

# UNEB U.C.E PHYSICS (PAPER 1) 2010

## SECTION A: (40 MARKS)

Answer all questions in the section

1. In a solar heating system, black layers are used because they are

- A. Bad emitters of heat.
- B. Bad absorbers of heat
- C. Good absorbers of heat
- D. Good reflectors of heat

2. Which of the following affects the frequency of a vibrating string?

- A. Tension and length of the string
- B. Length and mass of the string
- C. Mass per length of the string and temperature
- D. Tension and the velocity of sound produced.

3. Which of the following are second class levers?

- (i) See saw
- (ii) Wheel barrow
- (iii) Pair of tongs
- (iv) Nut cracker

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

4. The energy change that occurs in a loud speaker is

- A. Electrical to sound energy
- B. Kinetic to sound energy
- C. Sound to electrical energy
- D. Potential to sound energy

5. Figure 1 shows two coils P and Q close to each other

When switch K is closed, the bulb lights momentarily because

- (i) An emf is induced in Q
- (ii) An emf is induced in coil P
- (iii) The magnetic field between P and Q changes.

- A. (i) only
- B. (ii) only

- C. (iii) only
- D. (i) and (iii) only

6. A stone has a mass of 27g and volume  $9\text{cm}^3$ . find its density in  $\text{kgm}^{-3}$

- A.  $3.0 \times 10^3 \text{ kg m}^{-3}$
- B.  $3.0 \text{ kg m}^{-3}$
- C.  $3.0 \times 10^{-3} \text{ kg m}^{-3}$
- D.  $3.0 \times 10^{-5} \text{ kg m}^{-3}$

7. Figure two shows a wave trace when a.c is applied to the Y- plates and time base voltage to the x-plates of a C.R.O

The peak voltage is represented by

- A. PQ
- B. PR
- C. SU
- D. ST

8. A body of mass 2kg is projected vertically upwards with a velocity of  $10\text{ms}^{-1}$ . Find the maximum height reached.

- A. 0.5 m.
- B. 5.0m.
- C. 10.0m
- D. 50.0m

9. A charged microscope loses its charge when a flame is brought near its cap because

- A. Point action takes place at the cap
- B. The flame blows the charges off the cap
- C. Charges of opposite sign from the flame are attracted onto the cap
- D. The flame ionizes nearby air molecules and those of opposite sign are attracted on the cap.

10. Sound waves travel a distance of 48cm in 8s. if the separation between successive compressions is 3.0cm, find the frequency of the wave.

- A. 0.5 Hz
- B. 2.0 Hz
- C. 18.0 Hz
- D. 128.0 Hz

11. A ball falls from rest through a height of 92.5cm in 0.45s. find the acceleration due to gravity.

- A.  $0.45^2 \times 100 \text{ ms}^{-2}$   
 $2 \times 92.5$

B.  $0.45^2 \times 100 \text{ ms}^{-2}$

92.5

C.  $92.5 \text{ ms}^{-2}$

$0.45^2 \times 100$

D.  $2 \times 92.5 \text{ ms}^{-2}$

$0.45^{-2} \times 100$

12. A needle floats on the surface of water because of

- A. adhesion
- B. viscosity
- C. surface tension
- D. capillary attraction.

13. A body of mass 30kg weighs 60N on planet X. which one of the following statements is true?

- A. The acceleration due to gravity on X is greater than that on the earth.
- B. The mass of the body is greater on X than it is on earth
- C. The acceleration due to gravity on X is less than that on the earth.
- D. The mass of the body is less n X than it is on earth.

14. Which of the nuclei  ${}_{28}^{52}\text{W}$ ,  ${}_{28}^{52}\text{X}$ ,  ${}_{18}^{40}\text{Y}$  and  ${}_{18}^{40}\text{Z}$  are isotopes?

92 92 84 83

- A. W and Y
- B. X and Z
- C. Y and Z
- D. W and X

15. In figure 3, p is a charged body.

The possible signs of charges at X, Y and P is

X Y P

- A. Negative Positive Positive
- B. Negative Positive Negative
- C. Positive Positive Positive
- D. Negative Negative Negative

16. A body moving on a horizontal surface experiences a frictional force of 5N. if the normal reaction on the body is 20N, find the mass of the body.

- A. 0.5 kg
- B. 1.5 kg
- C. 2.0 kg
- D. 2.5 kg

17. Which one of the following is correct about the molecular theory of the magnet?

- A. Dipoles of a magnetized material face the same direction.
- B. Unmagnetised magnetic materials have no molecular magnets.
- C. Magnetic keepers reduce the magnetic force for the dipoles.
- D. Unmagnetised magnetic materials have molecular magnets arranged in an orderly manner.

18. A crane lifts a mass of 500kg through a height of 12m in 5s. find the power output.

- A.  $500 \times 5 \times 12 \text{ w}$
- B.  $500 \times 102 \times 5 \text{ w}$

10

C.  $500 \times 10 \times 12 \text{ w}$

5

D Unmagnetised magnetic materials have molecular magnets arranged in an orderly manner.

19. Figure 4 shows a ray of light from an object, Q refracted by a convex lens.

The image formed by the lens is

- (i) Real
- (ii) Inverted
- (iii) Upright

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

20. The velocity of a body of mass 2kg changes from  $10\text{ms}^{-1}$  to  $20\text{ms}^{-1}$  in 4s.

Find the resultant force that acts on the body.

- A. 2.5N
- B. 5.0N
- C. 10.0N
- D. 20.0N

21. Figure 5 shows a voltmeter ( v ) connected across a conductor of resistant R.

If the current through the conductor is 2.5A and the voltmeter reads 12.5v, find the value of R.

- A. 31.25#
- B. 15.00#
- C. 5.00#
- D. 0.20#

22. Which one of the following does not affect the rate at which a gas diffuses through a porous partition?

- A. Temperature of the gas
- B. Size of gas molecules
- C. Volume of the gas
- D. Size of the pore

23. Light travelling in air enters glass of refractive index 1.50. If the angle of incidence is  $30^{\circ}$ , what is the angle of refraction?

- A.  $19.5^{\circ}$
- B.  $20.0^{\circ}$
- C.  $45.0^{\circ}$
- D.  $48.6^{\circ}$

24. The mass of a sample of radioactive iodine -131 is 800g. if the half life of iodine -131 is 8 days, find the mass remaining undecayed after 32 days.

- A. 25g.
- B. 50g
- C. 100g
- D. 200g

25. Aluminium expands more than copper for the same temperature change.

Which of the following is true when a copper -aluminium bimetallic strip is heated?

- (i) It curves with copper on top
- (ii) It curves with aluminium on top
- (iii) It increases in length

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

26. A spherical ball has a radius of 3cm. Find its volume in  $m^3$ .

27. The work done in transferring one coulomb of charge from one point to another in a circuit is the

- A. Power
- B. Current
- C. Potential difference
- D. Electromotive force

28. A vibrator of frequency 20Hz produces waves of velocity  $2\text{ms}^{-1}$ . Find the period of the waves.

- A.  $1.0 \times 10^{-1}\text{s}$
- B.  $5.0 \times 10^{-2}\text{s}$
- C.  $5.0 \times 10^{-1}\text{s}$
- D.  $1.0 \times 10^1\text{s}$

29. During the power stroke of a petrol engine the

- A. Inlet valve opens.
- B. Piston moves down.
- C. Expanding gas pushes the piston down.
- D. Burnt gas is pushed out from the cylinder

30. A heater rated 240v 500w boils off water at  $100^{\circ}\text{C}$  in 6 minutes. Find the mass of the steam formed. ( specific latent heat of vaporization of water is  $2.26 \times 10^6 \text{ J kg}^{-1}$ )

A.  $\frac{6 \times 60 \times 2.26 \times 10^6}{500}$  kg

500

B.  $\frac{500 \times 2.26 \times 10^6}{6 \times 60}$  kg

6x60

C.  $\frac{6 \times 2.26 \times 10^6}{500}$  kg

500

D.  $\frac{500 \times 6 \times 60}{2.26 \times 10^6}$  kg

$2.26 \times 10^6$

31.

Figure 6 shows an electrical symbol for a

- A. Transformer
- B. Ammeter
- C. Rheostat

D. Cell

32. A mirage is formed as a result of

A. Diffraction of light

B. Absorption of light

C. Separation of white light into its components.

D. Total internal reflection of light

33. A spring has a natural length of 12cm. when load X is suspended from it, its length increases to 22cm, and when a load of 250N is attached to it, the length increases to 27cm. find the value of X.

A.  $250 \times 10$

15

B.  $250 \times 10$

5

C.  $250 \times 5$

10

D.  $250 \times 15$

10

34. Which one of the following is an advantage of a force pump over a lift pump?

A. A force pump does not use atmospheric pressure to raise water.

B. A force pump raises water to a level higher than a lift pump

C. A force pump uses less energy to raise water than a lift pump

D. The length of a force pump is less than that of a lift pump

35. Three resistors each of  $2\Omega$  are connected as shown in figure 7.

The effective resistance is

A.  $1.5\Omega$

B.  $2.0\Omega$

C.  $3.0\Omega$

D.  $6.0\Omega$

36. Which one of the following is not a radioactive emission?

A. X-rays

B. Y-rays

C.  $\alpha$ -rays

D. B-rays

37. Figure 8 shows a structure supporting a load.

Which of the girders R, S, T and U is under compression?

- A. U and R
- B. T and R.
- C. S and U.
- D. S and T

38. Figure 9 shows a cone of mass 4kg and base radius of 50cm resting on a table.

Find the pressure it exerts on the table.

39. Which of the following is true about a standing wave?

- (i) The wave profile does not move
  - (ii) It is formed when the waves of equal amplitude and speed moving in opposite directions overlap.
  - (iii) It is formed when identical waves traveling in the same direction with equal speed overlap.
- A. (i) and (iii) only
  - B. (i) and (ii) only
  - C. (ii) and (iii) only
  - D. (i) only.

40. A fire alarm rated 240v, 1.5kw runs for 10hrs a day. If the cost per unit electricity is shs.380, find the daily cost of running the alarm.

- A. Shs 570
- B. Shs 2400
- C. Shs 3800
- D. Shs 5700

SECTION B (40 MARKS)

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

41. Figure 10 shows a pulley system supporting a load of 600N.

Find the

(i) Tension in the string

(i) Value of  $p$  if the mechanical advantage is 3

42(a) State any two properties of alpha particles.



(b) Radon  $^{222}_{88}\text{Rn}$  decays to radium isotope, Ra, by emission of two beta particles according to the following equation.

(i) What is the value of A?

(ii) How many neutrons does the nucleus of radium isotope have?

43. (a) What is meant by temperature of body?

(b) Figure 11 shows a type of thermometer

(i) Name the type of the thermometer

(ii) State the physical property it uses to measure temperature

(iii) What is the use of the galvanometer?

44. (a) what is a magnetic field?

(b) Figure 12 shows the head of a cassette tape recorder.

(i) Explain why a current through the wire causes the tape to become magnetized.

(ii) The tape is usually made of plastic and coated with a thin layer of iron oxide. Why is iron oxide used?

45. (a) Define the following

(i) Aperture of a lens

(ii) virtual image

(b) A converging lens has a focal length of 10cm. calculate the power of this lens.

46(a) (i) what is meant by terminal velocity?

(ii) State a factor that affects terminal velocity of a body falling in a fluid.

(b) A ball bearing is released at the surface of a viscous liquid and allowed to sink through the liquid. Draw a velocity - time graph for the motion of the ball bearing.

47. (a) what is meant by absolute zero of temperature?

(b) A sealed flask contains gas at a temperature of  $27^{\circ}\text{C}$  and a pressure of 90k pa. if the temperature rises to  $127^{\circ}\text{C}$  what will be the new pressure?

48(a) What is the purpose of a vacuum in the x-ray tube?

(b) State three reasons why it is possible to detect fractures in bones using x-rays.

49. (a) State two ways by which energy losses in transformer are minimized.

(b) A 240V, 60W lamp is connected to the secondary coil of a set up transformer operating on a 24V supply. If the transformer is 100% efficient, find the current in the primary coil.

50. (a) What is meant by diffraction of waves?

(b) Draw a diagram to show the path of plane water waves through a narrow gap.

(c) State two factors that determine the intensity of sound.

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