

HIGHER SECONDARY EXAMINATION

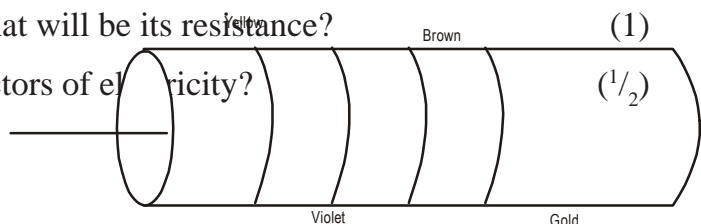
MODEL QUESTION PAPER

PHYSICS

Max. Marks : 60 marks
Time : 2 hrs
Cool off time : 15 minutes

HSE II

1. A polythene piece rubbed with wool is found to have a negative charge of $3 \times 10^{-7} \text{C}$.
 - a. Estimate the number of electrons transferred (1)
 - b. Is there a transfer of mass from wool to polythene? Explain. (1)
2. For the case of the electric field, we define an analogous quantity and call it electric flux.
 - a. Which law connects charge and electric flux. State the law. (1)
 - b. Obtain an expression for the Electric field due to a uniformly charged infinite plane sheet of charge. (2)
 - c. A surface encloses $+5 \mu \text{C}$ of charge. Find the total electric flux. (1)
3. Capacitor is a device which can store a large amount of charge.
 - a. Obtain an expression for the energy stored in a capacitor. (2)
4. Imagine a conductor through which a current I is flowing, and let V be the potential difference between the ends of the conductor.
 - a. Draw the relation graphically. (1)
 - b. If the length of a conductor doubles, what will be its resistance? (1)
 - c. Is Ohm's law applicable to all conductors of electricity? (1/2)



5. Find the value of the given resistor. (1)
- 6.a. You are given a potentiometer and voltmeter to measure the potential difference - which will give you the accurate measurement. Why? (1 1/2)
- b. With the help of a circuit, how will you compare the emf's of two cells using potentiometer. (2)
7. A charge q is moving with velocity V in a magnetic field.
 - a. Name the force acting on the charge. (1)
 - b. Is any work done by a magnetic field on a charge moving perpendicular to Magnetic field. Justify? (1)

- c. Obtain an expression for cyclotron frequency. (2)
- 8.a. State Biot Savart law (1)
- b. Derive an expression to find the magnetic field on the axis of a circular current loop. (2)
- c. Find the odd one out based on their magnetic properties.
Copper, Lead, Sodium, Water (1)
9. Raju observed a spark when he switched off an electric fan.
- a. What is the phenomenon behind this. (1)
- b. What is the emf induced across an inductor of inductance 2 mH when current changes from 1 ampere to 2 ampere in 1 second. (2)
- 10.a. Using phasor diagram obtain an expression for the impedance in a series LCR Circuit. (2)
- b. In an Airport a boy passes through a metal detector, heard an alarm. What is the phenomenon behind this. (1)
- c. A transformer consists of an iron core on which are wound a primary coil of 200 turns and a secondary coil of 100 turns. If the primary coil is connected to a 200 V. Find the secondary Voltage. (2)
11. Arrange the following in the ascending order of wave length in an electro magnetic spectrum.
Radio waves, Gamma rays, Ultraviolet, Visible X-rays, Infrared, Microwaves. (2)
12. When a ray of light travels from one medium to another it bends with the respect to thier refractive index.
- a. State the law behind this. (1)
- b. Derive the relation between object and image distance in terms of refractive index of the medium and the radius of curvature of the curved spherical surface.
$$\frac{n_2}{v} - \frac{n_1}{u} = \frac{n_2 - n_1}{R}$$
 (2)
13. Driving a car on a hot summer day, Robin feels a pool of water at a farther distance.
- a. Name and explain the phenomenon. (2)
- b. Refractive index of the diamond is 2.42. What is its critical angle. (2)
- 14.a. Light emitting from two seperate candles are coherent or not. Justify. (1)
- b. What do you meant by coherent source. (1)
- c. Find an expression for band width in Young's double slit experiment. (1)

15.

Metal A

Metal B

1

- a. Which metal has greater work function, comment. (2)
- b. Work function of Sodium is 2.3 eV. Does sodium shows photo electric emission for orange light.

$X = 6800 \text{ \AA}$, Given $h = 6.63 \times 10^{-34} \text{ JS}$. (2)

16. The total energy of an electron in the first excited state of the hydrogen atom is about -3.4eV.

- a. What is the kinetic energy of the electron in its state. (1)
- b. What is the potential energy of the electron in this state. (1)

17.a. Nuclear process are possible only for light and heavy nucle. Why. (1)

b. The half-life of ^{238}U undergoing decay is 4.5×10^9 years. What is the activity of 1g sample of ^{238}U ? (2)

18. Transistor means Transfer resistance.

a. Explain the action of a npn transistor as an oscillator. (3)

19. Basic building block of a digital circuits are logic gates.

a. Give the Truth table and Symbol of an AND gate and OR gate. (2)

20. A transmitting antenna at the top of a tower has a height 32m and the height of the receiving antenna is 50 m. What is the maximum distance between them for satisfactory communication in LOS mode? Given radius of earth $6.4 \times 10^6 \text{ m}$. (3)

