Name…… Index No……..

School……. Signature …….

535/1
PHYSICS
PAPER 1
July/August 2017
$2^1/_4$ hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

PHYSICS

Paper 1

2hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

- *This paper has* **two** *sections;* **A** *and* **B.**
- *Section* **A** *contains* **40** *objective type questions. You are required to write the correct answer* **A, B, C** *or* **D** *in the box on the right hand side of the question.*
- *Section* **B** *contains* **10** *structured questions. Answers to this section are to be written in the spaces provided on the question paper.*
- *Assume where necessary:*
  - *acceleration due to gravity, g* = $10ms^{-2}$
  - *specific heat capacity of water* = $4200\ J\ kg^{-1}k^{-1}$
  - *specific heat capacity of copper* = $400\ J\ kg^{-1}k^{-1}$
  - *density of water* = $1000kgm^{-3}$
  - *density of mercury* = $13600kgm^{-3}$
  - *speed of sound in air* = $340ms^{-1}$
  - *specific latent heat of vaporization of water* = $2.3 \times 10^6 J\ kg^{-1}$
  - *Speed of light in Vacuum* = $3.0 \times 10^8 ms^{-1}$
  - *Refractiveindex of air* = 1
  - *Specific latent heat of ice* = $336{,}000J\ kg^{-1}$

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

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Turn Over

SECTION A (40 Marks)

Answer **all** questions in this section

1. The product of mechanical advantage and effort of a machine is equivalent to
   A. work output.
   B. work input.
   C. effort.
   D. load.

2. When a body is thrown vertically upwards;
   (i) Its initial velocity is greater than zero.
   (ii) Its velocity at maximum height is zero.
   (iii) Its initial velocity upwards is zero.
   (iv) It moves with uniform velocity.
   A. (i) and (ii) only
   B. (i) and (iii) only
   C. (ii) and (iii) only
   D. (iii) and (iv) only

3. The freezing point of pure water can be lowered by
   A. decreasing pressure.
   B. addition of sugar.
   C. raising temperature.
   D. keeping water in a refrigerator.

4. A force of 4N is used to compress a spring by one fifth of its original length. If the force constant of the spring is $20Nm^{-1}$, calculate its original length.
   A. 0.2m
   B. 0.8m
   C. 1.0m
   D. 1.2m

5. 

Figure 1

Figure 1 shows the arrangement used when determining the focal length of a convex lens. When the image of the mesh falls on the screen, the focal length is equal to:
   A. distance between the screen and the lens.
   B. distance between the mirror and the lens.
   C. distance between the mirror and the screen.
   D. half the distance between the screen and the lens.

6. A volt per ampere is equivalent to;
   A. watt.
   B. coulomb.
   C. joule.
   D. ohm.

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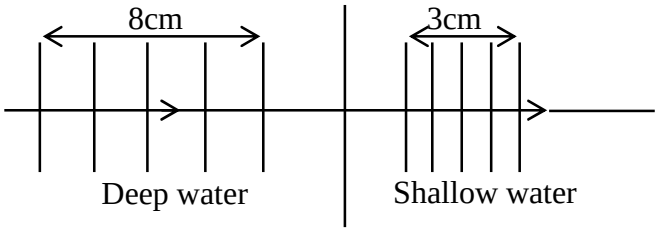
7. Hysteresis in a transformer refers to the
   A. generation of heat in the copper wires.
   B. demagnetization and magnetization of the core.
   C. loss of magnetic flux.
   D. heating of the soft iron core.

8. Figure 2 shows plane ripples travelling from deep to shallow water. If the frequency of the wave is 5Hz, calculate the change in speed of the waves.

Figure 2



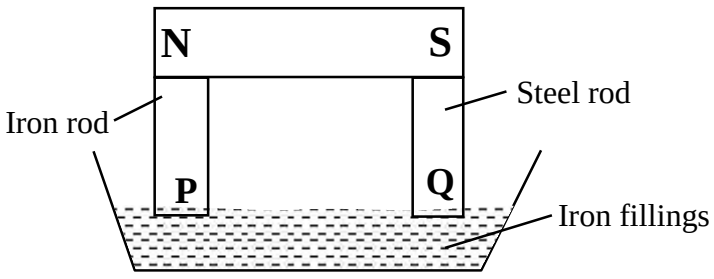
   A. $3.75cms^{-1}$
   B. $6.25cms^{-1}$
   C. $10.00cms^{-1}$
   D. $13.75cms^{-1}$

9. When cooking oil is accidentally poured on a cemented floor, it becomes difficult for one to walk on the floor. This is due to
   A. adhesion force between oil molecules and molecules of the feet being higher.
   B. higher cohesion force between the oil molecules and molecules of the feet.
   C. lower frictional force between the floor and the feet.
   D. oil being a viscous liquid.

10. When gamma rays are directed midway between two oppositely charged parallel metal plates, they are
   A. deflected towards the positive plate.
   B. deflected towards the negative plate.
   C. made to oscillate vertically between the plates.
   D. not affected by the plates

11. A soft iron rod P and steel rod Q in figure 3 below are attached to a permanent bar magnet and then dipped into iron fillings. The rods are then removed from the magnets.

Figure 3



Which of the following statements will be true about P or Q?
   A. P will acquire more iron fillings and will retain more.
   B. P will acquire more iron fillings and will retain less.
   C. Q will acquire more iron fillings and will retain more.
   D. Q will acquire more iron fillings and will retain less.

Turn Over

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12. A body of mass 50kg acted upon by a force of 800N accelerates from $0.5ms^{-1}$ to $8.5ms^{-1}$. How long does the acceleration take?
A. 2.0s
B. 1.0s
C. 0.5s
D. 0.2s

13. Which of the following is true about light travelling from glass to air?
A. Its wave length is directly proportional to its speed.
B. Its wave length is inversely proportional to its speed.
C. Its wave length decreases.
D. Its frequency decreases.

14. A lightning conductor has a high density of charge around its spikes so as to
A. allow smooth flow of charge from the cloud.
B. increase the charge on the clouds.
C. induce the same charge on the cloud.
D. ionise the surrounding air molecules.

15. **Figure 4**

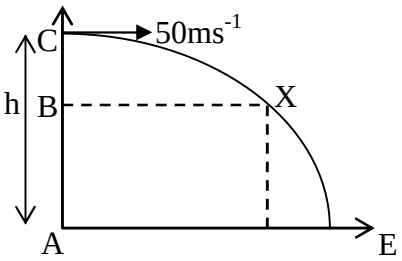

Figure 4 shows a body projected with a horizontal velocity of $50ms^{-1}$. Determine its acceleration at point X after travelling for 2s.
A. $10ms^{-2}$
B. $25ms^{-2}$
C. $50ms^{-2}$
D. $100ms^{-2}$

16. In rubbing two insulators P and Q together, P acquires a negative charge while Q acquires a positive charge, this means that during the rubbing process
A. Q gains electrons.
B. P gains protons.
C. P gains electrons.
D. Q gains protons.

17. A submarine of volume $6m^3$ floats with a third of its volume submerged in water of density of $1000kgm^{-3}$. Determine the mass of the submarine.
A. 1000kg.
B. 2000kg.
C. 3000kg.
D. 4000kg.

18. Which of the following can produce a cooling effect?
(i) Compression of a gas
(ii) Expansion of a gas
(iii) Evaporation of a liquid
A. (i), (ii) and (iii)
B. (i) and (iii) only
C. (ii) and (iii) only
D. (iii) only

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19. When a solid is melting, its temperature does not change because
A. the latent heat has reduced to zero.
B. the molecules of the substance have stopped moving.
C. the temperature rise is exactly equal to the heat given out.
D. the heat supplied is used to weaken the bonding between molecules.

20. Which part of a lens camera controls the exposure time?
A. Shutter.
B. Film.
C. Lens cover.
D. Diaphragm.

21. A source of e.m.f of 20.0V and internal resistance 1.0Ω is connected to three resistors each of 2Ω as shown in figure 5 below.

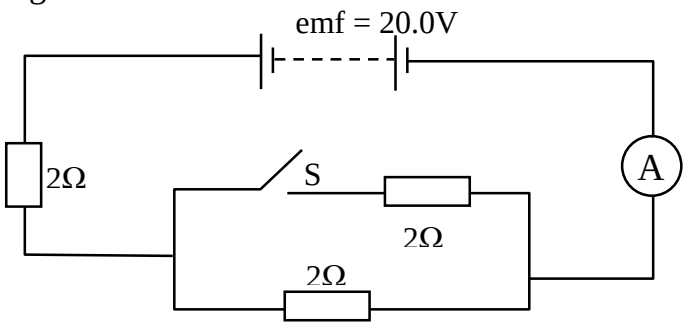

Figure 5

Determine the ammeter reading when switch S is closed
A. 2.9A
B. 3.3A
C. 4.0A
D. 5.0A

22. The half-life of a radioactive element is 14days. If the initial mass of a sample of the element is 32g, find the mass left after 1344 hours
A. 2g
B. 4g
C. 8g
D. 16g

23. A monochromatic ray of light is incident on a water to glass boundary as shown in figure 6 below.

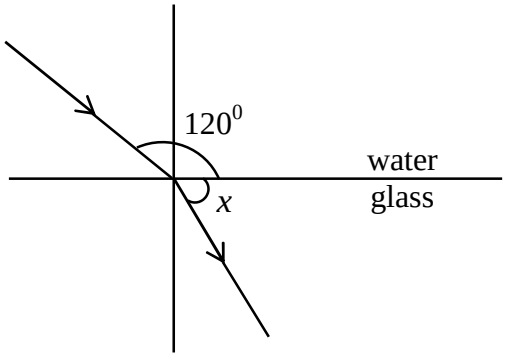

Figure 6

Given that the refractive indices of water and glass are 1.33 and 1.50 respectively, find the value of angle *x*.

A. 26.3º
B. 30º
C. 60º
D. 63.7º

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24.

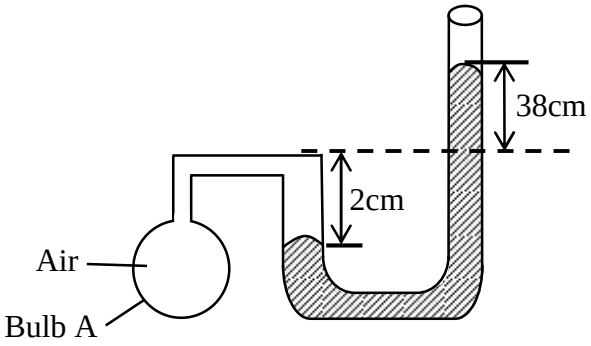

Figure 7

Figure 7 above shows a fixed mass of dry air trapped in bulb A. Calculate the total pressure of air given that atmospheric pressure is 76cmHg.

A. 36cmHg
B. 40cmHg
C. 116cmHg
D. 140cmHg

25. Which order of the following radiations is correct basing on their decreasing frequency.

A. Infrared, Yellow, Blue, Gamma rays.
B. Gamma rays , Blue, Yellow and Infra-red.
C. Blue, Yellow, Gamma rays and Infra-red.
D. Yellow, Gamma rays, Blue and Infra-red.

26. An immersion heater rated 3A, 240V is used to heat 100g of water. How long will it take to raise the temperature of water from 80ºC to vapour at 100ºC?

A. 11.7 seconds
B. 216.4 seconds
C. 313.9 seconds
D. 331.1 seconds

27. Figure 8 shows a displacement - time graph for a body under motion.

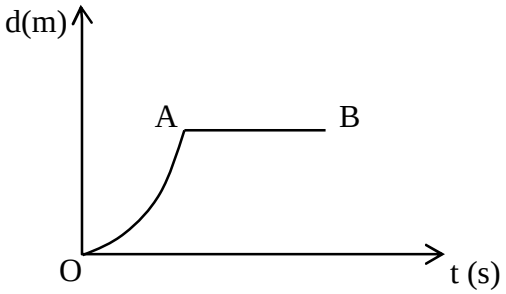

Figure 8

Describe the motion of the body between OA and AB.

	AO	AB
A	Constant acceleration	Constant velocity
B	Constant acceleration	Resting
C	Constant velocity	Constant acceleration
D	Constant displacement	Constant velocity

28. On which basis does a hydrometer operate?

A. Archimedes principle.
B. Pascal's principal.
C. Law of floatation.
D. Bernoulli's principle.

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29. Certain atoms emit gamma rays because
A. their nuclei are unstable.
B. they contain protons only.
C. their nuclei emit electrons.
D. their nuclei contain protons and electrons.

30.

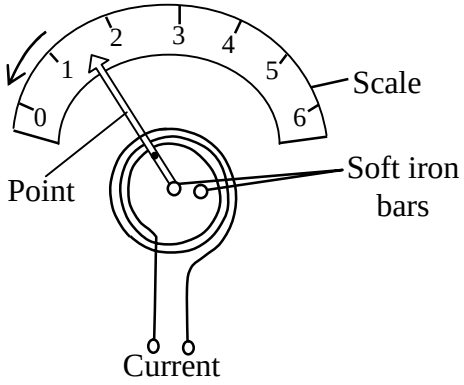

Figure 9

Figure 9 above shows a moving iron-meter. One of these statements is true about the set up when current flows through the coil.
A. The pointer is deflected over a uniform scale.
B. The repulsive force is smaller when the bars are closer.
C. The magnetic force of attraction is proportional to the square of the current.
D. The iron rods become magnetized with same polarity.

31. What happens when the crest of one wave over laps with the trough of another wave?
A. The wave experience constructive interference.
B. The waves are out of phase.
C. The amplitude of the wave becomes greater.
D. The waves are in one phase.

32. Substances which absorb ultra violet radiation and emit visible light are called
A. fluorescent substances.
B. luminescent substance.
C. translucent substances.
D. phosphorescent substances.

33.

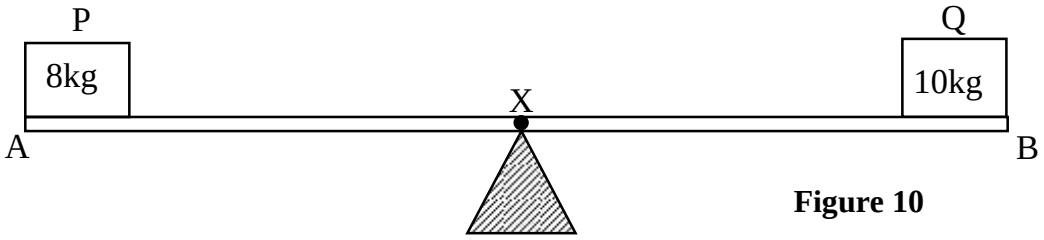

Figure 10

Two bodies P and Q of masses 8kg and 10kg respectively are placed at the ends of a uniform rod originally balancing at its centre as shown in figure 10.
If the rod is to be under mechanical horizontal equilibrium, then
A. distance AX should be decreased.
B. P should be placed at X.
C. distance AX should be increased.
D. distance BX should be increased.

34. An object dropped in a uniformly flowing water obstructs its flow. This effect is called
A. turbulence flow.
B. streamline flow.
C. Bernoulli's effect.
D. fluid flow.

Turn Over

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35. A turning fork of frequency 0.45kHz is sounded above the open end of a closed tube. Find the length of the air column for the first overtone to occur.
(Speed of sound in air = $340ms^{-1}$)

A. 1.76m
B. 1.32m
C. 0.75m
D. 0.57m

36. Which of the following pairs gives a defect and its cause in a simple cell?

	Defect	Cause
A	Local action	Presence of zinc amalgam
B	Polarisation	Use dilute electrolysis
C	Polarisation	Formation of hydrogen bubbles
D	Local action	Adding oxidising agent

37. Which of the following statements is correct about self-demagnetization in a bar magnet?

A. The free poles of a magnet repel each other and gradually alter the alignment of the domain axes.
B. It happens when a magnet is stored by using magnetic keepers.
C. The molecular magnets lie in a closed loop with no free poles.
D. It happens when magnets are stored in pairs.

38.

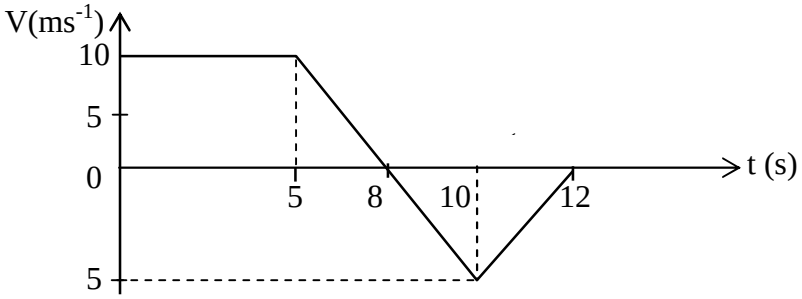

Figure 11

Figure 11 shows a velocity time graph of motion of a motorcyclist. Calculate the total displacement covered.

A. 85m
B. 75m
C. 65m
D. 55m

39. If the cost of one unit of electricity is shs.500 and the total cost of lighting two 75W lamps is shs.4,500, for how long will the lamps light?

A. 60 seconds
B. 60 minutes
C. 60 hours
D. 3600 seconds

40. Figure 12 below shows a source of heat **H** placed midway between two identical flasks p and q connected to the ends of a U – tube containing a liquid.

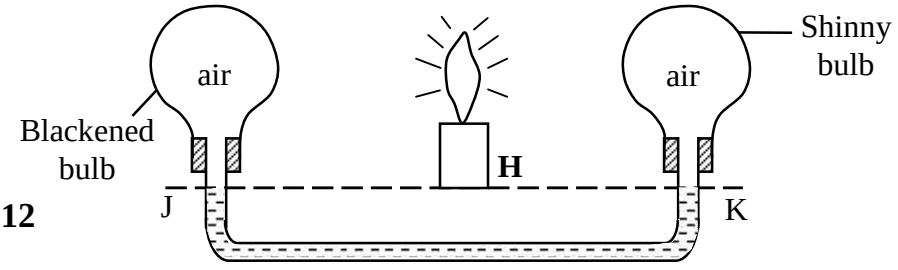

Figure 12

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Which one of the following is a correct observation about the liquid level?

A. It rises in J and falls in K.
B. It falls in J and rises in K.
C. It remains the same in both J and K.
D. It falls in both J and K.

SECTION B (40 Marks)

Answer **all** questions in this section.

41. a) Define a pascal. (01 marks)

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b) A mountain climber holding a barometer in his hands, climbs from a height of 200m of the mountain up to its top. If the level of mercury in the barometer falls from 75cmHg to 74cmHg, find the height of the top a mountain from where he started. (03 marks)

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42. a) Define **uniform retardation?** (01 mark)

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b)

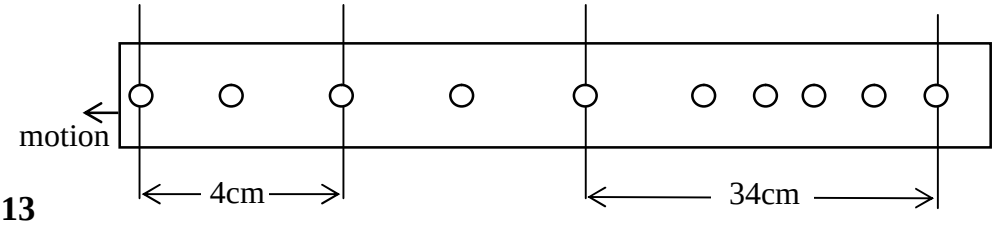

Figure 13

Figure 13 above shows dots made on a ticker tape pulled by a trolley through a timer of frequency 50Hz, calculate the acceleration of the tape. (03 marks)

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43. a) What is meant by term ‘Gassing’ in relation to the charging process of a lead acid accumulator? (01 mark)

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b) State any **two** ways of prolonging the life of a lead acid accumulator. (01 mark)

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c)

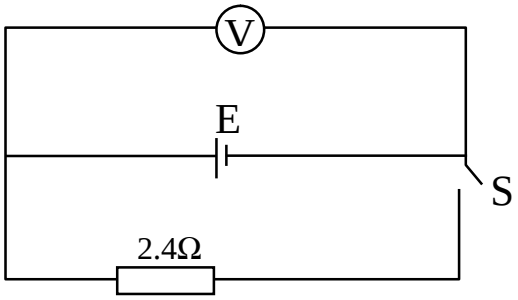

Figure 14

Figure 14 above shows a voltmeter V connected in parallel with a battery E and a 2.4Ω resistor.
When switch S is open, the voltmeter V reads 6V and 4.8V when the switch S is closed.
Find the internal resistance of the battery. (02 marks)

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44. a) Define the term ‘‘**hertz**’’ (01 mark)

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b) Figure 15 below shows circular waves incident on a convex reflector. Draw on the diagram, the wave pattern for the reflected wave fronts and fill in the missing parts. (01 mark)

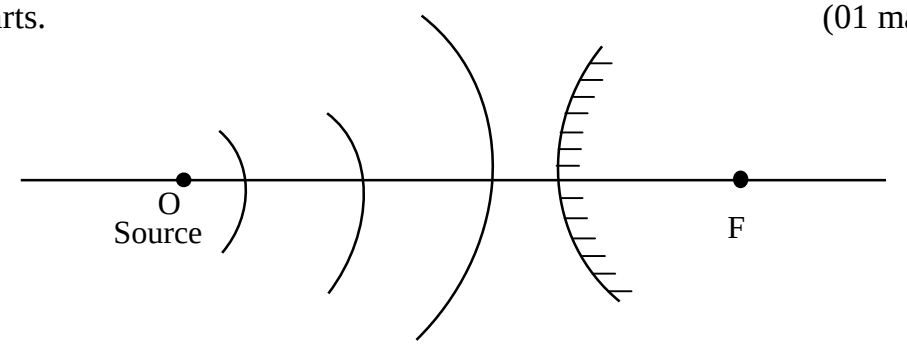

Figure 15

c) The wavelength of a radio wave is 19.2m. Calculate its frequency (02 marks)

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45. a) What is meant by **“Spontaneous disintegration”** in relation to radioactivity? (01 mark)

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b) A radioactive nuclei X decays by emission of an alpha particle and a beta particle to form nuclei Y. If the mass number of X is 215 and the difference between the mass number and atomic number of X is 131.
Write a balanced equation for the reaction. (03 marks)

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46. a) (i) State **Archimedes' principle.** (01mark)

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(ii) Mention any **one** use of principle in 46(a) above. (½ mark

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b) A glass block weighs 40N in air, and 30N when wholly immersed in a liquid of density 800kgm^{-3}. Calculate the volume of the glass block. (2½ marks)

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47. a) i) What is meant by the term **'Parallax'** as applied to light. (01 mark)

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ii) State any **two** differences between the nature of images formed by a pin hole camera and a plane mirror. (02 marks)

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b) Sketch a diagram to show the formation of the eclipse of the moon. (01 mark)

48. a) Define **absolute Zero.** (01 mark)

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Turn Over

b) Ice cubes of mass 500g at 0℃ are mixed with 3kg of water at 0℃. How much heat will be needed to convert the mixture to water at 10℃? (03 marks)

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49. a) What do you understand by **electrostatic induction?** (01 mark)

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b) State the **law of electrostatics.** (01 mark)

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c)

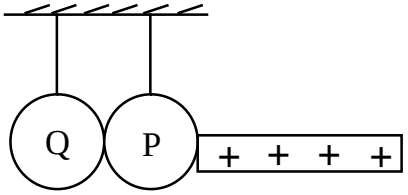

Figure 16

Conductors P and Q are placed into contact with each other and a positively charged rod placed into contact with P as shown in figure 16 above. State the nature of charges acquired by P and Q.

i) P…….. (½ mark)

ii) Q…….. (½ mark)

d) After sometime, the positively charged rod is withdrawn and the conductors are separated. State the new charges on P and Q

i) P……. (½ mark)

ii) Q…… (½ mark)

50. a) Distinguish between a magnet and a ferro magnetic material. (01 mark)

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b)

Figure 17

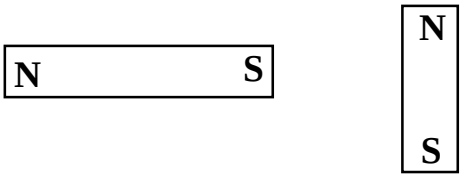

Figure 17 above shows two identical bar magnets placed close to each other.

(i) Sketch on the diagram above the magnetic field pattern between the two magnets. (02 marks)

(ii) State any **two** uses of magnets. (01 mark)

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