Class : 10
Date : January 16, 2008

Theexampapers. com

## PHYSICS

Section-I ( 40 marks)
Attempt all the questions from this section.
QI.
a) Which type of levers have a mechanical advantage less than one? Give a reason. Why are they then used ?
b) A body of mass 4 kg initially at rest is subjected to a force of 16 N . What is the kinetic energy acquired by the body at the end of 10 S ?
c) Define the term 'inertia'. On which physical quantity does it depend?
d) The wavelength of red is $7 \times 10^{-7} \mathrm{~m}$ and that of blue is $4 \times 10^{-7} \mathrm{~m}$. Will the speed of both colours be the same (a) in a vacuum (b) in a glass?.
e) Why are gamma rays emitted only in nuclear processes and not in orbital electrons transitions?
a) A man rowing a boat upstream is at rest with respect to the shore. Is he doing work?
b) What special properties are attributed to a prism when it is in the minimum deviation position?
c) Arrange infra red rays, $\gamma$ rays, ultra violet rays, visible light and $X$ rays in decreasing order of their wavelength.
d) Give one example of forced vibration and of resonance.
e) Which characteristic of a sound determines its loudness? How is the loudness related to this characteristic of the wave?
a) When does one need (1) a fast film and (ii) a slow film?
b) An object is placed in front of a diverging lens at a distance equal to the focal length of the lens. Draw a ray diagram to show the formation of the image.
c) Glass is transparent in nature. Why does glass powder look opaque? When water is poured over it, it again becomes transparent. Explain.
d) Why is there an increase in the resistance, when two resistors are connected in a series?
e) An electrical gadget can give an electric shock to its user under some circumstances. What are those circumstances?
a) State the kind of nuclear reaction taking place in a nucleus during the emission of a $\beta$ particle.
b) The temperature of 400 g of cold water rises by $10^{\circ} \mathrm{C}$ when 200 g of hot water at $50^{\circ} \mathrm{C}$ is added to it. What was the initial temperature of the cold water?
c) Calculate the value of the resistance, which must be connected to a $12 \Omega$ resistance to provide an effective resistance of $4 \Omega$.
d) State Faraday's Laws of Electromagnetic Induction.
e) Define the term binding energy per nucleon. State the approximate value of average binding energy per nucleon.

Section II ( 40 marks)
Attempt any four questions from this section.
Q. 5
a) I) State the law of Conservation of Energy.
ii) Name the energy transformation that occurs

1) in a loudspeaker.
2) in an electric cell. ( Primary )
b) I) Define an Inclined Plane.
ii) What type of lever should preferably be used as a force multiplier? Draw a sketch of such a lever.
c) A pulley system has a velocity ratio of 3 and an efficiency of $80 \%$. Draw a labelled diagram of this pulley systern. Calculate the mechanical advantage of the system and the value of the effort required to raise a load of 300 N .
Q.6. The diagram given below shows an object $O$ and its image I. Copy the diagram and draw suitable rays to locate the lens and its focus. Name the type of lens in this case.

b) i) State Snell's law.
ii) Calculate the Velocity of light in a glass block of refractive index 1.5 . (velocity of light in air $=3 \times 10^{8} \mathrm{~ms}^{-1}$ )
c) 1) What is an optical fibre?
ii) Give one practical use of an optical fibre.

## Q. 7

a) In a laboratory for finding specific latent heat of ice, 100 g of water at $30^{\circ} \mathrm{C}$ was taken in a calorimeter made of copper and of mass 10 g . When 10 g of ice at $0^{\circ} \mathrm{C}$ was added to the mixture and kept within the liquid till the ice melted completely, the final temperature of the mixture was found to be $20^{\circ} \mathrm{C}$.
i) What is the total quantity of water in the calorimeter at $20^{\circ} \mathrm{C}$ ?
ii) Specific heat capacities of water and copper being $4.2 \mathrm{~J} / \mathrm{g}^{\circ} \mathrm{C}$ and $0.4 \mathrm{~J} / \mathrm{g}^{\circ} \mathrm{C}$ respectively, what quantity of heat would each release in cooling down to $20^{\circ} \mathrm{C}$ from the initial stage?
iii) Write an expression for the heat gained by ice on melting.
iv) Calculate the value of the latent heat of fusion of ice from the data discussed above.
b) Electrical Power P is given by the expression $\mathrm{P}=(\mathrm{Q} \times \mathrm{V}) \div$ time.
i) What do the symbols $Q$ and $V$ represent?
iI) Express 'Power' in terms of current and resistance explaining the symbols used therein.
Q. 8
a) State two factors on which the rate of emission of thermions depends.
b) The isotope of $q_{2} \mathrm{U}^{238}$ decays by alpha emission to an isotope of Thorium (Th). The Thorium isotope decays by beta emission to an isotope of Protactamium (Pa).
Write down the equation to represent these two nuclear changes.
c) Draw a cathode ray tube consisting of a heater, a cathode, a cylindrical anode and a deflecting system. Show how you will connect a low tension battery of 6 V and a high tension one of 1000 V to the electrodes of the tube.
Q. 9.
a) I) State the function of a split ring in a DC motor.
2) State three factors on which the magnitude of force on a current carrying conductor placed in a magnetic field depends. Can this force be zero for some portion of the conductor?
b) I) State the functions of the following in a nuclear reactor.
i) Moderator
ii) Control rods
iii) Coolant
I) Mention two important precautions that should be taken while handling radioactive materials.
ii) State two uses of radio isotopes.
Q. 10
a) A radar is able to detect the reflected waves from an enemy plane after a time interval of 0.02 milliseconds. If the velocity of the wave is $3 \times 10^{8} \mathrm{~ms}^{-1}$, calculate the distance of the plane from the radar.
b) The diagram shows a coil connected to a center zero galvanometer $G$. The galvanometer shows a deflection to the right when the N - pole of a powerful magnet is moved to the right as shown:

i) Explain why the deflection occurs in the galvanometer.
ii) Does the direction of the current in the coil appear clockwise or anticlockwise when viewed from the end A?
iii) State the observation in $G$ when the coil is moved away from $N$.
iv) State the observation in $G$ when both the coil and the magnet are moved to the right at the same speed.
c) State two ways by which the frequency of transverse vibration of a stretched

