SC 512105
WASSCE 2025
PHYSICS 1
Objective Test
1¼ hours

1

Name ....

Index Num

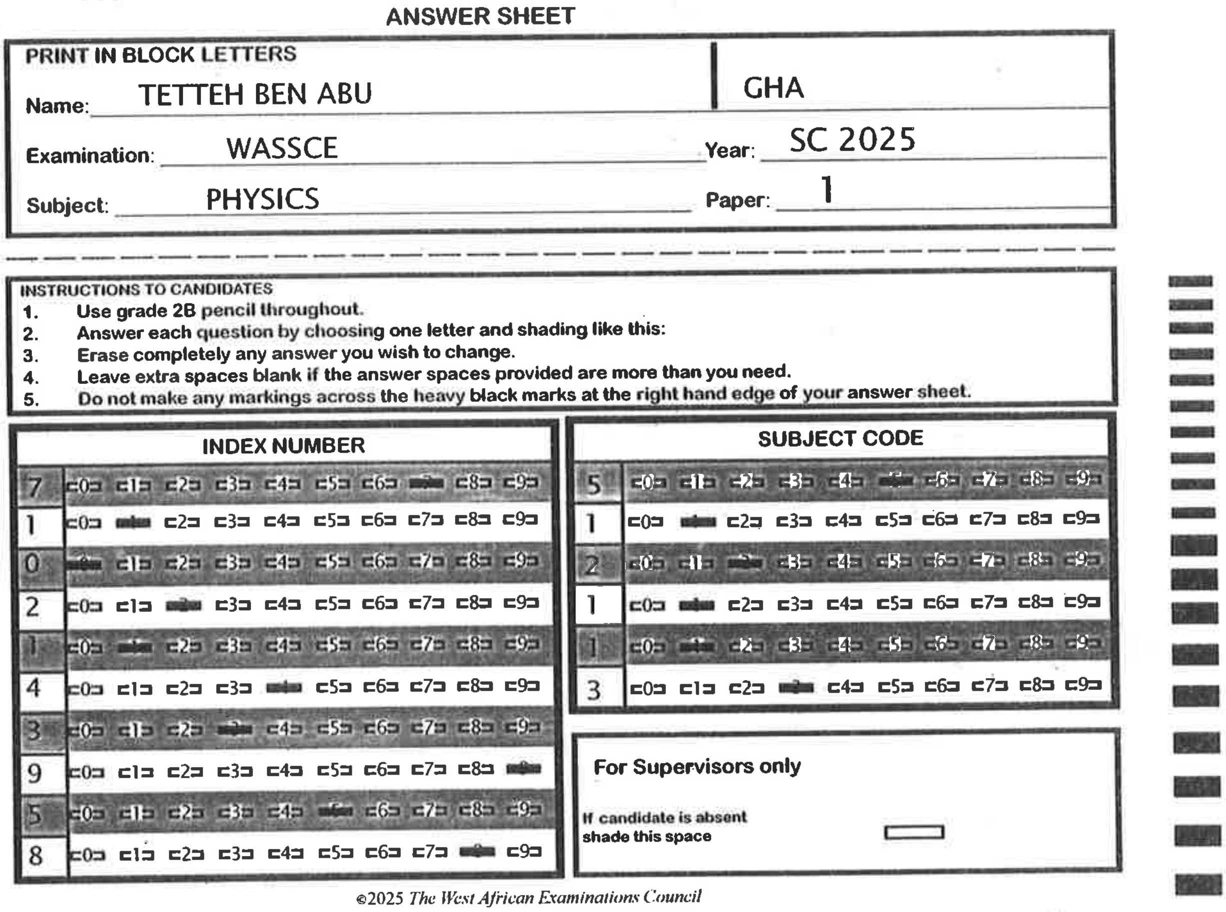
THE WEST AFRICAN EXAMINATION

West African Senior School Certificate Examination
for School Candidates

SC 2025 PHYSICS 1 1¼ hours
[50 marks]

Do **not** *open this booklet until you are told to do so. While you are waiting, read and observe the following instructions. Write your* **name** *and* **index number** *in the spaces provided above.*

1. Use **2B** pencil throughout.
2. On the pre-printed answer sheet, check that the following details are **correctly** printed:
   (*a*) In the space marked **Name**, check your **surname** followed by your **other names**.
   (*b*) In the spaces marked *Examination*, *Year*, *Subject* and *Paper*, check 'WASSCE', '(SC) 2025', 'PHYSICS', and '1' respectively.
   (*c*) In the box marked *Index Number*, your **index number** has been printed vertically in the spaces on the left-hand side, and each numbered space has been shaded in line with each digit. **Reshade** each of the shaded spaces.
   (*d*) In the box marked *Subject Code*, the digits 512113 are printed vertically in the spaces on the left-hand side. **Reshade** the corresponding numbered spaces as you did for your index number.
3. An example is given below. This is for a male candidate whose name is Ben Abu TETTEH. His *index number* is 7102143958 and he is offering *Physics* 1.



THE WEST AFRICAN EXAMINATIONS COUNCIL
ANSWER SHEET

PRINT IN BLOCK LETTERS
Name: TETTEH BEN ABU | GHA
Examination: WASSCE **Year:** SC 2025
Subject: PHYSICS **Paper:** 1

INSTRUCTIONS TO CANDIDATES
1. Use grade 2B pencil throughout.
2. Answer each question by choosing one letter and shading like this:
3. Erase completely any answer you wish to change.
4. Leave extra spaces blank if the answer spaces provided are more than you need.
5. Do not make any markings across the heavy black marks at the right hand edge of your answer sheet.

INDEX NUMBER

7	0	1	2	3	4	5	6	■	8	9
1	0	■	2	3	4	5	6	7	8	9
0	■	1	2	3	4	5	6	7	8	9
2	0	1	■	3	4	5	6	7	8	9
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4	0	1	2	3	■	5	6	7	8	9
3	0	1	2	■	4	5	6	7	8	9
9	0	1	2	3	4	5	6	7	8	■
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SUBJECT CODE

5	0	1	2	3	4	■	6	7	8	9
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3	0	1	2	■	4	5	6	7	8	9

For Supervisors only
If candidate is absent shade this space ☐

Answer **all** *the questions.*

Each question is followed by **four** *options lettered* A *to* D. *Find the* **correct** *option for* **each** *question and shade in pencil on your answer sheet, the answer space which bears the same letter as the option you have chosen.*

Give only **one** *answer to* **each** *question. An example is given below.*

A body starts moving with a speed of 40 m s^{-1} and accelerates uniformly to 90 m s^{-1} in 4.0 s. Calculate the distance travelled.

A. 360 m
B. 260 m
C. 200 m
D. 180 m

The correct answer is 260 m, which is lettered **B**, *and therefore answer space* **B** *would be shaded.*

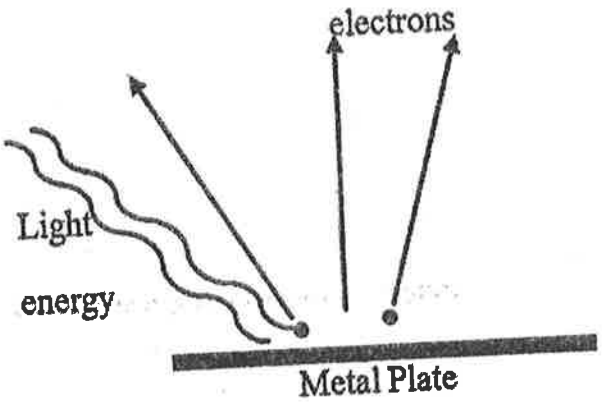
⊏A⊐ ▬B▬ ⊏C⊐ ⊏D⊐

Think carefully before you shade the answer spaces; erase completely **any** *answers you wish to change.*

Do **all** *rough work in this question paper.*

Now answer the following questions:

1. The phenomenon illustrated in the diagram below is



A. photoelectric effect.
B. thermionic emission.
C. reflection of light.
D. wave –particle paradox.

2. What temperature on the kelvin scale is equivalent to 10 °C change in Celsius reading?

A. 263 K
B. 273 K
C. 283 K
D. 10 K

3. Hot liquid in a vacuum flask cools extremely slowly because some modes of heat transfer cannot take place in a vacuum. These modes are

A. conduction and convection only.

B. conduction and radiation only.

C. conduction, convection and radiation.

D. convection and radiation only.

4. A swimmer coming out of a pool of water soon feels cold on a sunny day. The swimmer experienced coldness because

A. water evaporates from the skin.

B. convection occurs in the air.

C. air is a bad conductor of heat.

D. water is a good conductor of heat.

5. A car of mass 1000 kg travelling at 72 km hr^{-1} is brought to rest over a distance of 30 m. Calculate the retardation of the car.

A. 7.1 ms^{-2}

B. 6.2 ms^{-2}

C. 6.7 ms^{-2}

D. 5.8 ms^{-2}

6. Which of the following actions is a process of converting a moving-coil galvanometer into an ammeter? Connecting a resistor of

A. large resistance in series with it.

B. small resistance in parallel with it.

C. small resistance in series with it.

D. large resistance in parallel with it.

7. A ball, **X** is dropped from a height of 200 m at the same instance that another ball, **Y** is projected vertically from the ground with an initial velocity of 100 ms^{-1}. At what height above the ground will the two balls meet? [$g = 10\ ms^{-2}$]

A. 180 m

B. 100 m

C. 20 m

D. 220 m

8. Which of the following materials is used in nuclear reactors to moderate the speed of neutrons for the fission process?

A. Uranium rod

B. Boron rod

C. Graphite rod

D. Concrete shield

9. An object of mass 0.1 kg cools from 40° to 34°. Calculate the amount of heat released by the object. [specific heat capacity of the object is 0.4 J $kg^{-1}K^{-1}$]

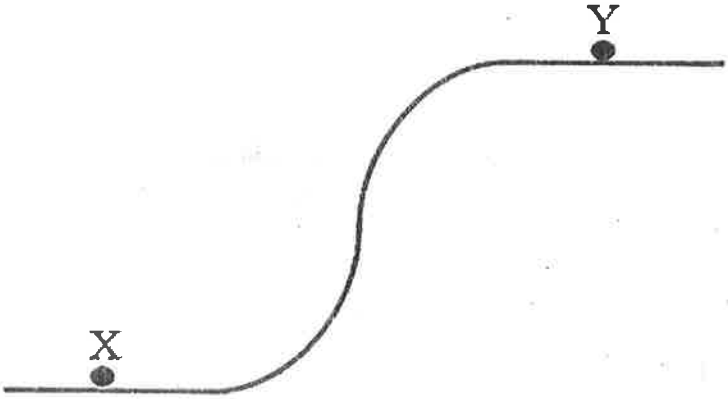
A. 5.61×10^3 J

B. 1.36×10^3 J

C. 0.24×10^3 J

D. 9.15×10^3 J

10. A cyclist travels up a hill from point, **X** to point, **Y** as illustrated in the diagram below. The major energy transformation from **X** to **Y** is



A. gravitational potential to kinetic.

B. potential energy.

C. kinetic to gravitational potential.

D. heat to kinetic.

11. A metal of mass 10 kg falls freely to the surface of a planet with an acceleration of 1.70 ms^{-2}. Calculate the magnitude of the weight of the metal.

A. 11.7 N

B. 8.3 N

C. 5.9 N

D. 17.0 N

12. The energy stored in a capacitor of capacitance 5 μF is 40 J. Calculate the voltage across the terminals of the capacitor.

A. 400 V

B. 2000 V

C. 4000 V

D. 200 V

13. When an elastic material exceeds its elastic limit, the material would

A. return to its original size.

B. yield at that point.

C. break at that point.

D. not extend again.

14. Two masses, **A** and **B** have the same momentum. Mass **B** can have more kinetic energy than **A** if it

A. is moving faster than **A**.

B. has the same mass as **A**.

C. has less mass than **A**.

D. is moving at the same speed as **A**.

15. The process by which heat is transferred from one point to another in a solid material is called

A. radiation.

B. conduction.

C. convection.

D. evaporation.

16. The induced emf of a transformer is 24.0 V when the output voltage is 240.0 V. What is the ratio of the numbers of turns in the primary coil to the numbers of turns in the secondary?

A. 15 :1

B. 1: 15

C. 1: 10

D. 10 : 1

17. Which of the following properties of a material is temperature dependent?

A. Opacity

B. Mass

C. Density

D. Weight

18. The air resistance on a parachutist of mass 102 kg falling vertically downward is 150 N. Calculate the acceleration of the parachutist. [$g = 10\ ms^{-2}$]

A. $11.4\ ms^{-2}$

B. $8.5\ ms^{-2}$

C. $4.8\ ms^{-2}$

D. $25.5\ ms^{-2}$

19. A golf ball is kicked with an initial velocity of $20\ ms^{-1}$ at an angle of 60° to the vertical . Calculate the magnitude of the horizontal component of the velocity of the ball.[$g = 10\ ms^{-2}$]

A. $23.1\ ms^{-1}$

B. $17.3\ ms^{-1}$

C. $10.0\ ms^{-1}$

D. $40.0\ ms^{-1}$

20. Two metals, A and B gain the same quantity of heat in warming through a temperature difference of 5 °C. Given that the ratio of their specific heat capacities are $\frac{A}{B} = \frac{2}{1}$, the ratio of their masses $\frac{M_A}{M_B}$ will be

A. $\frac{1}{2}$.

B. $\frac{1}{3}$.

C. $\frac{2}{1}$.

D. $\frac{3}{1}$.

21. The maximum frequency of incidence radiation on a metal surface below which no electron is emitted from the surface of a metal is called

A. threshold frequency.

B. critical frequency.

C. maximum frequency.

D. resonance frequency.

22. Convection takes place in

A. solid and liquid only.

B. solid and gas only.

C. liquid and gas only.

D. liquid only.

23. The S.I. unit for work is derived from the combination of the units

A. foot, pound and second.

B. kilogram , metre and second.

C. gram, metre and second.

D. kilogram, centimetre and second.

24. Which of the following statements about a curved mirror is **correct**?

A. The pole of a curved mirror is at the center of its reflecting surface.

B. A converging mirror diverges parallel rays from a point call real focus.

C. A curved mirror converges parallel rays to a point called virtual focus.

D. The focal length of a spherical mirror is twice the radius of curvature.

25. A cargo truck of mass 8000 kg is moving at a constant speed of 15 ms^{-1}. The brakes are suddenly applied and the truck comes to rest in 3 s. Determine the average braking force.

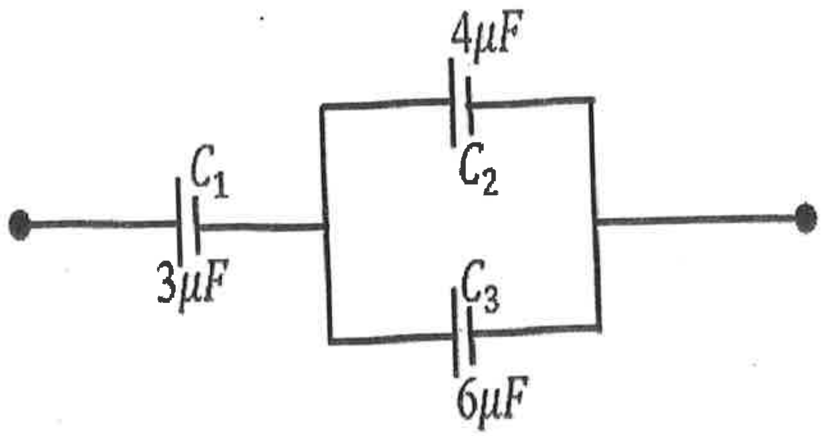
A. 40 kN

B. 80 kN

C. 120 kN

D. 24 kN

26. The network below is a combination of three capacitors. Calculate the effective capacitance of the connection.



A. 4.00 μF

B. 4.40 μF

C. 12.00 μF

D. 1.67 μF

27. A body acted upon by a variable force, **F**, produces a corresponding velocity **each** time. Assuming that the power of the body is constant, **F** and **V** are related by the expression

A. $F \propto V^{-1}$.

B. $F \propto V^{1/2}$.

C. $F \propto V^{2}$.

D. $F \propto V^{-2}$.

28. The distance between two successive troughs of a wave is 16.5 cm and the velocity of the wave is 247.5 ms^{-1}. Calculate the frequency of the wave.

A. 15.00 Hz

B. 40.84 Hz

C. 4083.75 Hz

D. 1500.00 Hz

29. In photoelectricity, the number of electrons emitted per second from a metallic surface is proportional to the

A. work function of the metal.
B. frequency of the incident radiation.
C. energy of the incident radiation.
D. intensity of the incident radiation.

30. A radio station broadcast covers a distance of 3.27 m away at a nearby stadium. At what frequency was the radio wave transmitted? [$c = 3.0 \times 10^{8}\ ms^{-1}$]

A. 92.5 MHz
B. 98.1 MHz
C. 100.9 MHz
D. 91.7 MHz

31. When two substances are placed in contact with **each** other and no net exchange of thermal energy occurs between them during the contact, the substances must have the same

A. heat of fusion.
B. heat of vaporization.
C. temperature.
D. specific heat capacity.

32. Hot ware of mass, X g is added to water of mass, $\frac{X}{2}$ g at 20 °C. If the temperature of the mixture is 50 °C, calculate the initial temperature of the hot water.

A. 72 °C
B. 65 °C
C. 86 °C
D. 55 °C

33. Which of the following statements about X-rays is **correct**? They

A. have very low frequency.
B. have long wave length.
C. cause certain materials to fluorescence.
D. are affected by electric fields.

34. Sound waves are produced in a stretched string by plucking it. Which of the following situations occurs as the waves travel along the string?.

A. Energy is transferred

B. Amplitude increases

C. Matter is transferred

D. Frequency increases

35. If Uranium – 234 disintegrates by emitting an alpha particle. The resultant atom would be

A. 232 Th.

B. 230 Th.

C. 234 Th.

D. 228 Th.

36. In a simple pendulum experiment, a graph of the length of the pendulum is plotted on the vertical axis and the square of the corresponding period on the horizontal axis. The acceleration due to gravity is given by the quantity

A. $4\pi^2 \times$ slope.

B. $\frac{4\pi^2}{\text{slope}}$.

C. $\frac{\text{slope}}{4\pi^2}$.

D. slope.

37. The **most** convenient way of charging a body without friction and contact with a charged body is by

A. induction.

B. demagnetization.

C. electrolysis.

D. catalyst.

38. A projectile, **P** is launched at an angle of 30° to the horizontal. A second projectile, **Q** is launched at an angle of 60° to the horizontal. The range of **P** compared to **Q** is

A. the same.

B. doubled.

C. halved.

D. reduced to one-quarter

39. During a radioactive process, the number of active nuclei disintegrating per unit time is the

A. undecayed sample.

B. activity.

C. half-life.

D. decay constant.

40. The number of electrons in uranium nucleus $^{235}_{92}U$ is

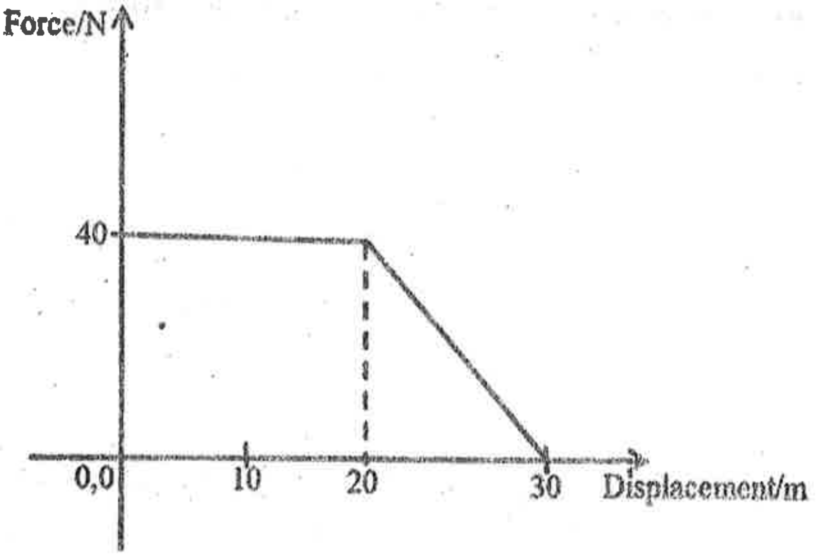
A. 164.

B. 143.

C. 327.

D. 92.

41. The diagram below illustrates the force – displacement graph for the motion of a body. Calculate the work done on the body.



A. 500 J

B. 1000 J

C. 750 J

D. 800 J

42. Which of the following pairs of light rays are most widely separated in the spectrum of white light.?

A. Blue and yellow

B. Orange and blue

C. Red and yellow

D. Orange and indigo

43. An atom in an excited state is one whose

A. electrons are all in the allowed orbit.

B. electrons have moved to infinity.

C. electrons have moved to higher energy levels.

D. potential difference is maximum.

44. According to Bohr's postulate about atoms,

A. the longer an electron remains its stationary state, the more its chances of making a transition.

B. an electron undergoing excitation must move from a higher to a lower stationary state.

C. when an electron remains in its stationary state , it must emit electromagnetic radiation.

D. an electron undergoing excitation must move from a lower stationary state to a higher stationary state.

45. A ray of light is incident upon a plane mirror at an angle of 25°. The mirror is rotated clockwise through an angle of 15°. Determine the new angle of reflection.

A. 65°

B. 55°

C. 80°

D. 40°

46. The water vapor in the air is saturated at a temperature called the

A. melting point.

B. freezing point.

C. dew point.

D. ice point.

47. A body, **X** of mass 5 kg moving with a velocity of 30 ms^{-1} is suddenly hit by another body, **Y** moving in the same direction. After the collision, **X** moves with a speed of 50 ms^{-1} in its original direction. Calculate the impulse received by body, **X**.

A. 250 Ns

B. 150 Ns

C. 100 Ns

D. 200 Ns

48. Two spherical bodies attract **each** other with a gravitational force of 4.0 N. What would be the magnitude of the force if the magnitude of the distance is quadrupled?

A. 2.0 N

B. 8.0 N

C. 16.0 N

D. 4.0 N

49. When the direction of vibration of particles of a medium is parallel to the direction of propagation of a wave, the wave propagated is said to be

A. transverse.

B. standing.

C. electromagnetic.

D. longitudinal.

50. How long will it take a radioactive material with a half-life of 10 days to reduce to $\frac{1}{32}$ of its original number ?

A. 50 days

B. 30 days

C. 20 days

D. 40 days

END OF PAPER

SC5122
WASSCE (SC) 2025
PHYSICS 2
Essay
1½ hours
2

CANDIDATE'S NAME

INDEX NUMBER	SIGNATURE

DATE:

THE WEST AFRICAN EXAMINATIONS COUNCIL

West African Senior School Certificate Examination
for School Candidates

SC 2025 PHYSICS 2 1½ hours
[60 marks]

INSTRUCTIONS TO CANDIDATES

1. *In the spaces provided above, fill in your* **name**, **full index number**, *normal* **signature** *and the* **date** *of examination.*

2. *This booklet consists of* **two** *parts:* **I** *and* **II**. *Answer* **eight** *questions in all:* **five** *questions from part* **I** *and* **three** *questions from part* **II**.

3. *Write your* **index number** *and the* **question number** *of* **each** *question you answer, at the* **top** *of* **each** *page.*

4. *Write on* **both** *sides of the paper unless otherwise instructed on the question paper.*

5. *Begin* **each** *answer to a question on a fresh page. Leave* **two** *lines between answers where there are sub-sections to the same question.*

6. *On* **no account** *should you tear off any part of the booklet. It is an examination malpractice to do so. The answer booklet will be collected at the end of the examination.*

7. *Write in the space provided below, the* **NUMBER OF THE QUESTIONS YOU HAVE ANSWERED** *in the order in which you have written them.*

For Examiner's Use Only	
Question Number	Mark
TOTAL	

PAPER 2
ESSAY
[60 marks]

1½ hours

Answer **eight** *questions in all;* **five** *questions from Part* **I** *and* **three** *questions from Part* **II**.

PART I
[15 marks]

Answer any **five** *questions from this part.*

All *questions carry* **equal** *marks.*

1. The Young's modulus of an elastic material is represented by the equation, $\frac{KL}{A} = M^xL^yT^z$ where **K**, **L** and **A** represent the force constant, length and area respectively. Determine the values of x, y and z. [3 marks]

2. Fig. **1** illustrates a body projected at point, **O**, with an initial velocity, **u**, to the horizontal.

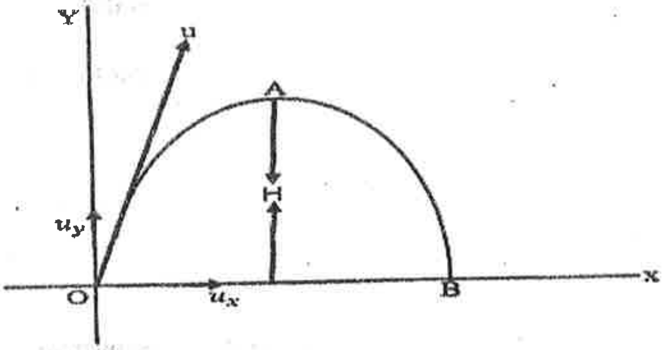


Fig. **1**

(*a*) At what point is the velocity of the projectile momentarily at rest?

(*b*) State the value of θ when the distance **OB** is maximum.

(*c*) Write an equation for the time, *t*, taken by the projectile to reach maximum height.

[3 marks]

3. State **three** conditions under which a laser will produce laser beam. [3 marks]

4. A spherical ball is dropped in a cylinder that contains viscous fluid. List **three** forces that act on the ball as it floats through the fluid. [3 marks]

5. A simple pendulum bob is displaced at an angle of 10° and then released after which it undergoes oscillation on the vertical plane. The pendulum is 100 cm long and has a mass of 60 g. Calculate the maximum potential energy attained by the bob in oscillation. [$g = 10\ m\ s^{-2}$] [3 marks]

6. State **three** uses of a diode. [3 marks]

7. An elastic material of force constant 750 Nm^{-1} has a length of 200 cm. If the cross sectional area of the material is 5 mm^2, calculate the Young's modulus of the material. [3 marks]

PART II

[45 marks]

Answer **three** *questions from this part.*
All *questions carry* **equal** *marks.*

8. (*a*) (i) Draw a pulley system that has a velocity ratio of 4.
(ii) A body of mass 25 kg is pulled over a rough surface with a 35 N force. If the object accelerated at a rate of 1.5 ms^{-2}, calculate the frictional force acting on the object and the surface.

[5 marks]

(*b*) Define the following terms as applied to machines:
(i) velocity ratio;
(ii) efficiency.

[4 marks]

(*c*) (i) A screw jack of pitch 2 mm is to be used to lift a car of mass 8000 kg. The length of the tommy bar of the jack is 25 cm. Calculate the effort that would have been required to attain an efficiency of 85 %.
(ii) Explain why the efficiency of a machine is always **less** than 100 %.

[6 marks]

9. (*a*) (i) Define the term *thermal conductivity*.
(ii) Give **one** difference between *latent heat of fusion* and *latent heat of vaporization*.

[4 marks]

(*b*) (i) An iron rod of mass 2.5 kg at 250 °C is dropped into some quantity of water initially at 33 °C. What would be the mass of the water when the temperature is at 72 °C?
(ii) A piece of ice at −15 °C is subjected to heat until the ice changes to steam at 100 °C. Sketch a heating curve to illustrate the changes in temperature during the process.

[7 marks]

(*c*) (i) State **two** effects of heat on a substance.
(ii) By how much should water of temperature −25 °C be increased to obtain its freezing point temperature?

[4 marks]

10. (*a*) (i) State **two** characteristics of resonance.
(ii) Mention the effects of temperature and pressure on the speed of sound.
(iii) List the types of resonance as applied to wave.

[7 marks]

(*b*) A referee leaning on a wall blows his whistle towards another wall 50 m away. He hears the second echo 2 seconds later. Calculate the velocity of the sound of the whistle in air.
[speed of sound in air = 330 ms^{-1}]

[3 marks]

(*c*) (i) Draw a diagram illustrating convergent and divergent beams of light.
(ii) The critical angle for glass in air is 39°. Calculate the refractive index of the glass.

[5 marks]

11. (*a*) In a tabular form, classify the following substances as ferromagnetic or diamagnetic materials: bismuth, nickel, cobalt, lead, gadolinium, mercury. [3marks]

(*b*) Two capacitors, 8 μF and 4 μF are connected in parallel and placed in series with a 6 μF capacitor:

(i) draw the circuit diagram for the arrangement;

(ii) calculate the effective capacitance in the circuit.

[5 marks]

(*c*) (i) A step up transformer is designed to operate from a 20 V supply to deliver 200 V. If the efficiency of the transformer is 80 %. Calculate the current in the primary coil when the output terminals are connected to a 300 V and 150 W lamp.

(ii) A charged particle travelling at a speed of 7.0×10^6 ms^{-1} enters at right angle into a magnetic field of strength 0.30 T. If it moves in a circular path of radius 25 cm in the field, calculate the ratio of the charge, *q*, to the mass, *m*, of the particle.

[7 marks]

12. (*a*) (i) Define *decay probability* of a radioactive element.

(ii) State the difference between *prompt neutrons* and *delay neutrons*.

[4 marks]

(*b*) A metal has a work function of 3.2 eV, calculate:

(i) its threshold frequency;

(ii) the maximum velocity of photoelectrons produced when the substance is illuminated with light of wave length 4.5×10^{-7} m;

(iii) the stopping potential with light of wavelength 4.5×10^{-7} m.

[9 marks]

(*c*) Table **1.0** shows the energy levels of an atom, study it carefully and draw the energy level diagram of the atom.

n	1	2	3	4	5	∞
E_n/eV	−12.30	−5.59	−1.50	− 0.75	− 0.33	0.00

Table **1.0**

[2 marks]

END OF PAPER

....Question Number.....................................

Index Number... **Question Number**.........................