PHYSICS THEORY(232/1&2)

PRESENTED BY;

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Paper 1 Topics

1. Measurement 1 and 2.
2. Force, turning effect of a force, equilibrium and center of gravity, Hooke's law, particulate nature of matter.
3. Pressure, fluid flow, gas laws, floating and sinking.
4. Thermal expansion, heat transfer, quantity of heat.
5. Linear motion, newton's laws of motion, work energy power and machines, uniform circular motion.

Paper 2 Topics

1. Rectilinear propagation and reflection at plane surfa0ce, reflection at curved surfaces, refraction of light, thin lenses.
2. Cells and simple circuits, current electricity, heating effect of electric current, mains electricity.
3. Electrostatics 1 and 2.
4. Waves 1 and 2, Sound, electromagnetic spectrum.
5. Magnetism, magnetic effect of electric current, electromagnetic induction.
6. Photoelectric effect, cathode rays and cathode ray tube-rays, radioactivity, electronics.

Handling Physics Theory

Key areas

- Category of questions

1. Statement questions
2. Numerical questions
3. Diagrammatical questions

- Language of physics exams
- Terms used
- Questions involving magnetic and electric field lines
- misconceptions.
- Diagrams
- Tackling numerical questions
- Questions involving ray diagrams
- Questions involving graphs
- Experimental questions
- Others

LANGUAGE OF PHYSICS EXAMINATIONS

Common terms include:

1. Distinguish/Differentiate/Contrast

To show that difference between two things or terms, e.g

- Mechanical and electromagnetic waves
- Fission and Fusion
- Answer should be in continuous prose otherwise use T- table
- Same features should be discussed

2. Compare and contrast

Compare- Give the similarities by stating the common feature

Contrast-give the difference between similar features

The eye and the camera

3. Explain/ explain an observation

Give a systematic and detailed account about something .

- Explain the working principles of a devise e.g the working of an electric bell
- Observation??? Detected using the five normal senses-systematic explanation of the science behind it.

4- State:/List/Name

- Factors
- Characteristics
- Laws
- Principles
- Functions

When stating factors or characteristics.

- ❖state the factors without explaining
- ❖Restrict yourself to the no of factors or characteristics required

Some important factors to me mastered:

-factors affecting pressure in fluids
-Factors affecting surface tension
-factors affecting stability of an object
-factors affecting capacitance
-factors affecting the strength of an electromagnet
-factors affecting the size of force on a conductor carrying current in a magnetic field
-factors affecting heating effect of an electric current
-melting and boiling point of a substance
-speed of sound
-photoelectric effect
-size of induced emf
-electrical resistance of a conductor

5. Definition of terms

- key words must be used.
- Don’t use the same word to define itself.
- Meaning must come out clearly.
- Never use terms you are not sure about.
- Should not interchange words e.g refraction and reflection.

Some Common Terms to define

- Pressure
- Moment of a force
- Centre of gravity
- Capacitance
- Magnification
- An electromagnet
- Work,Power, MA, VR,E
- Specific heat capacity
- Specific latent
- Thermionic emission
- Current
- Emf
- Moment of a force
- Centre of gravity
- Capacitance
- Magnification
- An electromagnet
- Angular velocity or acceleration
- Relative density
- Absolute refractive index
- Potential difference
- Focal length or principal focus
- Half-life
- Photoelectric effect
- Threshold frequency
- Work function
- Kilowatt hour
- Photoelectric effect
- Threshold frequency
- Work function
- Specific heat capacity
- Specific latent heat of fusion & vaporization

6. Distinguish between two terms or quantities

Mass

Weight

Heat

Temperature

Stable

Unstable

Streamline

Turbulent

Real

Vitue

Primary cells

Secondary cells

Soft magnetic materials

Hard magnetic materials

Transverse waves

Longitudinal waves

Magnetic materials

Non magnetic materials

Speed

Velocity

Soft X-rays

Hard X-rays

Fission

Fusion

Intrinsic semiconductor

Extrinsic

P type

n type semiconductor

Ohmic conductor

Non ohmic conductor

7.Principles and laws

- Should be stated verbatively
- laws/ principles' operate under certain conditions
- The conditions under which the laws operate must be accurately stated.
- Confusing laws/ principles with similar wording –law of floatation and Archimedes principle

Laws and principles

- Pascal's principle
- Principle of moments
- Hooke's law
- Bernoullis principle
- Basic law of electrostatics
- Basic law of magnetism
- Faradays law of electromagnetic induction
- Lenz's law
- Snell's law
- Newton's three laws of motion
- The three gas laws
- Archimede's principle
- Law of flotation
- Ohm's law

8. Experimental Questions

Describe an experiment or Outline the steps

Give a step by step and instructive procedure.

- List of apparatus
- Well labeled diagram
- Diagram must be correct
- Conventional symbols should be used
- Procedure - systematic and instructive
- Table
- State how the data obtained shall be used
- Expected Graph
- Conclusion- Statement from findings/Formula

Ilustrate - Describe with the aid of a diagram e.g sea breeze

9. Magnetic and electric field lines

- Partten
- Direction
- Properties of field lines

Misconceptions

- Charges and poles
- Movement of –ve charges & redistribution of positive charges
- Quantity of Final charge and original charge
- Induced emf and current
- Neutralise and discharge
- Failure to interpret symbols, e.g dot and a cross
- Flemings left and right hand rule
- Loudspeaker & the microphone
- The motor and the generator
- Flux leakage and flux linkage
- Stepping up voltage not current

10. Sketch

- ❖ Diagrams
- ❖ Graphs
- ➢ No accuracy is required
- ➢ Should give a clear picture/main features must be shown

10. Draw and label

- ❖ Diagram must be clearly labeled and proportional.
- ❖ Graphs should be drawn to a good scale- Conditions for the scale mark apply.

11. Label – should not carry any other possible meaning

11. State and explain/explain your observation

- State the observation- What is an observation?
- Give a reason /explanation for the observation using clear scientific terms.
- Explanation should be systematic
- An explanation of an observation(s) made. E.g
  - Motion of a conductor carrying current in a magnetic field
  - Deflection of a galvanometers pointer connected to a conductor in a magnetic field when the conductor cuts the field
  - Explain why heavy commercial vehicles have many wheels
  - Explain why small insects are able to walk on the surface of water

12.Tackling numerical questions

Determine/Find/Calculate

- When tackling numerical questions, write the appropriate formula. Formulae not expression.
- Always work in SI unit,
- In case one is not working in SI units, write the unit you are working with.
- Questions testing on SI units, state the units in words and not in symbol form when not sure of symbol.
- Read the question carefully before answering it. Do not invent your own question.
- The number of points/answers are pegged on

13. Formulae statements

- Some statements are treated as the formulae and are awarded accordingly, e.g.
- Clockwise moments = anticlockwise moments
- Heat lost=heat gained
- Upthrust =weight of the fluid displaced.
- Weight of the floating object=weight of the fluid displaced.
- Momentum before collision= momentum after collision
- Volume of the oil drop = volume of the oil patch
- 14. Show that –Prove of formula.

Cont.

- Consider the following task.

Clear working should proceed as follows

Convert 2kg to newtons'

- ✓ W = m x g
- ✓ = 2kg x 10 N/Kg
- ✓ = 20N

- Don't display your clear working, avoid putting your working on the

14. Conversion Of Units

- Milli (mA, mg, mm, ms) – 10^{-3}
- Micro (uF, us) – 10^{-6}
- Kilo (Km, KHz, Kg) - 10^{3}
- Mega (MHz)- 10^{6}
- If question requires a unit to be stated it should be in words not symbols
- A question requiring two formulae, the mark at the formula leading to final answer.

15. Question with subsequent parts

- ❖ Show some acceptable working for the leading section
- ❖ Use the answer in the leading question correctly
- ➢ writing the correct formula –not an expression, eg u2 + 2as
- ➢ Do the right substitution using the answer in the leader question
- ➢ Work out the final answer to the correct significant figures and SI unit

16. Equation for effective ;

- 1. Resistance

$$\frac{I}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \ldots\ldots\ldots\ldots\ldots\frac{1}{R_n} \ldots\ldots\ldots\ldots\ldots Parallel$$

$$R_T = R_1 + R_2 + \ldots\ldots\ldots R_n \ldots\ldots\ldots\ldots\ldots\ldots Series$$

2. Capacitance

$$\frac{I}{C_T} = \frac{1}{C_1} + \frac{1}{C_2} + \ldots\ldots\ldots\ldots\ldots\frac{1}{C_n} \ldots\ldots\ldots\ldots\ldots Series$$

$$C_T = C_1 + C_2 + \ldots\ldots\ldots C_n \ldots\ldots\ldots\ldots\ldots\ldots Parallel$$

17. Ray diagrams

- Real rays must have direction/arrows
- Real rays must be drawn by a continuous line
- Rays direction is indicated after the source
- Virtue rays are drawn with a broken line
- Virtue rays have no direction
- Rays must be straight.
- No thick rays-use a sharp pencil
- Don’t repeat the line-double line
- Correct symbols for curved mirrors and thin lenses must be used.

18. Questions involving graphs

- Never leave a hanging graph – extrapolate to cut either or both axes.
- When working out the gradient remember factors like 10^{14} used in the scale .
- label axes and give the units for the quantities.
- Scale must be uniform, simple and accommodative.
- Plotted points must be visible –line should not cover them

Cont.

- Don't break any of the axes
- Intercepts should be read accurately-don't draw a thick line
- Curves should drawn with a free hand- not as a segmented line
- Must show clearly how the graph was used, eg

1. K=gradient – points must be extracted from the gragh and shown with a triangle
2. fo = x-intercept- intercept must be clear
3. Tangent at a point shown and g determined
4. Vertical and horizontal line shown for decay curve when determining half life

Cont.

- When working out the gradient,
- The gradient statement should be written in full.
- The points of extraction on the graph should be shown using a triangle.
- Substitution of the extracted points should be evident
- Gradient at a point on a curve, tangent is shown
- Graph should cover at least 2/3 of the page.
- Graphs in physics should never have broken axes since the intercepts that are significant will not be correct.- Poor scale

19. Other areas

- For structured questions, Comprehend your answer before you write it down
- Be careful with answers which come very fast in your head
- Never leave an alternative answer
- Cancelled work will be marked if no alternative
- If you must give more answers than required, never number, block or separate your answers with a comma. Stagger them.

20. Numerical Answers

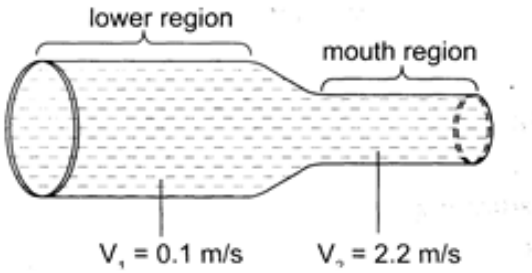
- Should never be expressed in fraction form unless so required.
- Should be expressed in 4 sig figures unless otherwise specified.

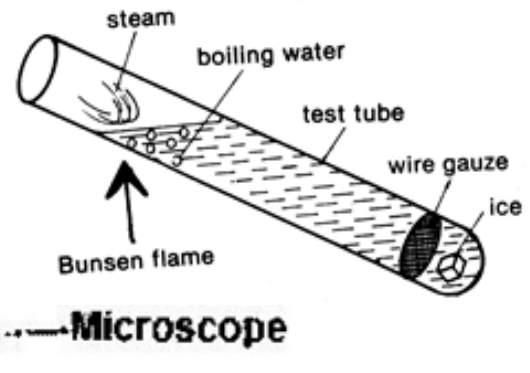
21. Questions involving diagrams

This involves questions like,

- show on the diagram,
- Indicate on the diagram
- Label
- Complete the diagram
- Sketch a diagram
- Draw a diagram
- Identify mistakes
- State or explain changes to improve on the diagram
- Explain how a drawn device works
- Draw a circuit diagram
- Complete the circuit
- sketch a graph etc.

22. Common diagrams





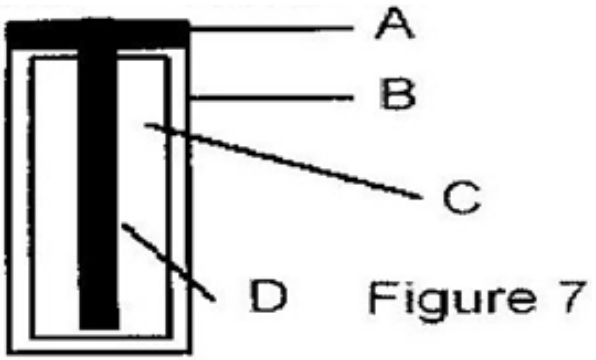


Figure 7

Figure 9

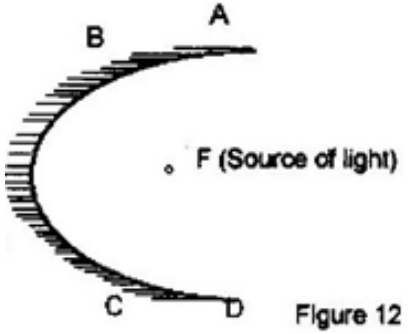


Figure 12

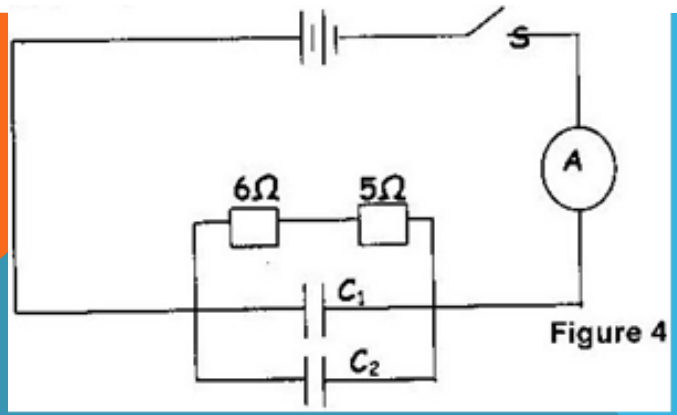
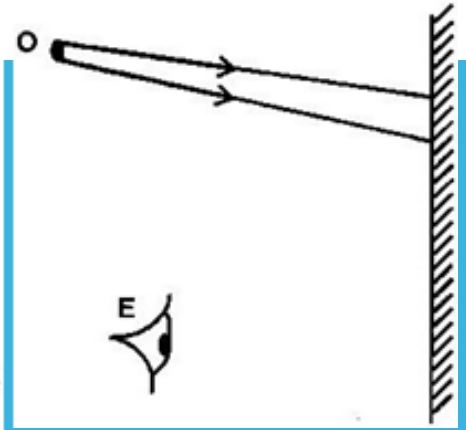
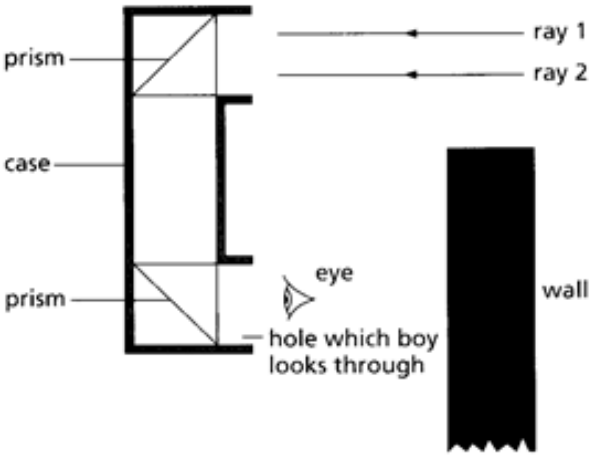
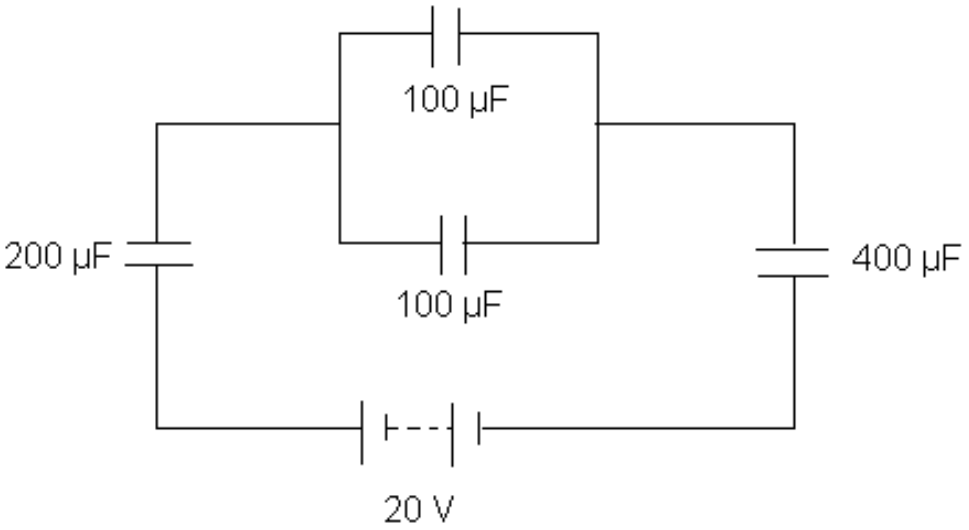
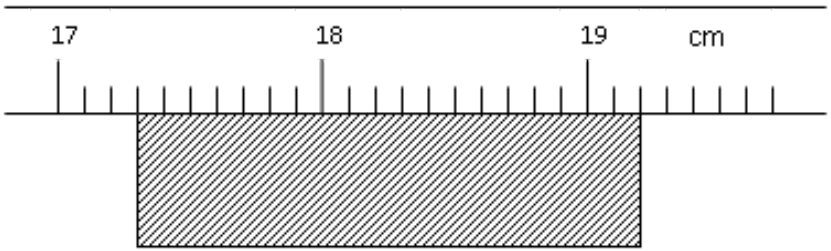


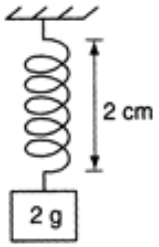
Figure 4

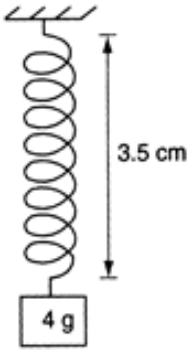


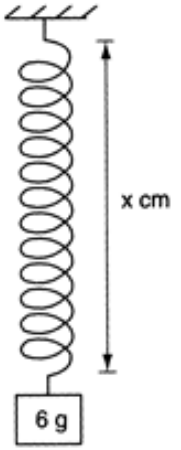

prism
case
prism
ray 1
ray 2
eye
hole which boy looks through
wall

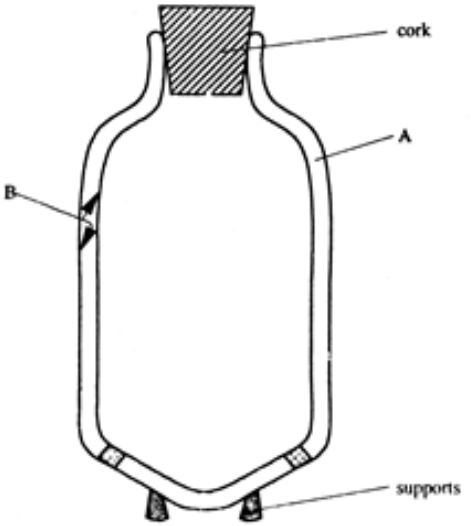

100 μF
200 μF
100 μF
400 μF
20 V

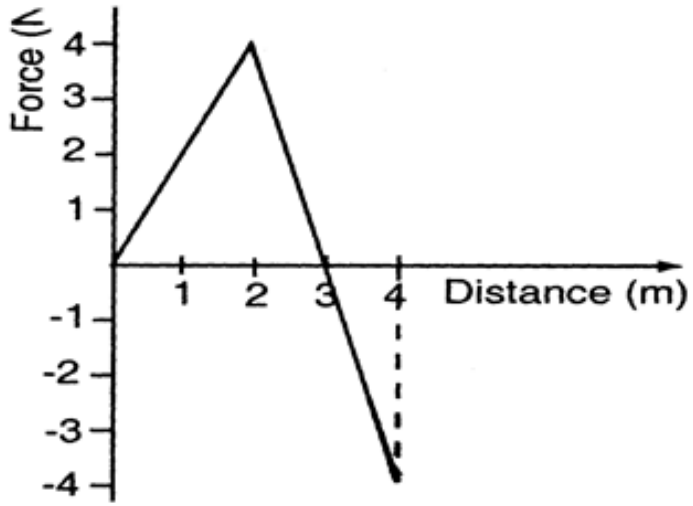

17
18
19
cm

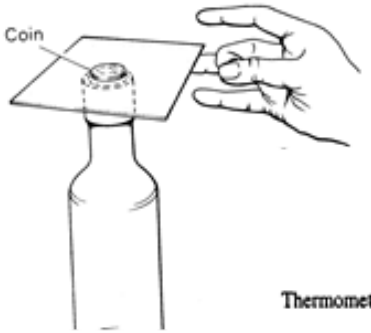

2 cm
2 g


3.5 cm
4 g


x cm
6 g


cork
A
B
supports


Force (N
4
3
2
1
-1
-2
-3
-4
1
2
3
4
Distance (m)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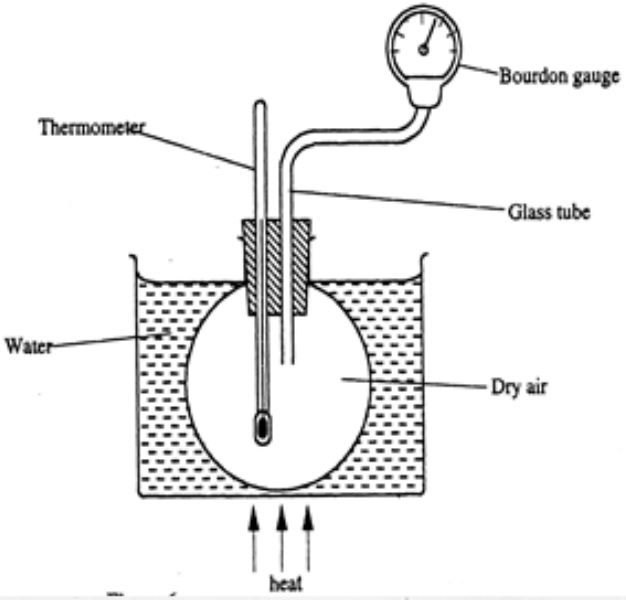
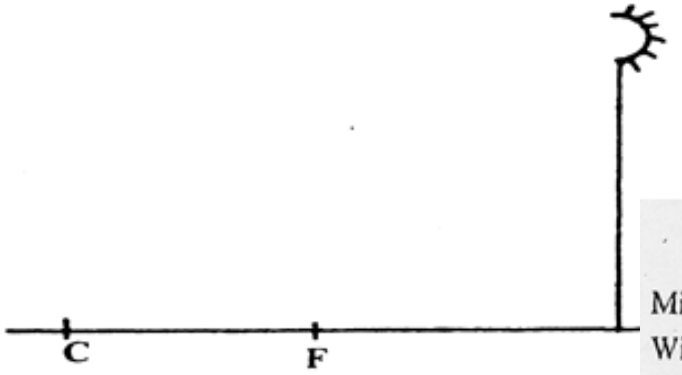
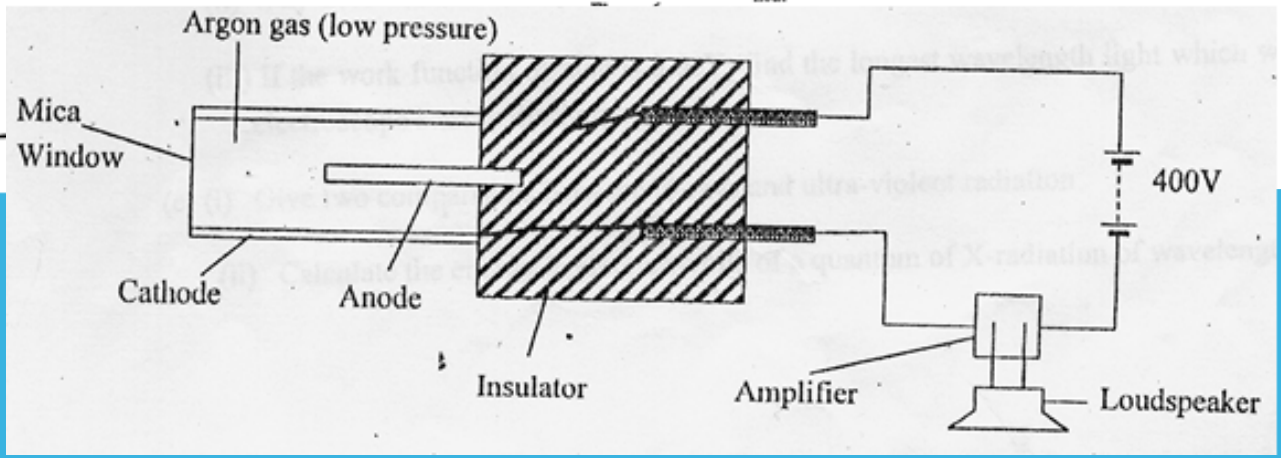
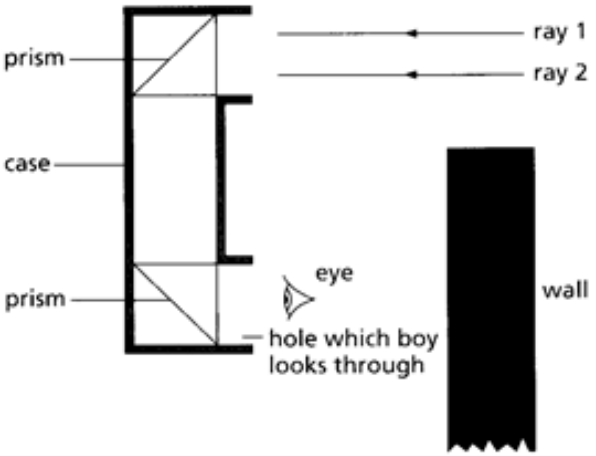
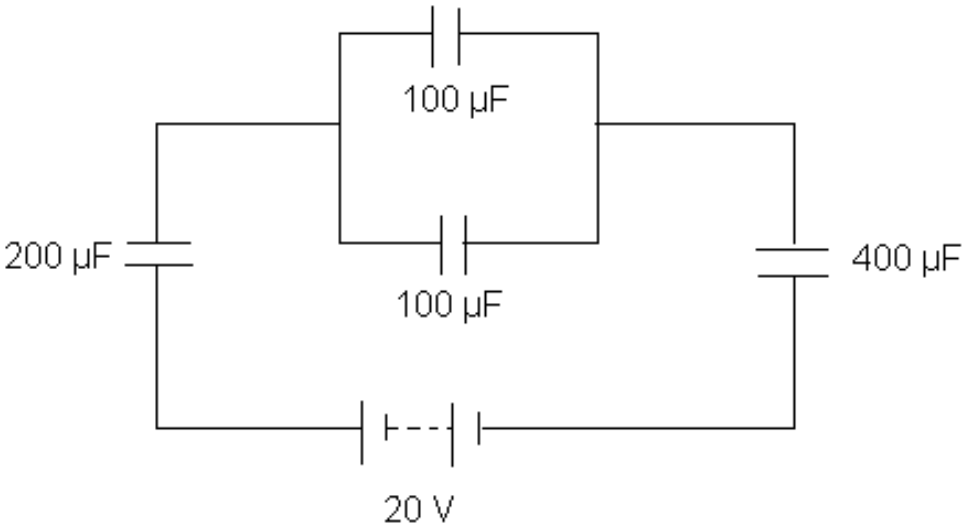
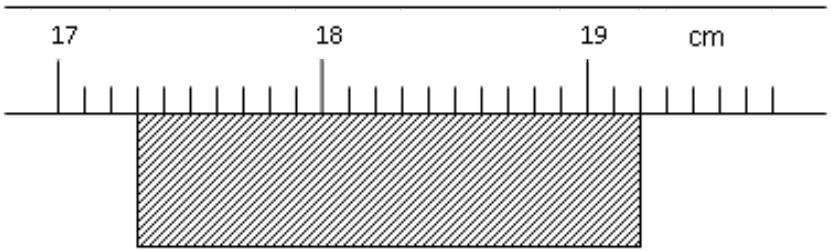

Bourdon gauge
Thermometer
Glass tube
Water
Dry air
heat

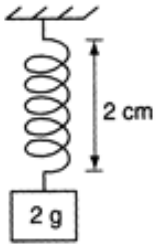

C
F

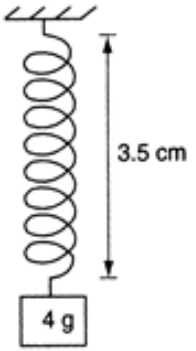

Argon gas (low pressure)
Mica
Window
Cathode
Anode
Insulator
400V
Amplifier
Loudspeaker

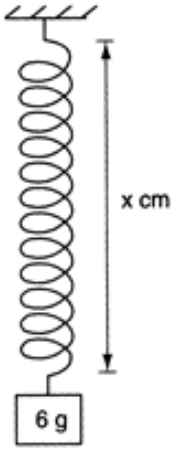

prism
case
prism
ray 1
ray 2
eye
hole which boy looks through
wall

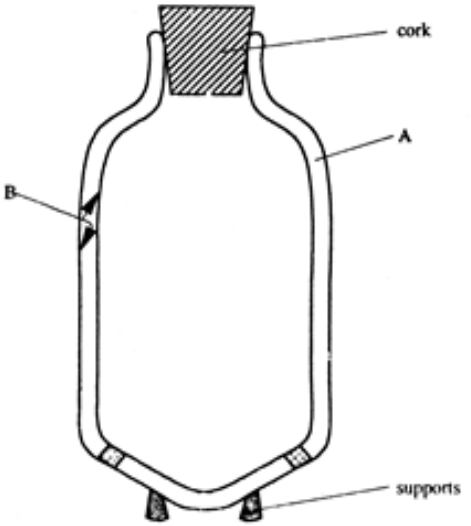

100 μF
200 μF
100 μF
400 μF
20 V


17
18
19
cm

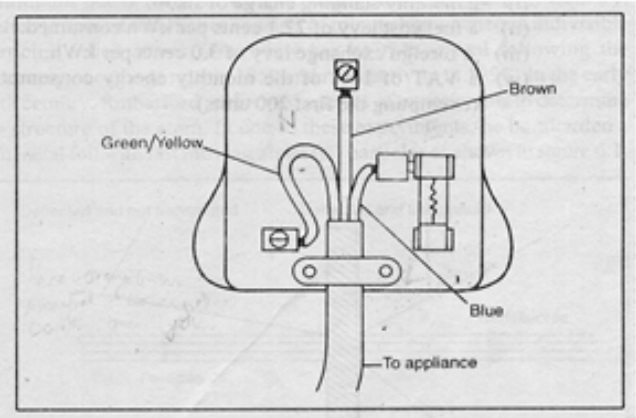

2 cm
2 g

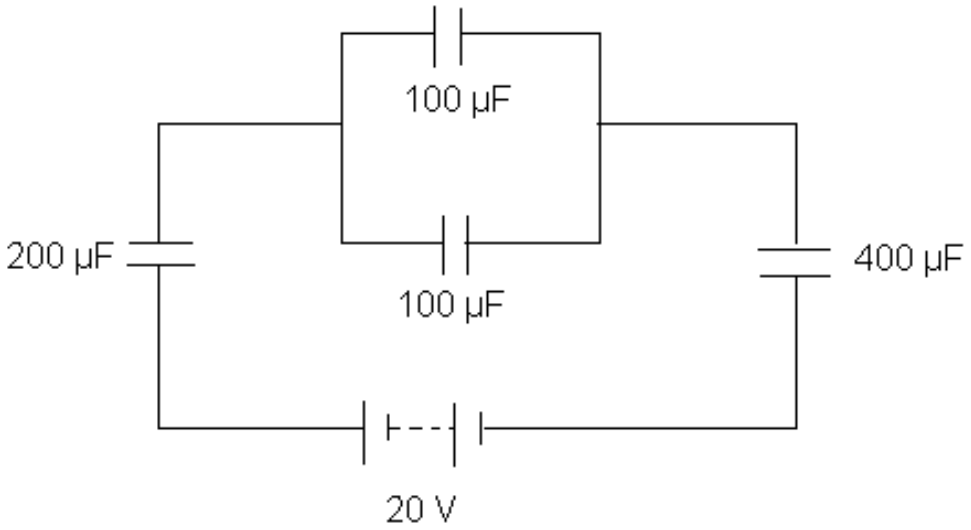

3.5 cm
4 g

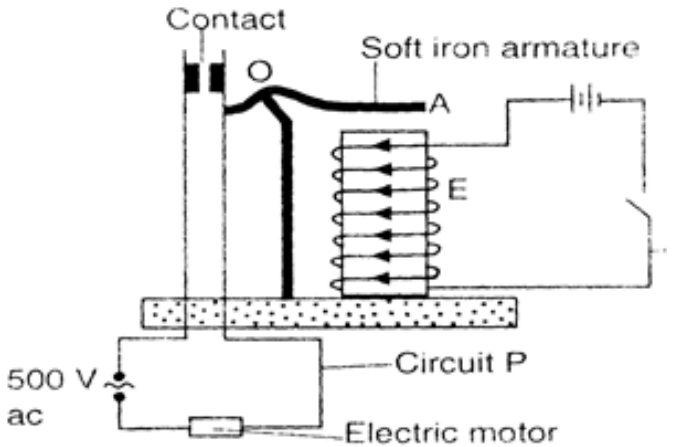

x cm
6 g

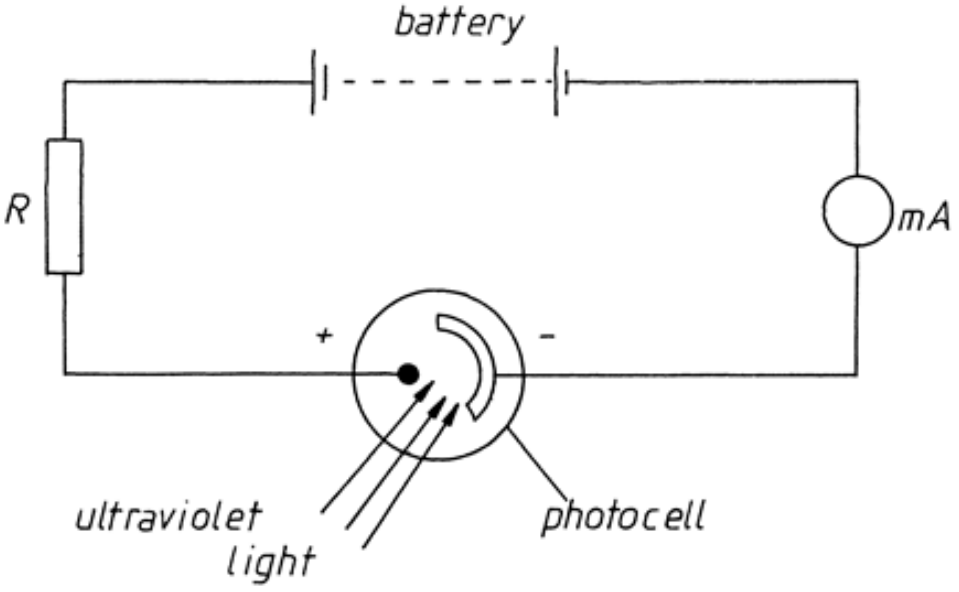

cork
A
B
supports

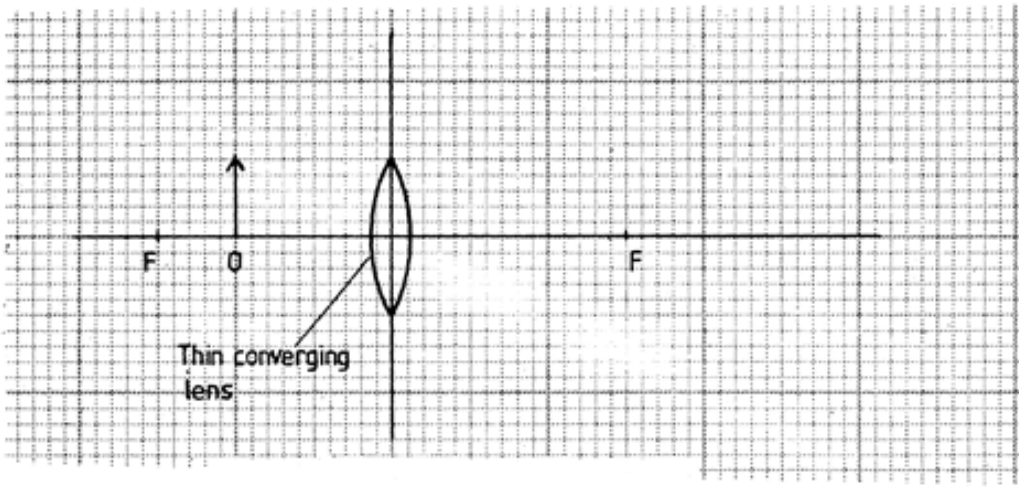
Circuit diagrams 23.











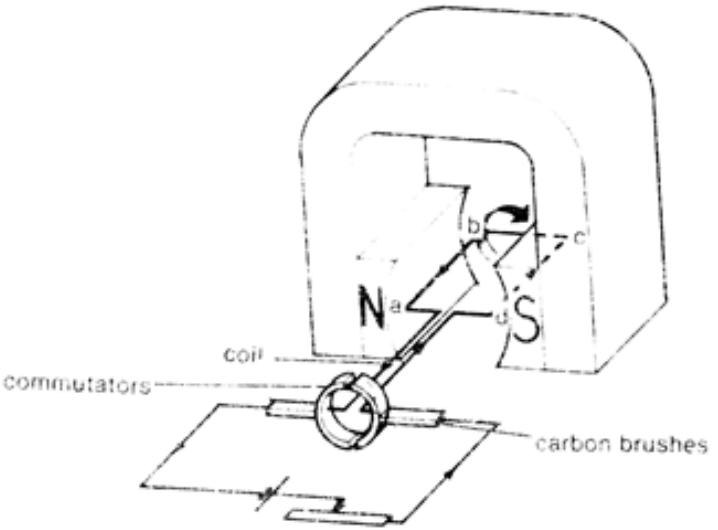
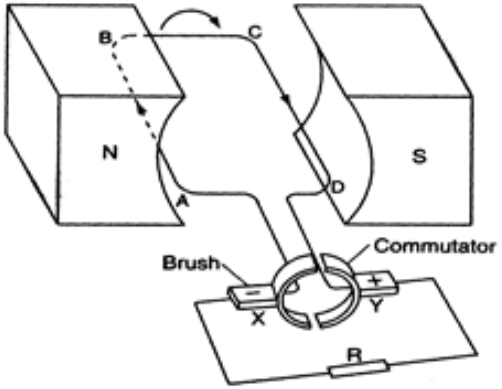


Figure 16.22 Simple DC motor



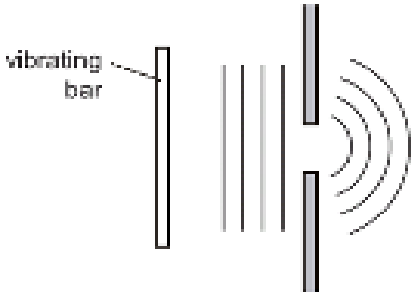


diagram 1

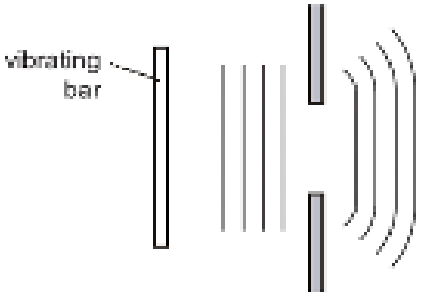
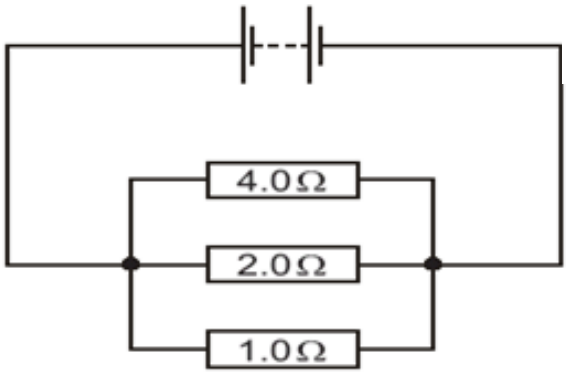
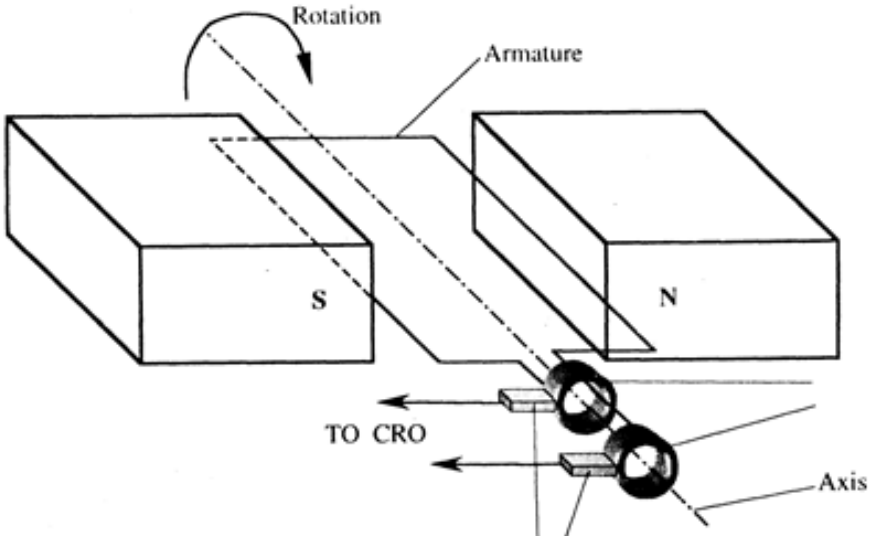
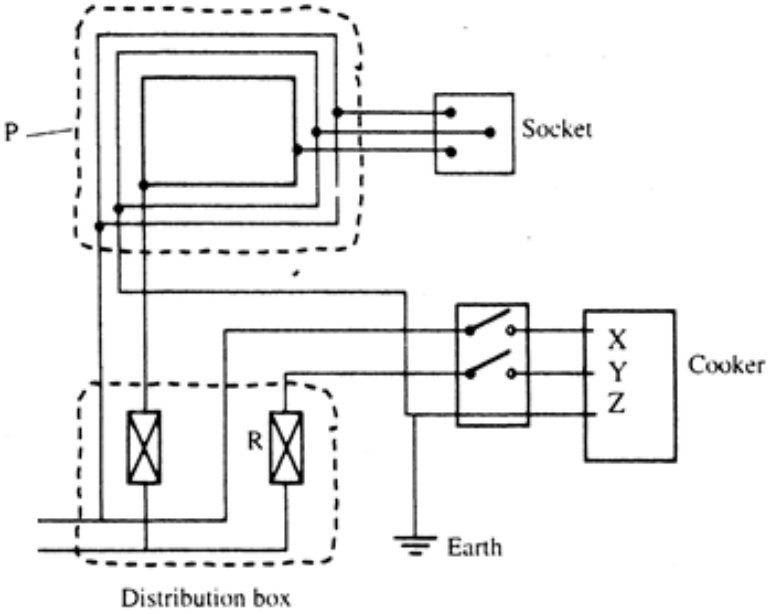
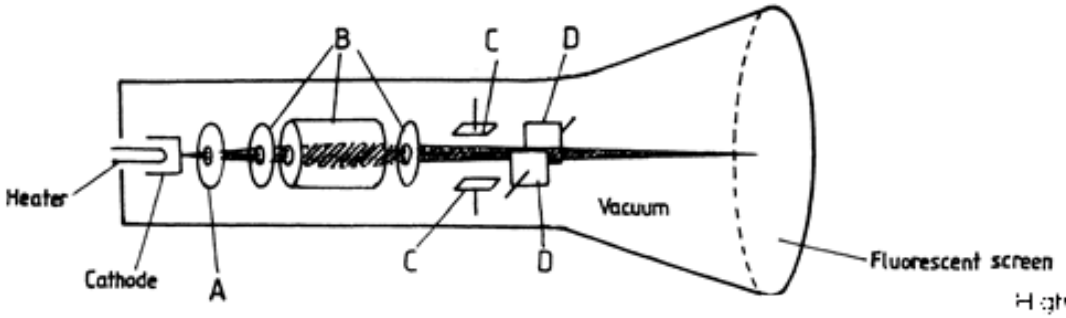


diagram 2









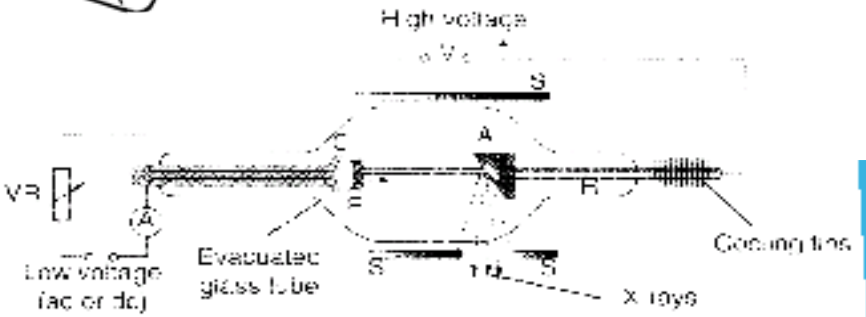
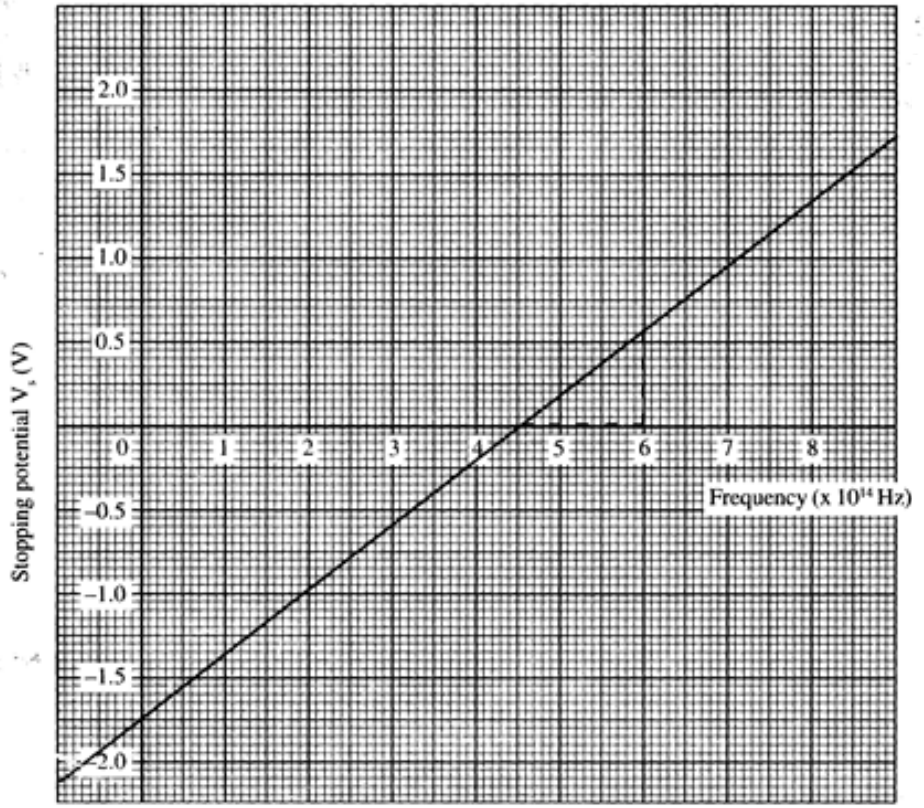


Fig. 3.1: Coolidge X-ray tube


Stopping potential V_s (V)
2.0
1.5
1.0
0.5
0
−0.5
−1.0
−1.5
−2.0
1
2
3
4
5
6
7
8
Frequency (x 10^{14} Hz)

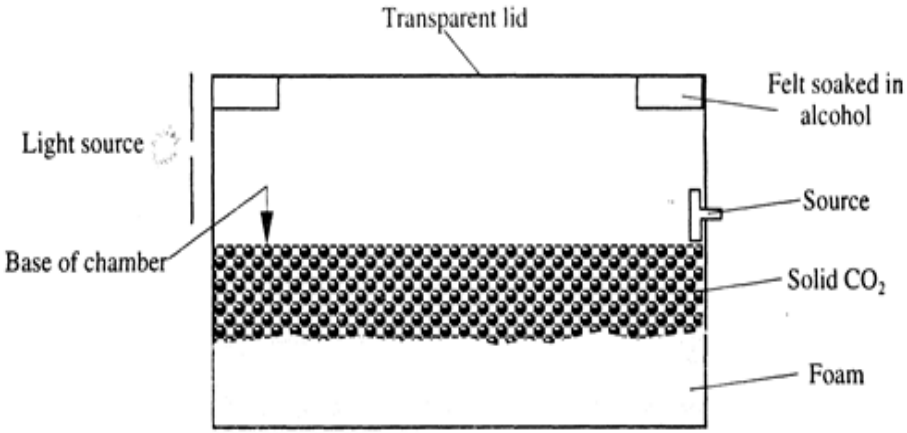
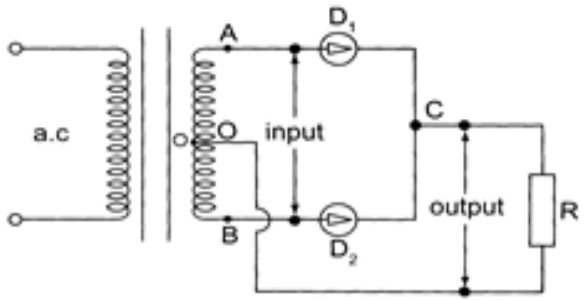
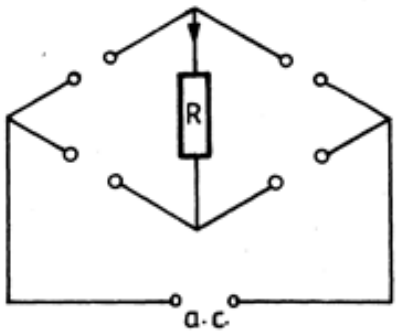
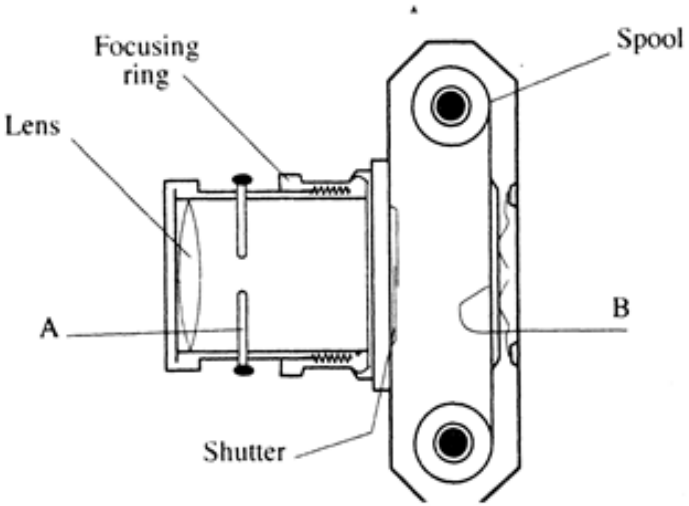
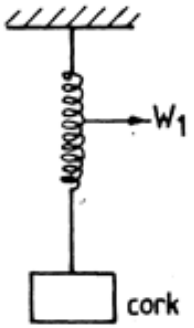

Transparent lid
Felt soaked in alcohol
Light source
Source
Base of chamber
Solid CO_2
Foam

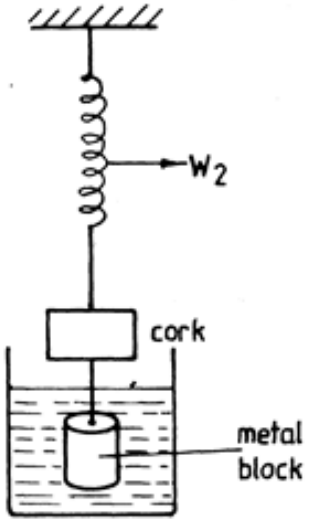
Figure 4

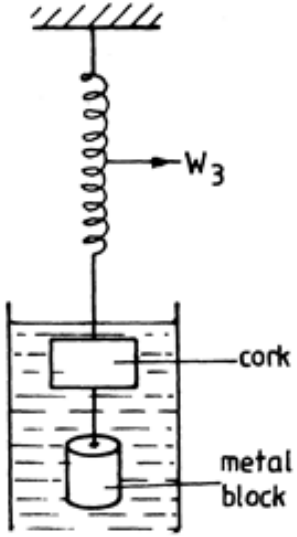

a.c
A
D_1
O
input
C
output
R
B
D_2

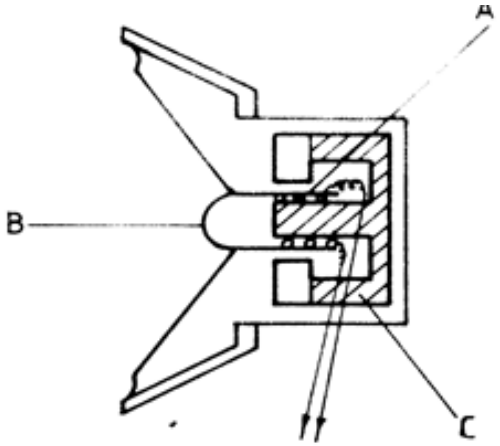

R
a.c

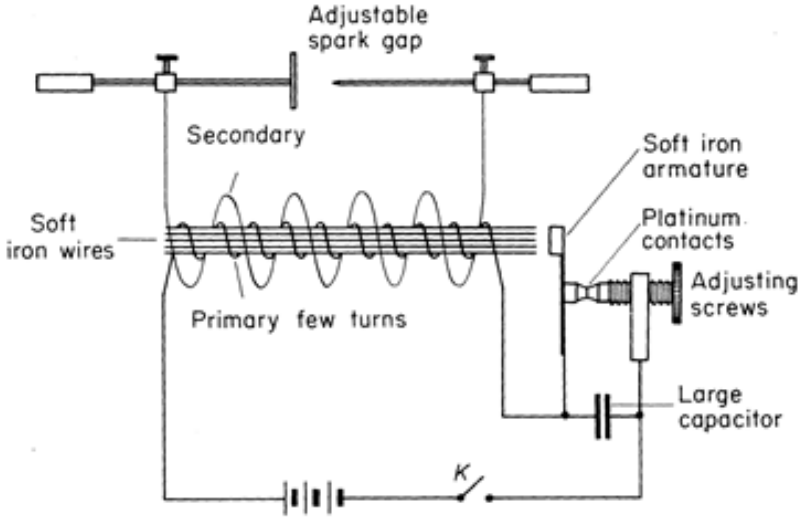

Focusing ring
Spool
Lens
A
B
Shutter


W1
cork


W2
cork
metal block


W3
cork
metal block


A
B
C


Adjustable spark gap
Secondary
Soft iron armature
Soft iron wires
Platinum contacts
Adjusting screws
Primary few turns
Large capacitor
K

Exam appproach

Peruse through the paper and ;

- ❖ Identify the easy and short questions and mark them . Usually carry 1-2 mks. Such are of the form;
  - ✓ Define
  - ✓ State
  - ✓ Label /show in the diagram
  - ✓ Identify
  - ✓ Name
  - ✓ Distinguish/compare/contrast
  - ✓ Simple calculations
- ❖ Easy but long questions. And with a different sign. 2-3 mks .Such are of the type;
  - ❑ state and explain – structured
  - ❑ Sketch a diagram or a graph
  - ❑ Draw a diagram or graph
  - ❑ Determine/calculate/Find the value of
  - ❑ Show that/ prove of a formula
  - ❑ Use the graph to determine
  - ❑ Describe
- ❖ Any other which may be deemed challenging. Such can not be more than two and does not

Cont. Exam appproach

- Start tacking the short and easy questions first
- Go to the easy but long questions
- Tackle any other question
- Verify your answers especially calculations
- Submit your work
- You are done

THANK YOU AND GOD BLESS YOU