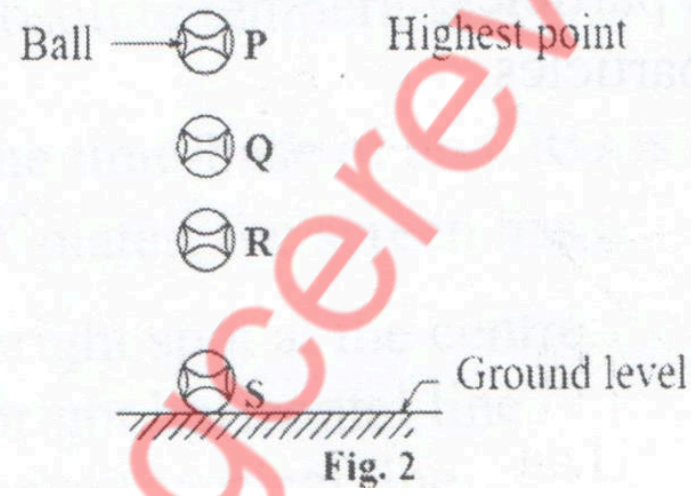

Fig. 2

Which one of the following statements is true about the kinetic energy of the ball?

A. Kinetic energy at Q is equal to kinetic energy at R
B. Kinetic energy at Q is less than kinetic energy at P
C. Kinetic energy at R is a greater than kinetic energy at S
D. Kinetic energy at P is less than kinetic energy at S

16. Figure 3 shows the decay curves of three radioactive substances P, Q and R of half-lives tP, tQ and tR, respectively. Which one of the following is correct about the half-lives of P,Q and R?

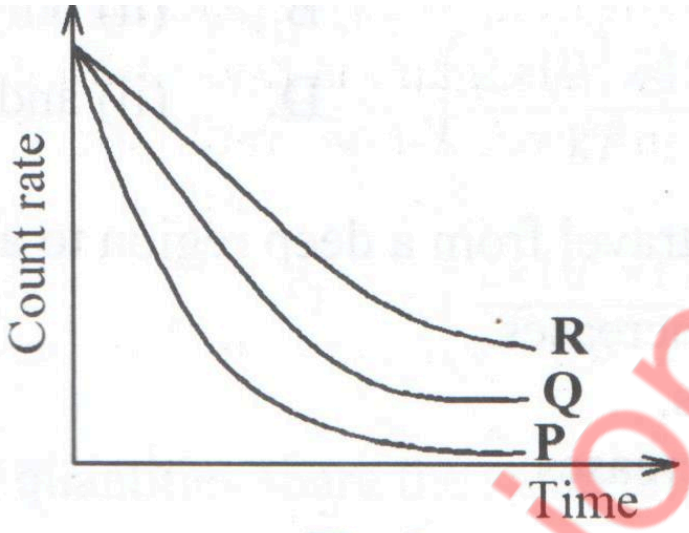

Fig. 3

A. tP < tQ < tR
B. tP < tQ < tR
C. tP > tR < tQ
D. tP > tQ > tR

17.In a transformer, the core is laminated and made out of soft iron to

i) concentrate the magnetic flux
ii) reduce on the induced current
iii) make a better design.

A. i) and ii) only
B. i) and iii) only
C. ii) and iii) only
D. i), ii) and iii)

18. Figure 4 shows a test tube containing water and ice at the bottom.

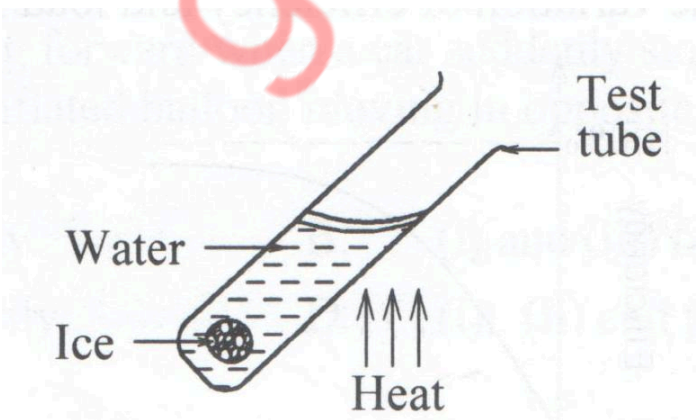

Fig. 4

If the test tube is heated near the mouth, by which process does heat reach the ice?

A. Radiation
B. Convection
C. Conduction
D. Evaporation

19.Which of the following properties of cathode rays shows that they carry charge?

i) They move in a straight line
ii) They are deflected in a magnetic field
iii) They produce heat in X-rays tubes

A. i) only
B. ii) only
C. iii) only
D. ii) and iii) only

20. When water waves travel from a deep region to a shallow region the

i) wavelength increases
ii) speed reduces
iii) frequency increases.

A. ii) only
B. i) and ii) only
C. ii) and iii) only
D. i) ii) and iii)

21. An ammeter of resistance 3.0# can measure a maximum current of 5.0A. Find the resistance of the resistor needed to connect it to an ammeter which can read to 20.0A.

A. 0.75 #
B. 1.0 #
C. 15 #
D. 60 #

22. A body of weight 6N falls vertically to the ground through wind blowing Eastwards with a force of 8N. Find the resultant force on the body.

A. 2.0N
B. 8.0N
C. 10.0N
D. 14.0N

23. Figure 5 shows the variation for efficiency and load for a block and tackle system.

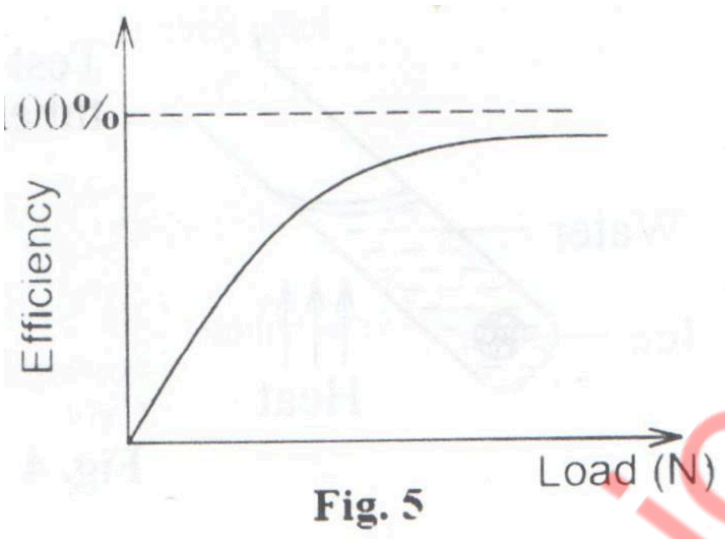

Fig. 5

Which of the following is correct about the graph?

i) Increase in the load increase efficiency

ii) The velocity ratio limits the mechanical advantage and efficiency is less than 100%

iii) At high loads efficiency decreases.

A. i) and ii) only
B. i) and iii) only
C. ii) and iii) only
D. i) , ii) and iii)

24. A pressure of a gas is 2×10^5 Pa at 18^0C. If the temperature increases to 45^0C at constant volume, find the new pressure.

A. $\left(\frac{2 \times 10^5 \times 291}{318}\right)$ Pa

B. $\left(\frac{2 \times 10^5 \times 45}{17}\right)$ Pa

C. $\left(\frac{2 \times 10^5 \times 318}{291}\right)$ Pa

D. $\left(\frac{2 \times 10^5 \times 17}{45}\right)$ Pa

25. Which of the following quantities share the same unit?

i) Resistance

ii) Potential difference

iii) Current

iv) Electromotive force

A. i) and ii) only
B. ii) and iv) only
C. iii) and iv) only
D. ii) and iii) only

26. A sound wave of wavelength 0.7m travels 840m in 2.5s. Find the frequency of the wave.

A. 235.2 Hz
B. 336.0Hz
C. 480.0Hz
D. 588.0Hz

27. Which of the following changes show conservation of linear momentum?

i) A gun recoiling after a bullet is fired

ii) A body jerking forward when a car suddenly stops

iii) Air from an inflated balloon moving in opposite direction to that of the ballon

A. i) and ii) only
B. i) and iii) only
C. ii) and iii) only
D. i), ii) and iii)

28.Figure 6 shows a velocity-time graph for a car of mass 1500kg starting from rest

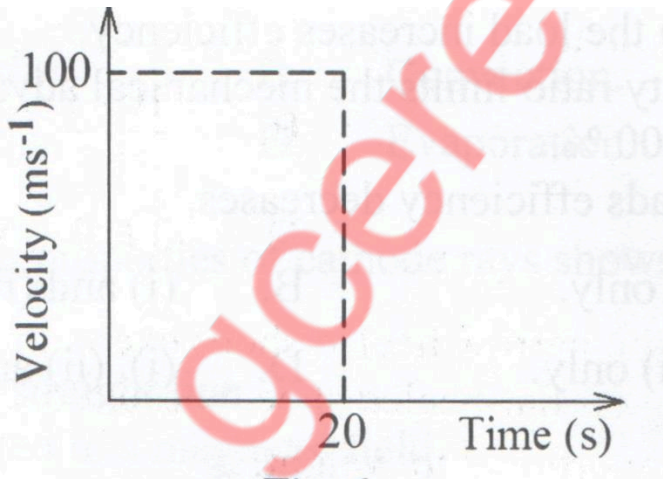

Fig. 6

Find the power developed by the engine to attain a velocity of 100ms-1.

A. 750kW
B. 3,000kW
C. 30,000kW
D. 750,000kW

29. The working of an echo sounder is based on the fact that

i) sound waves travel through liquids

ii) aound waves can be reflected

iii) density of a liquid affects the speed of sound.

A. i) and ii) only
B. ii) and iii) only
C. i) and iii) only
D. i), ii) and iii)

30. A metallic solid of mass 45kg rests on copper rod of cross-sectional area 0.5cm2 standing vertically as shown in figure 7.

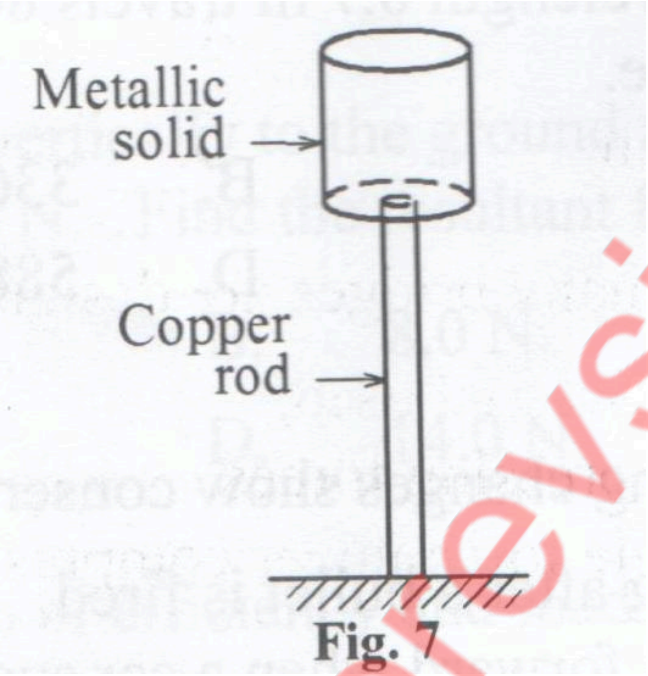

Fig. 7

Calculate the stress in the rod.

A. 9.0 × 102 Nm-2
B. 9.0 × 105 Nm-2
C. 9.0 × 106 Nm-2
D. 9.0 × 108 Nm-2

31. A ball of 3kg moves at 10ms-1 towards a volley ball player. If the player hits the ball and the ball moves back with a velocity of 5ms-1, find the change in momentum.

A. $\frac{5 \times 3}{10}$

B. $\frac{10 \times 3}{5}$

C. $3\ (10 - 5)$

D. $3\ (10 + 5)$

32. A person putting on narrow heeled shoes exerts greater pressure on a surface than when putting on flat –heeled shoe, because pressure is

i) directly proportional to weight

ii) inversely proportional to area

iii) directly proportional to depth

A. ii) only
B. iii) only
C. ii) and iii) only
D. i), ii) and iii)

33. A transformer has 1000 turns in the primary coil and 500 in the secondary coil. If an a.c voltage of 120V is applied to the primary, calculate the voltage across the secondary coil.

A. $\left(\frac{1000 \times 20}{5000}\right) V$

B. $\left(\frac{5000 \times 100}{1000}\right) V$

C. $\left(\frac{5000 \times 120}{1000}\right) V$

D. $\left(\frac{1000}{5000 \times 120}\right) V$

34. An oil of volume 6.28 × 10-5 cm3 forms a circular patch of diameter 0.4cm on surface of water. Calculate the thickness of a molecule of the oil. (Take #=3.14).

A. 2.5×10^{-6} cm
B. 1.250×10^{-4}cm
C. 1.570×10^{-4}cm
D. 5.000×10^{-4}cm

35. Roof structures and many bridges are designed with triangular sections to

i) minimize the material used

ii) withstand compression forces

iii) minimize tensile force under compression

A. ii) only
B. ii) and iii) only
C. i) and iii) only
D. i), ii) and iii)

36. An image formed by a concave mirror coincides with its object placed 28cm away. Find the focal length of the mirror.

A. 7 cm
B. 14 cm
C. 28 cm
D. 56 cm

37. A rubber bullet of mass 100g is fired from a gun of mass 5kg at a speed of 200ms-1. Find the recoil velocity of the rifle.

A. $\frac{5\times200}{100\times1000}$

B. $\frac{5\times1000}{100\times200}$

C. $\frac{100\times200}{5\times1000}$

D. $\frac{200\times1000}{5\times100}$

38. An electric iron 1 kW, a fridge of 100W, a television set and computer each of 50W are to be switched on at once. Find the size of the circuit breaker needed in the meter box at 240V.

A. $\frac{240}{1200}$A

B. $\frac{1200}{240}$A

C. $\frac{240}{251}$A

D. $\frac{251}{240}$A

39. Which of the following statement(s) is/are correct bout a liquid in a capillary tube if the adhesive force is greater than the cohesive force?

i) It wets the glass
ii) It forms a concave meniscus
iii) It is depressed in the capillary tube

A. i) , ii) and iii)
B. ii) and iii) only
C. i) and iii) only
D. i) and ii) only

40. Figure 8 shows a graph of output voltage against time of an a.c generator.

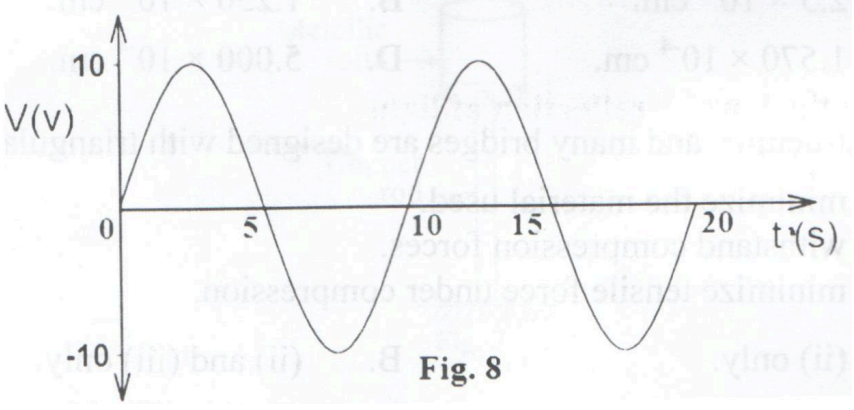

Fig. 8

Find the frequency of rotation.

A. 0.1 Hz
B. 0.5 Hz
C. 2.0 Hz
D. 10.0 Hz

SECTION B

Answer all questions in this section.

41. a) i) Define a joule

ii) State Newton's second law of motion

b) An athlete of 80kg moving at 5ms-1,slides through a distance of 10m before stopping in 4s. Find the workdone by friction on the athlete.

42. a) State the laws of reflection of light

b) By use of two rays from the object, O, show how an observer, E is able to see the image O in figure 9.

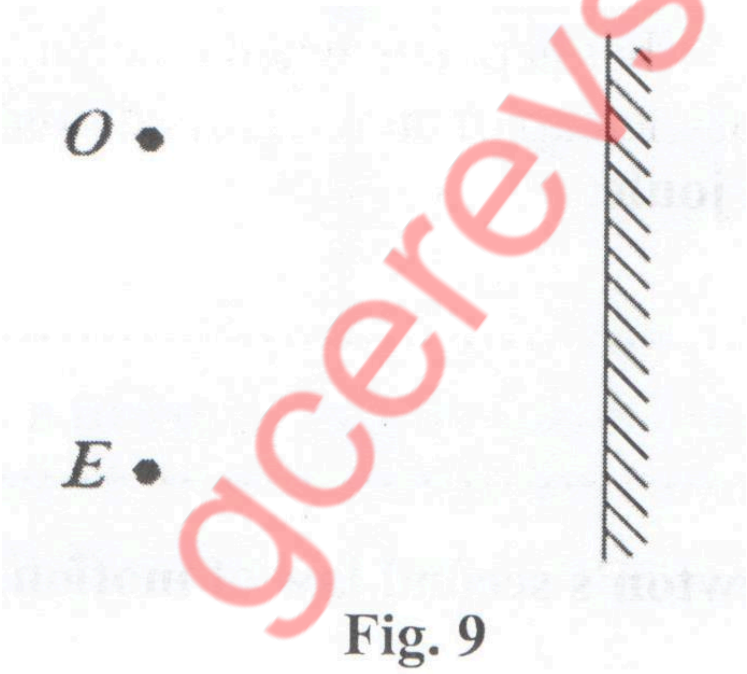

Fig. 9

c) With the aid of a diagram, describe what is meant by diffuse reflection.

43. a) Define surface tension

b) A small piece of filter paper is placed on water surface and a needle gently placed on it.

i) State what is observed.

ii) Explain what happens if the water is heated gently.

44. a) Two insulators X and Y are rubbed against each other. If X gains electrons what charge does it have?

b) Explain briefly what happens when a negatively charged rod is positioned near the cap of uncharged gold leaf electroscope.

45. a) What is force?

b) A vertical spring of length 30 cm is stretched to 36cm when a n object of mass 100g is placed in a pan attached to it. The spring is stretched to 40cm when a mass of 200g is placed in the pan. Find the mass of the pan.

46.a) State the principle of moments

b) A hand cart of length 1.5m, has the centre of gravity at length 0.5m from the wheel when loaded with 50kg as shown in figure 10.

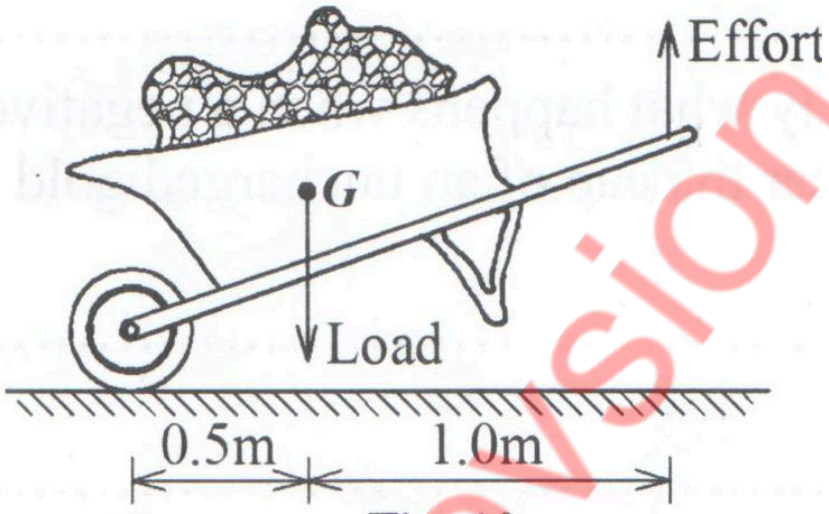

Fig. 10

If the mass of the hand cart is 10kg, find the effort needed to lift the hand cart.

47. Figure 11 shows the essential parts of an X-ray tube in operation.

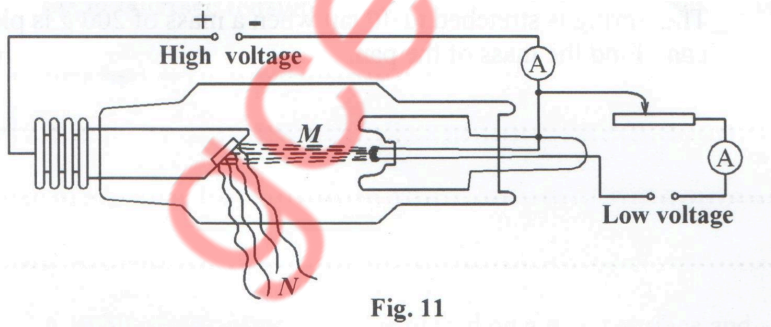

Fig. 11

a) Name the parts labeled M and N

b) What is the use of the

i. high voltage?
ii. low voltage?

c) State two uses of X –rays

48.a) Sketch the wave profile of a vibrating string when it produces a

i. fundamental note
ii. second overtone

b) A tuning fork of frequency 310Hz produces resonance when the length of a resonance tube above water surface is 130mm and again when it is 646mm. Calculate the speed of sound in air.

49. a) Figure 12 shows a trolley carrying a magnet and moving at a high speed towards the coil. The trolley enters and passes through the coil.

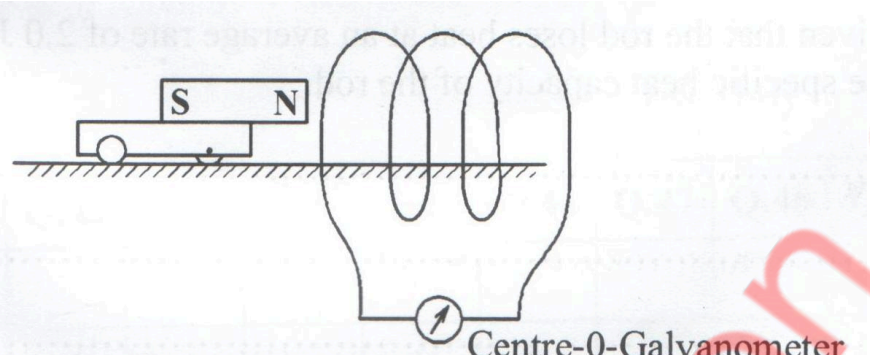

Fig. 12

Explain what happens to the trolley and the galvanometer as the trolley enters the coil.

b) A 12V battery is connected to a 3# resistor. Calculate the current flowing in the circuit.

50. a) Define specific heat capacity of a substance

b) Figure 13 shows a cooling curving of a rod of mass40g heated to a temperature of 600C and allowed to cool.

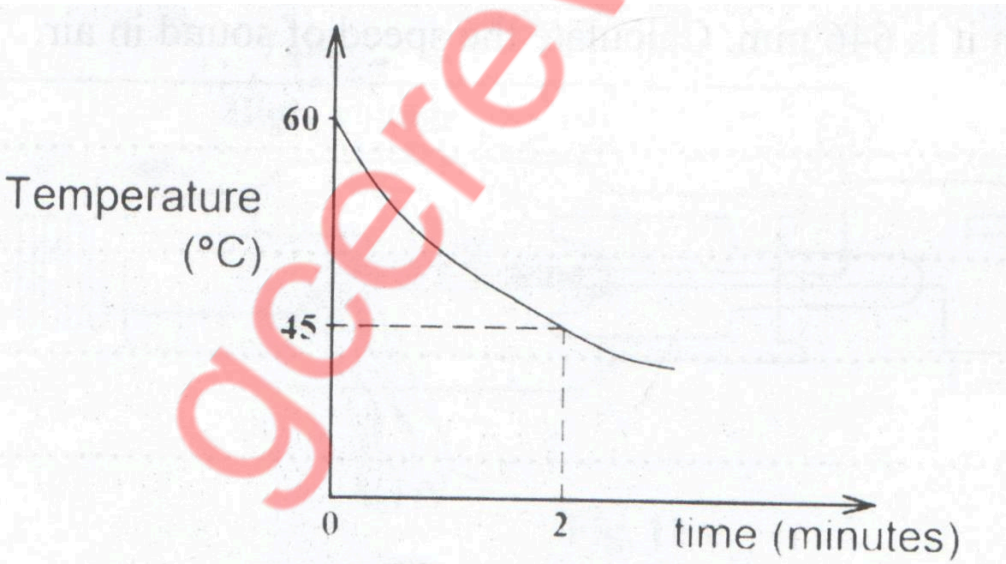

Fig. 13

Given that the rod loses heat at an average rate of 2.0Js-1, calculate the specific heat capacity of the rod.

END