## PHYSICS PAPER 232/1 K.C.S.E 1999

1. What is the reading on the vernier calipers shown in figure 1?

2. Figure 2 show ${ }^{5}$ s forces f 1 and F 1 and F 2 acting on a meter rule such that it is in equilibrium.


4ark on the figure a third force F3 acting on the rule such that it is in equilibrium maintained.
3. e state how the position of the centre of gravity of a body in stable equilibrium changes to that in the rest position when the body is slightly tilted and then released.
4. A vacuum pump was used to pump out air from the glass tube immersed in liquids as shown in figure3.


After sometime the level of paranum rose to position A. Mark 1, the corresponding position for the water level. Give a reason for your answer.
5. Fig. 4 shows a capillary tube placed in though of mercury.

Fary

Give a reason why the level of mercury in the capillary tube is lower than in the beaker.
6. Figure 5 shows a bimetallic strip at roons temperature. Brass expands more than invar when heated equally.


Sketch the bimetallic strip after being cooled several degrees below room temperature.
7. In an experiment to study the atoms of gold, a beam of $\alpha$ - particles was directed onto a thin sheet of gold. The 40 llowing observations were made:
(i) Mafbrity of the particles went straight through undeflected
(ii) ${ }_{6}$ Afew particles deflected through varying angles up to 180 .
8. Eigure 6 shows a ray of light incident on plane mirror at point O .


The mirror is rotated clockwise through an angle $30^{\circ}$ about an axis perpendicular to the paper. Determine the angle through which the reflected ray rotated.
9. Figure 7 shows a sharp pin fixed on a cap of leaf electroscope. The electroscope is highly charged and then left for sometime.


Explain why the leaf collapses
10. Determine the ammeter reading when a p.d of 3.0 volts is applied across Pq in figure 8 .

11. A wire fixed at one end extends by 4 mm when a load 8 f 0 N is suspended from the other end. Determine the load that would cause an extension of 1.5 mm on the wire (assume elastic limit is not exceeded)
12. How can it be shown that the strength of a magnet is concentrated at the poles?
13. Figure 9 shows a wire carrying a current whose direction is into the paper.


The wire is placed in a magnetic field.


Fig. 9
Indicate on the figure theidirection of the force acting on the wire.
14. Determine the moment of the couple shown in figure 10.


Fig: 10
15. An industrial trolley of mass 20 kg carrying a mass of 50 kg is acted on by constant force. The trolley moves along a horizontal smooth surface with an acceleration of $0.5 \mathrm{~ms}-2$. Determine the acceleration of the trolley after the mass falls off.

Figure 11 is a graph which shows how the vertical height through which a machine raises a mass 20 kg varies with time.


Determine the power output of the machine after 40 seconds.
17. Figure 12 shows how displacement varies with time as a wave passes a fixed point.


Determine the frequency of the waves. Fig. 1.
18 Two tuning forks of frequencies 256 Hz and 258 Hz are sounded simultaneously and then placed close to each other, calculate the beat frequency.
19. When a current of 2.0 flows in a resistor for 10 minutes, 15,000 joules of electrical energy is displaced. Determine the voltage the resistor.
20. A substance of mass 2 kg and specific beapt capacity 400 Jkg K initially at $81^{\circ} \mathrm{C}$ is immersed in water at $20^{\circ} \mathrm{C}$. If the final temperature is $21^{\circ} \mathrm{C}$. Determine the mass of water. (The specific heat capacity of water is $4200 \mathrm{j} / \mathrm{kgK}$ ).
21. A galvanometer of internakresistance $50 \Omega$ gives a full-scale deflection when a current of 10 mA passes through it. Deteraine the value of the resistance required to convert the galvanometer to a voltmeter with full-scafe deflection of 5 volts.
22. A microscope is fogased on a mark on horizontal surface. A rectangular glass block 30 mm thick is place on the mark. The microscope is then adjusted dd10mm upwards; to bring the mark back to focus, determine the refractive index of the glass.
23. State the effergy transformation when fast moving electrons are suddenly stopped by a target in an X- ray tube.
24. A bydet is fired horizontally at a target. Neglecting air resistance give a reason why the horizontal acceleration of the bullet is zero.
25. 13 shows a section of a pipe PQ . A constant pressure difference maintains a streamline flow of a liquid in the pipe.


Fig. 15
If the cross-sectional area $A_{1}$ at $P$ is less than $A_{2}$ at $Q$, state how the liquid velocity. $V_{2}$ at $Q$ compares with velocity $\mathrm{V}_{1}$ at P .
26. The figure 14 is a resistor-capacitor circuit. At time $t=0$, the switch is closed at A for sometime, and then opened. The switch is them closed at $B$ for sometime.


Fig. 14
On the axis provided, sketch the graph of voltage V across the capacitor against time $\mathrm{t}(\mathrm{t} 1$ and t 2 represents times for qpening at A and closing at B respectively).

27. Determine the pressure required to compress a gas in a cylinder initially at $20^{\circ} \mathrm{C}$ and at a pressure $1.03 \times 10^{-5}$ to one-eight of its origin $\mathfrak{F}^{5}$ volume.
28. Arrange the following in order offincreasing frequencies -Gamma radiation, radio waves, infrared, and X -rays.
29. A concrete block of volume is totally immersed in seawater of density $p$. Write an expression for the up thrust on the black..
30. It is observed that wherin ultraviolet light is shone onto a clean zinc plate connected to the cap of negatively charged feaf electroscope, the leaf collapse. Explain this observation.
31. Figure 15 shos ${ }^{2}$ s two masses 0.1 kg and 0.2 kg connected by a string through a hole on a smooth horizontal ${ }_{0}$ surface.


$$
\text { Fig. } 15
$$

The 0.1 kg mass rotates in a horizontal circle of radius 3 cm . Calculate the angular velocity of the mass when the system is in equilibrium. Use acceleration due to gravity $\mathrm{g}=10 \mathrm{~ms}-2$
32. Sketch a diagram to show the position of an object, when a converging lens is used as an magnifying glass.
33. Figure 16 shows a wire XY at right angles to a magnetic field. XY is part of circuit containing a galvanometer.


XY is moved

34. Figure 17 shows the electric wiring of ectric heater $A, B, C$ are the main wires.

35. raddioactive nuclide of atomic number z emits a beta particle and gamma rays. State the atomic snumber of the new nuclide.

