VIVEK TUTORIALS

Physics
Preliminary Examination
Max Marks: 80

Date : **Grade: 10th (ICSE)** **Time: 2 Hours**

SECTION I (40 Marks)
Attempt all Questions from this section

Question 1

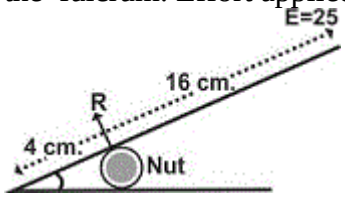
(a) Why is it easier to open a door by applying the force at the free end of it? 2

(b) With reference to the direction of action, how does centripetal force differ from centrifugal force? 2

(c) At which point is the centre of gravity situated in : 2
a.triangular lamina and
b.circular lamina?

(d) A body is acted upon by a force. State two conditions when the work done is zero. 2

(e) In the below given diagram a nut cracker is shown with a nut at a distance of 4 cm from the fulcrum. Effort applied is 25 N. Calculate the resistance R. (i.e., load). 2



Question 2

(a) The out put current of a transformer in which the voltage is stepped down is usually higher than the input current. Explain why. 2

(b) Write the expression for the heat energy Q received by the substance when m kg of substance of specific heat capacity c J kg^{-1} K^{-1} is heated through Δ t °C. 2

(c) Why does a hot cup of tea get cooled on adding sugar to it ? 2

(d) State the medical use of radioactivity. 2

(e) Mention the names of the most prominent products of the fission of $_{90}U^{235}$ 2

Question 3

(a) How does the refractive index of a medium depend on the wavelength of light used? 2

(b) Does total internal reflection occurs when light passes from a rarer medium to a denser medium ? 2

(c) An illuminated object lies at a distance 1.0 m from a screen. A convex lens is used to form the image of object on a screen placed at distance 75 cm from the lens. Find : (i) the focal length of lens, and (ii) the magnfication. 2

(d) Name the factors affecting the critical angle for the pair of media. 2

(e) Name three properties of ultraviolet radiations which are similar to visible light. 2

Question 4

(a) (i) Under what conditions does resonance occur ? 2
(ii) Why is a loud sound heard at acoustic resonance ?

(b) A stringed musical instrument, such as the sitar, is provided with a number of wires of different thicknesses. Explain the reason for this. 2

(c) An electric kettle is rated 2.5 kW, 250 V. Find the cost of running the kettle for two hours at Rs. 5.40 per unit? 2

(d) (i) Name the device used to protect an electric circuit from overloading and short circuits. 2
(ii) On what effect of electricity does the above device work?

(e) Two lamps, one rated 220 V, 50 W and the other rated 220 V, 100 W are connected in series with mains of 220 V. Explain why does the 50 W lamp consume more power. 2

SECTION II (40 Marks)
Attempt all Questions from this section

Question 5

(a) Explain the motion of a planet around the sun in a circular path. 3

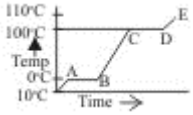
(b) 6.4 kJ of energy causes a displacement of 64 m in a body in the direction of force in 2.5 s. Calculate 3
(i) the force applied and
(ii) power in horse power (hp). (Take 1 hp = 746 W).

(c) A block and tackle system of 5 pulleys is used to raise a load of 500 N steadily through a height of 20 cm. The work done against friction is 2000J. Calculate : 4
(i) Work done by effort
(ii) Efficiency of system
(iii) Displacement of the effort.applied
(iv) M.A.
(v) V.R.

Question 6

(a) (i) What do you understand by the suberscript and superscript in $_{92}U^{235}$? 4
(ii) Complete the following reaction using the appropriate subscript or superscript, where missing?
$_{92}U + {}_{0}n^{1} \rightarrow Ba^{141} + {}_{36}Kr + 3\ {}_{0}n^{1}$

(b) A piece of ice is heated at a constant rate. The variation of temperature with heat input is shown in the graph below: 3
(i) What are represented by AB and CD?
(ii) What conclusion can you draw about the nature of ice from the above graph?



(c) A metal piece of mass 50 g at 27°C requires 2400 J of heat energy in order to raise its temperature to 327°C. Calculate the specific heat capacity of the metal. 3

Question 7

(a) (i) State the laws of refraction of light. 3
(ii) Write a relation between the angle of incidence (i), angle of emergence (e), angle of prism (A) and angle of deviation (d) for a ray of light passing through an equilateral prism.

(b) Complete the following sentences : 3
(a) An object is placed at a distance of more than 40 cm from a convex lens of focal length 20 cm. The image formed is real, inverted and _____
(b) An object is placed at a distance 2f from a convex lens of focal length f. The size of image formed is ___ that of the object.
(c) An object is placed at a distance 5 cm from a convex lens of focal length 10 cm. The image formed is virtual, upright and ____

(c) Explain the following : 4
(i) Infrared radiations are used for photography in fog.
(ii) Infrared radiations are used for signals during war.
(iii) The photographic darkrooms are provide with infrared lamps.
(iv) A rock salt prism is used instead of a glass prism to obtain the infrared spectrum.
(v) A quartz prism is required for obtaining the spectrum of the ultraviolet light.
(vi) Ultraviolet bulbs have a quartz envelope instead of glass.

Question 8

(a) Write the factors on which intensity of sound depends. 3

(b) (i) A man stands at a distance of 68 m from a cliff and fires a gun. After what time interval will he hear the echo, if the speed of sound in air is 340 ms^{-1}? 3
(ii) If the man had been standing at a distance of 12 m from the cliff, would he have heard a clear echo?

(c) The stem of a vibration tuning fork is pressed against the table top firmly. Answer the following questions : 4

(i) Will there be produced an audible sound ?
(ii) Is the above sound produced due to the vibrations produced in table top.
(iii) If the answer of (ii) is yes, then name the type of vibrations produced.
(iv) Under what conditions the vibrating tuning fork will cause resonance ?

Question 9

(a) (i) State Ohm's law. 3
(ii) Diagrammatically illustrate how you would connect a key, a battery, a voltmeter, an ammeter, an unknown resistance R and a rheostat so that it can be used to verify the above law.

(b) Draw a labelled diagram with necessary switch regulator, etc. to connect a bulb and a fan with the mains. In what arrangement are they connected in the mains : series or parallel? 3

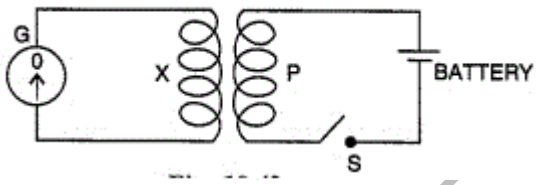
(c) (i) State three factors which govern the speed of rotation of an electric motor. 4
(ii) State the law which determines the direction of magnetic field round a current carrying conductor.

Question 10

(a) What is meant by earthing of an electrical appliance? Why is it essential? 3

(b) A voltage source sends a current 2.5 A to a resistor of 20 Ω connected across it for 5 minutes. Calculate : (i) the p.d. of the source, (ii) the electrical energy supplied by the source, and (iii) the heat in cal, produced in the resistor. 3

(c) The following diagram shows a coil X connected to a sensitive centre-zero galvanometer G and a coil P connected to a battery through a switch S. 4
(a) Describe the observation when the switch S is (i) closed suddenly, (ii) then kept closed, (iii) finally opened.
(b) Name and state the law which explains the above observations.



-------- All the Best --------