Candidate's Name: .....

School Name: .....

District: .....

Signature: .....

Centre No.					Personal No.		
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535/1
PHYSICS
Paper 1
July/Aug. 2019
2¼ hours

MUKONO EXAMINATION COUNCIL
Uganda Certificate of Education
PHYSICS
Paper 1

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES

Section **A** *contains* **40** *objective type questions. You are required to write the correct answer* **A**, **B**, **C** *or* **D** *in* **blue** *or* **black** *against each question in the box on the right hand side.*

Section **B** *contains* **10** *structured questions. Answers are to be written in the spaces provided on the question paper.*

Mathematical tables and silent non-programmable calculators may be used.

Acceleration due gravity, g	=	$10\ m\ s^{-2}$
Density of water	=	$1000\ kg\ m^{-3}$
Specific heat capacity of water	=	$4200\ J\ kg^{-1}\ K^{-1}$
Specific latent heat of fusion of ice	=	$3.36 \times 10^{5}\ J\ kg^{-1}$

For Examiners' use only

Q. 41	Q. 42	Q. 43	Q.44	Q.45	Q.46	Q.47	Q.48	Q.49	Q.50	MCQ	Total

SECTION A: (40 MARKS)

Answer **all** *the questions in this section.*

1. The short-hand method of writing very big or small numbers in powers of ten is called
A. estimation
B. rounding off
C. standard form
D. significant figures.

2. An experiment which can be carried out to determine the approximate thickness of molecules of a liquid is
A. Brownian motion experiment
B. capillarity experiment
C. oil-film experiment
D. diffusion experiment

3. Hooke's law states that the extension produced on an elastic material is
A. directly proportional to the applied force provided elastic limit is exceeded.
B. directly proportional to the force provided elastic limit is not exceeded.
C. inversely proportional to the force provided elastic limit is exceeded.
D. inversely proportional to the force provided elastic limit is not exceeded.

4. The part of an X-ray tube which is responsible for dissipating heat to the surroundings is the
A. anode.
B. lead shield.
C. cooling fins.
D. glass envelope.

5. The spreading out of waves when they pass through a gap or around a sharp corner is known as
A. refraction.
B. interference.
C. diffraction.
D. reflection.

6. A soft magnetic material is the one which
A. can break easily.
B. can be magnetised easily.
C. is weakly attracted by a magnet.
D. can retain its magnetism for a long time.

7. The term accommodation, as applied to the eye refers to its ability to
A. vary the distance between the lens and the retina.
B. control the light intensity falling on the retina.
C. distinguish between different colours.
D. vary the focal length of the eye lens.

8. The device that melts and breaks the circuit in case of a power surge is called a
A. fuse
B. plug
C. adapter
D. circuit breaker

9. The mode of heat transfer by means of electromagnetic waves is called

A. evaporation
B. conduction
C. radiation
D. convection.

10. Water has a maximum density at a temperature of

A. 0 ^{o}C
B. 4 ^{o}C
C. 20 ^{o}C
D. 100 ^{o}C

11. A car accelerates at a rate of 2 m s^{-2} from 4 m s^{-1}. If its final velocity is 10 m s^{-1}, find the time taken to reach this velocity.

A. 3 s
B. 7 s
C. 12 s
D. 20 s

12. Two bodies, each with momentum of 5.0 kg m s^{-1} and 8.0 kg m s^{-1} move in the same direction before they collide and stick together. If their common velocity is 2.0 m s^{-1}, find the total mass in kilograms.

A. 1.25
B. 1.50
C. 3.20
D. 6.50

13. The pressure exertedby a liquid at the base of a cylinder increases when the height of the liquid increases because of increase in

A. area of contact of the liquid with the sides of the container.
B. atmospheric pressure on the surface of the liquid.
C. weight of the liquid above the base of the cylinder.
D. density of the liquid since its height increases.

14. The velocity of a 3 kg object changes by 14 m s^{-1} when a force is applied on it for 7 s. Find the force applied on the object.

A. $\frac{3\times 14}{7}$ N
B. $\frac{14\times 7}{3}$ N
C. $\frac{3\times 7}{14}$ N
D. $\frac{14}{3\times 7}$ N

15. **Figure 1** shows a uniform beam of length 6.0 m.

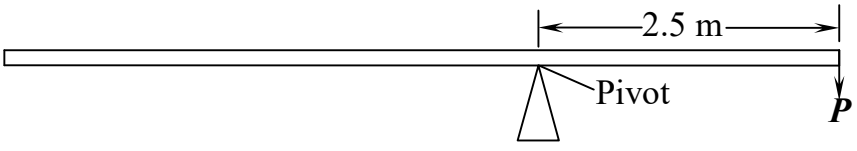

Fig. 1

If its mass is 15 kg, find the mass ***P*** that will keep the beam horizontal.

A. $\frac{2.5\times 0.5}{15}$ B. $\frac{15\times 2.5}{0.5}$

C. $\frac{3.5\times15}{2.5}$ D. $\frac{0.5\times15}{2.5}$

16. A force of 2.5 N acts steadily for 2 s. If the power developed is 1.6 W, find the displacement, in metres, of the point of application of the force.

A. $\frac{1.6\times2}{2.5}$

B. $\frac{1.6\times2.5}{2}$

C. $\frac{2\times2.5}{1.6}$

D. $1.6 \times 2 \times 2.5$

17. Which of the following sets of energy changes of kinetic energy and potential energy is correct for a body thrown vertically upwards?

	Kinetic energy	Potential energy
A.	increases	increases
B.	increases	decreases
C.	decreases	decreases
D.	decreases	increases

18. A body of volume 0.20 m^3 floats in a liquid with 0.08 m^3 of its volume in air. If the density of the liquid is 3 kg m^{-3}, find the upthrust.

A. 1.2 N
B. 2.4 N
C. 3.6 N
D. 6.0 N

19. A solid of mass 150 g is molded into a cuboid of width 6.0 cm and length 15.0 cm. If the density of the solid is 5 g cm^{-3}, find the height of the cuboid, in centimetres.

A. $\frac{5\times6\times15}{150}$

B. $\frac{5\times15}{150\times6}$

C. $\frac{150}{5\times6\times15}$

D. $\frac{150\times6}{5\times15}$

20. A box of weight 8 N exerts a pressure of 100 N m^{-2} when it rests on a surface. If the width of the box is 0.2 m, find its length, in metres.

A. $\frac{8}{100\times0.2}$

B. $\frac{100\times0.2}{8}$

C. $\frac{100\times8}{0.2}$

D. $\frac{0.2}{100\times 8}$

21. During Brownian motion experiment, when the temperature of the glass cell is reduced, the random motion of the smoke particles reduces because

A. kinetic energy of air molecules reduces.
B. number of molecules in the cell reduces.
C. pressure increases and this reduces speed.
D. size of molecules increases.

22. Which of the following statements explain the causes of green house effect?

(i) The short wavelength radiation from the sun is absorbed and heats the earth
(ii) Green house gases block the re-radiation of longer wavelength radiations
(iii) The extra heat energy blocked causes increase in temperature.

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

23. Hot water at 80^{o}C is poured into a basin containing 2 kg of cold water at 25^{o}C. If the temperature of the mixture rises to 60^{o}C, find the mass of water at 80^{o}C.

A. 0.3 kg
B. 0.6 kg
C. 1.8 kg
D. 3.5 kg

24. Which of the following are reasons why the bulb of a liquid-in-glass thermometer is **not** allowed to dip into boiling water when determining the upper fixed point instead it is put in steam?

(i) Dipping the thermometer in boiling water makes it break.
(ii) If there are impurities, they will raise the boiling point.
(iii) Water does not boil uniformly.

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

25. A ray of light in medium ***P*** is internally reflected when it reaches the boundary between medium ***P*** and ***Q***. Which of the following conclusions are correct?

(i) The angle of incidence is greater than the critical angle.
(ii) Medium ***P*** has a larger refractive index than ***Q***.
(iii) Medium ***Q*** is optically denser than medium ***P***.

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

26. Which of the following characteristics describes images formed by a driving mirror in a car?

A. Magnified and real
B. Diminished and virtual
C. Erect and same size as object
D. Inverted and far away from the mirror.

27. Which of the following properties distinguishes hard X-rays from soft X- rays? Hard X-rays are

(i) produced when the accelerating voltage is increased.
(ii) produced by increasing the number of electrons striking the target.
(iii) of shorter wavelength and higher frequency.

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

28. The frequencies of two musical notes, ***P*** and ***Q*** are 256 Hz and 512 Hz respectively. If they have the same amplitude, which of the following statements about the two notes are true?
(i) ***Q*** is louder than ***P***.
(ii) ***Q*** has a higher pitch than ***P***.
(iii) The wavelength of ***P*** is longer than that of ***Q***.
A. (i) and (ii) only
B. (ii) and (iii) only
C. (i) and (iii) only
D. (i), (ii) and (iii)

29. When a pin hole of a pin-hole camera is enlarged, a blurred image is formed because
A. of overlapping of many images.
B. the image formed is virtual.
C. a laterally image is formed.
D. the image formed is magnified.

30. A ray of light is incident on the water-glass boundary at an angle of 40^{o}. If the refractive indices of water and glass are 1.3 and 1.5 respectively, find the angle of refraction.
A. 33.9^{o}
B. 47.8^{o}
C. 56.6^{o}
D. 74.6^{o}.

31. **Figure 2** shows a displacement-time curve for a water wave.

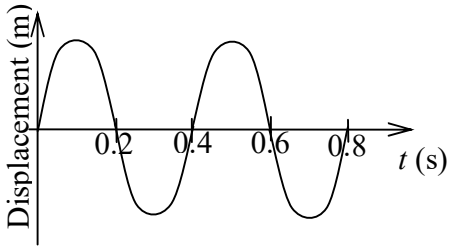

Fig. 2

Find the frequency of the wave.
A. 0.2 Hz
B. 0.4 Hz
C. 2.5 Hz
D. 5.0 Hz

32. Which of the following statements shows what will happen to the water waves in a ripple tank if the dipper vibrates at a faster rate? The
A. waves will travel faster.
B. wave fronts will be closer.
C. peaks of the waves will be higher.
D. longitudinal waves will be produced in water.

33. Which of thefollowing statements about the working of an electron gun of the cathode ray oscilloscope is correct?
(i) The filament produces electrons thermionically.
(ii) The control grid regulates the brightness of the screen.
(iii) Anodes attract, focus and accelerate electrons to the screen.
A. (i), (ii) and (iii).
B. (i) and (ii) only
C. (i) and (iii) only

D. (ii) and (iii) only

34. A nuclide, $^{234}_{92}X$, decays by emitting an alpha particle and two beta particles to nuclide ***Y***. Which of the following nuclides is correct for ***Y***?

A. $^{228}_{90}Y$

B. $^{228}_{92}Y$

C. $^{230}_{90}Y$

D. $^{230}_{92}Y$

35. **Figure 3** shows an arrangement of cells of e.m.f 1.5 V, 1.5 V and 2.0 V.

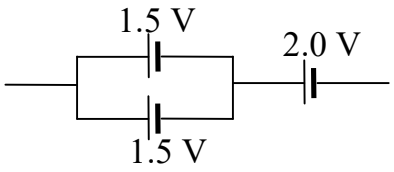

Fig. 3

Find the total e.m.f of the cells.

A. 1.25 V
B. 2.75V
C. 3.50 V
D. 5.00 V

36. Which of the following statements explain why a bulb connected to a simple cell gradually glows dim?

(i) Hydrogen gas on copper plate makes it difficult for the flow of electrons
(ii) Hydrogen gas produced reacts with the copper rod
(iii) Zinc gets used up when the cell is working

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

37. An ebonite rod is rubbed with the fur and the rod becomes negatively charged. Which of the following statements explains this?

(i) Fur loses electrons.
(ii) The rod gains electrons.
(iii) Fur gains protons from the rod.

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

38. A straight wire connected to a galvanometer and put between poles of a strong magnet as shown in **Figure 4**

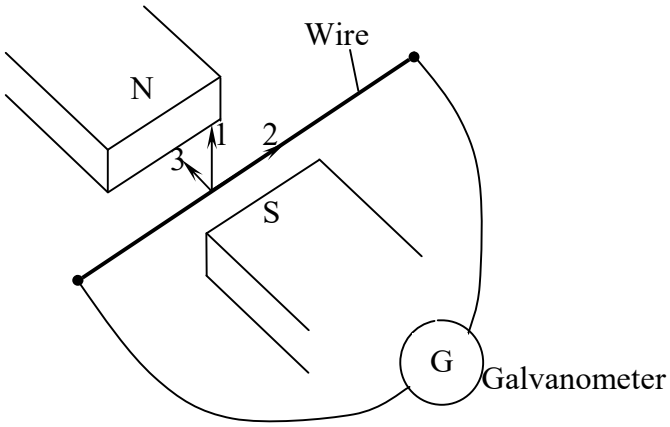

Fig. 4

Which of the following actions on the arrangement causes a pointer of the galvanometer to deflect? Moving the

A. wire in direction one
B. wire in direction two
C. poles in direction two
D. poles in direction three

39. When a North pole of a magnet is brought close to two materials ***Y*** and ***Z***, each in turn, ***Y*** was repelled and there was no effect on ***Z***. What are materials ***Y*** and ***Z*** made of?

	Y	***Z***
A.	Unmagnetised iron	Unmagnetised iron
B.	Unmagnetised iron	Magnetised iron
C.	Copper	Magnetised iron
D.	Magnetised iron	Copper

40. A mobile phone charger has a transformer which steps down voltage from 230 V to 3.8 V. If the primary coil has 5200 turns and the transformer is 100% efficient, find the number of turns in the primary coil.

A. $\frac{230\times3.8}{5200}$

B. $\frac{5200\times3.8}{230}$

C. $\frac{230\times5200}{3.8}$

D. $\frac{5200}{230\times3.8}$

SECTION B (40 MARKS)

Answer **all** *questions in this section. All the working must be shown clearly in the spaces provided.*

41. (a) What is meant by term **uniform velocity**? **(*01 mark*)**

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(b) **Figure 5** shows dots made on a tape pulled through a ticker tape timer of frequency 50 Hz.

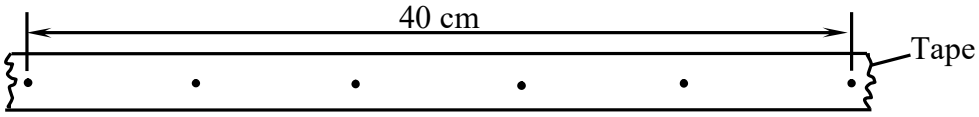

Fig. 5

(i) Calculate the uniform velocity of the tape. **(*02 marks*)**

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(ii) Sketch a velocity-time graph of the body. **(*01 mark*)**

42. (a) Define the term **moment of a force**. **(*01 mark*)**

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(b) **Figure 6** shows a light rod with two weights hanging on it but it is not in equilibrium.

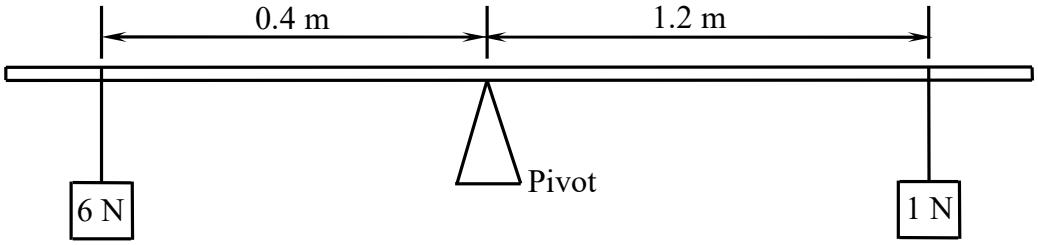

Fig. 6

Determine where the third weight of 2 N should be suspended from the pivot to balance the rod. **(*03 marks*)**

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43. (a) Define the term **noise**. **(*01 mark*)**

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(b) What change does your ear detect when you are listening to a sound note if:

(i) its amplitude is raised? **(*01 mark*)**

.....

(ii) its frequency is raised? **(*01 mark*)**

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(c) The distance between two successive nodes in a stationary waves is 75 cm. Find its wavelength. **(*01 mark*)**

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44. (a) Define a **magnetic field**. **(*01 mark*)**

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(b) **Figure 7** shows a solenoid carrying a current. On the diagram, draw a magnetic field pattern associated with the solenoid. **(*02 marks*)**

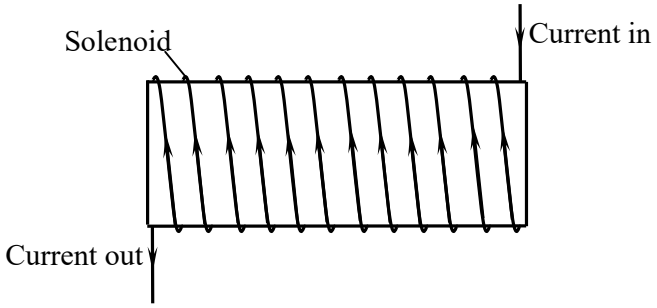

Fig. 7

(c) State **two** applications of electromagnets. **(*01 mark*)**

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45. (a) Define the term **latent heat of a substance.** **(*01 mark*)**

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(b) A piece of pure melting ice of mass 0.05 kg, is mixed with water at 0^{o}C. When 25000 J of heat energy was supplied to the mixture with continuous stirring, the temperature increased to 4^{o}C. Determine the mass of water which was at 0^{o}C. **(*03 marks*)**

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46. (a) An experiment was carried out in a vacuum to study two radiations from a radioactive substance. The radiations were passed through an electric field between two metal plates. A photographic film was placed as shown and when it was developed, two black marks ***X***and ***Y*** were seen as shown in **Figure 8**.

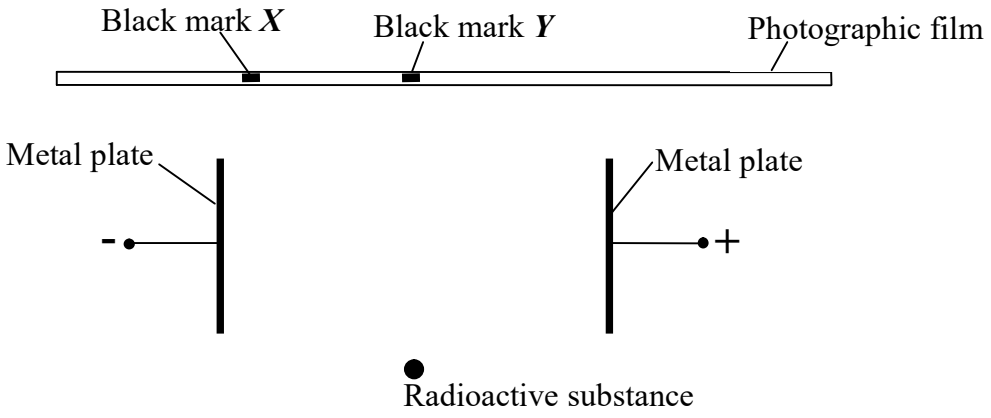

Fig. 8

(i) State the property of radiations that enables them form black marks on the film. **(*01 mark*)**

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(ii) Which radiation is responsible for the formation of marks ***X*** and ***Y***?

X **(*0½ mark*)**

.....……

Y **(*0½ mark*)**

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(b) A radioactive substance has a half life 15 days. Find the time taken for it to decay to one eighth. ***(02 marks)***

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47. (a) State **two** ways of increasing efficiency of a block and tackle pulley system. ***(01 mark)***

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(b) A machine raises a load of 500 N through a height of 10 m. If the work done against friction is 1000 J, find the total work done by the effort. ***(02 marks)***

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(c) Sketch a graph to show the variation of efficiency against load for a block and tackle pulley system. **(*01 mark*)**

48. **Figure 9** shows a 240 V mains supply used to operate a circuit with appliances ***Y*** and ***Z***and a measuring instrument ***X***.

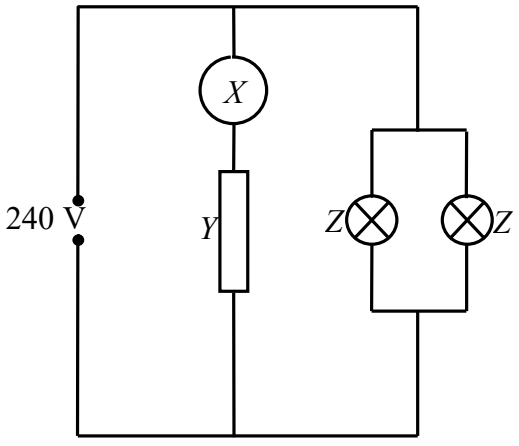

Fig. 9

(a) Name the

(i) measuring instrument, ***X***. **(*0½ mark*)**

.....

(ii) appliance, ***Z***. **(*0½ mark*)**

.....

(b) Explain why appliances ***X*** and ***Y*** are connected in parallel. **(*01 mark*)**

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(c) Appliance ***Y*** is rated 200 W while each of appliances ***Z*** is rated 60 W.

(i) Determine the energy used by appliance, ***Y***, in half an hour**.** **(*01 mark*)**

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(ii) If the cost of electric energy is sh 750 per unit, find the cost of running the appliances for 20 hours. **(*01 mark*)**

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49. (a) Define the term **dispersion of light**. **(*01 mark*)**

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(b) Yellow light is incident on a glass prism as shown in **Figure 10**.

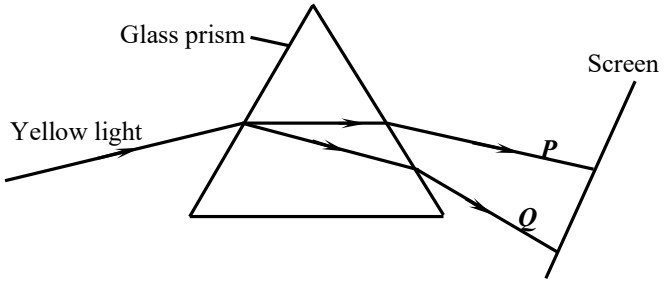

Fig. 10

(i) Name the colours***P*** and ***Q***. **(*0½ mark @*)**

P .....

Q .....

(ii) Colour***P*** is mixed with cyan. Name the resultant colour. **(*01 mark*)**

.....

(c) State **one** natural phenomenon which occurs due to dispersion. **(*01 mark*)**

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50. (a) Define the term **electrostatic induction**. **(*01 mark*)**

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(b) A positively charged sphere is suspended inside a metal can by an insulating thread and the exterior of the can earthed as shown in **Figure 11**.

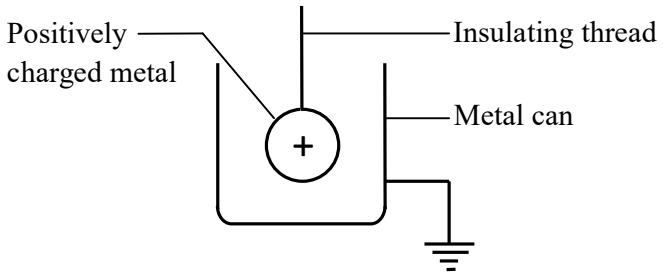

Fig. 11

On **Figure 11**, draw the resulting charges created on the can. **(*01 mark*)**

(c) Explain what happens to a positively charged body when it is touched with a finger. **(*01 mark*)**

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(d) State **two** uses of a gold leaf electroscope. **(*01 mark*)**

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END