

# HIGHER SECONDARY EXAMINATION

## MODEL QUESTION PAPER

### PHYSICS

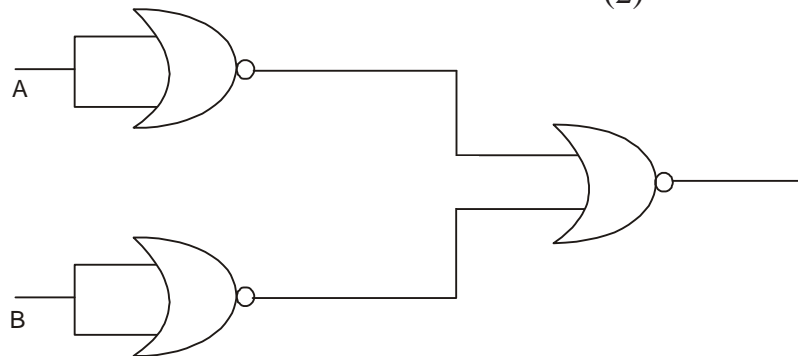
Max. Marks : 60 marks  
Time : 2 hrs  
Cool off time : 15 minutes

HSE II

1. Act of transmission of information from one place to another is called communication.
  - a. Which are the modes of propagation of e.m. waves. (1½)
  - b. Mention the importance of modulation in communication. (1½)
  - c. Is it necessary for transmitting antenna to be at the same height as that of the receiving antenna for LOS propagation? A TV transmitting antenna is 81 m long. How much service area can it cover if the receiving antenna is at the ground level? (2)
2. Fill up the blanks. (2)

A	I <sub>c</sub> = 0.95 m A	I <sub>B</sub> = .....	I <sub>t</sub> = I <sub>ma</sub>
B	A = 1	B = 0	Y = A + B = .....
C	For conductor, E <sub>g</sub> =0	Insulator E <sub>g</sub> >5eV	Semiconductor, E <sub>g</sub> ≈ ...
D	Always reverse biased	.....	Voltage regulator

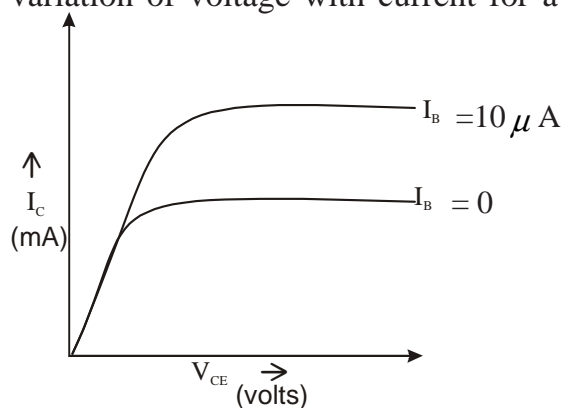
3. Write the truth table for the circuit given below. Identify the logic operation performed by the circuit. (2)



4. Semiconductor diode is a non-ohmic conductor.
  - a. Which property of the diode enable it to work as a rectifier. (½)
  - b. Explain the working of a full wave rectifier with a neat diagram. (2½)

OR

The graphical variation of voltage with current for a semiconductor device is given below.



- a. Identify the device (1/2)
- b. Name the different regions of the above graph. (1 1/2)
- c. Explain the proper working conditions of the above device. (1)
5. Radio activity is a nuclear phenomena in which an unstable nucleus attains stability.
- a. Which are the radio active radiations associated with radio activity. (1 1/2)
- b.



- c. The half life of  ${}_{38}^{90}\text{Sr}$  is 28 years. What is the disintegration rate of 15 mg of this isotope. (1 1/2)

- 6.a. Draw binding energy curve for nuclid & mark the most stable element. (2)

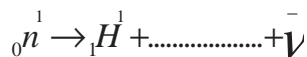
- b. What is the significance of the curve (2)

7. The ejection of electrons from the surface of certain metals when light of 'suitable frequency' fall on it is called photoelectric effect.

- a. What is the importance of 'suitable frequency' in the above phenomenon. (1)

b. What happens when

i. Intensity is increased.



ii. Negative potential is increased.

iii. Frequency is increased. (3)

8. Waves associated with moving material particle is called matter wave.

- a. Name the experiment which determines the wave nature of a moving electron. (1/2)

- b. Explain how the existence of matter wave is established through this experiment. (2 1/2)

9. What is the effect on interference in Young's double slit experiment due to the following operations.

- a. Source is replaced by another source of shorter wavelength.

- b. Separation between two slits is increased. (1+1)

OR

10. In a single slit diffraction experiment the width of the slit is made double the original width. How does this affect the size and intensity of the central diffraction band. (2)

11.a. Magnifying power of a simple microscope is inversely proportional to the focal length of the lens. What then stops us from using a convex lens of smaller and smaller focal length and achieving greater & greater magnifying power.

(2)

- b. Why must both objective and eyepiece of a compound microscope have short focal length. (1)

- c. Draw the ray diagram for the image formation of a compound microscope. (1)
12. The following graph represents the  $i$ - $d$  curve of an optical instrument placed in air.

$i$

- a. Name the device. (1)
- b. Obtain an expression for the refractive index produced by such a device. (3)
- c. How is the deviation affected if the above arrangement is immersed in a liquid of refractive index less than that of the device. (1)

13. Identify the EM waves for the following

- a. Satellite communication
- b. Remote sensing
- c. Sterilisation
- d. Cellular phone (2)

14. a. Explain the meaning of the statement “electric charge of a body is quantised”.

b. Quantisation of electric charge is not considered when we deal with macroscopic charged bodies. Why? (2)

15. A man standing on the ground touches the power line with bare feet and gets fatal shock. But a bird sitting on the power line does not experience any shock. Why? (1)

16. A spherical shell of radius ‘R’ is uniformly charged to a surface charge density  $\sigma$ .

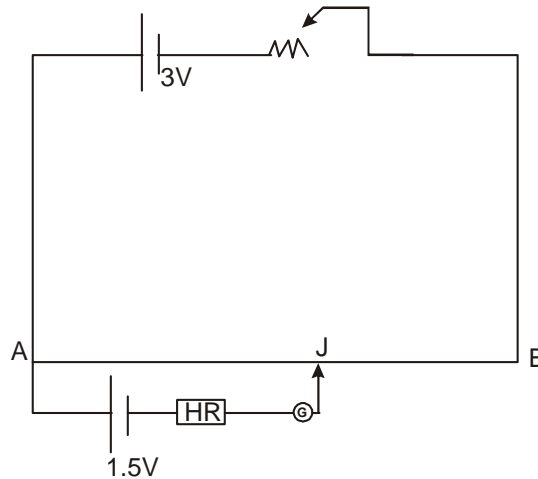
- a. State the theorem which can be used to find the electric field outside the shell.
- b. Using the theorem arrive at an expression for electric field at distance ‘r’ from the centre of the shell.
- c. It is safe to be inside a vehicle rather than outside, when there is lightning. Comment on this. (1+2+1)

17. The data given below shows the variation of potential with charge during charging of a condenser.

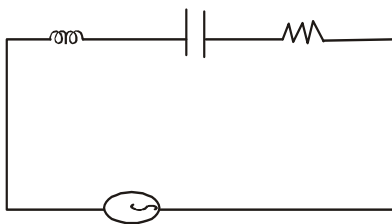
Q	0C	1 C	2 C	3 C	4 C	5 C
V	0V	5V	10V	15V	20V	25V

- a. Draw a graph with charge along Y axis and potential along X axis.
- b. Estimate the energy stored in the condenser from the graph. (2)

18. A boy used the following circuit in the laboratory for determining the emf of the cell.



- a. Identify the principle behind the circuit. (1/2)
  - b. Draw the modified circuit for comparing the emf of two cells using the above circuit. (1)
  - c. It is considered that the potentiometer is a better instrument to measure emf than a voltmeter. Justify your answer. (1)
19. Current carrying circular loop can be considered as a magnetic dipole.
- a. Name the law used to find the magnetic field due to the above coil. (1/2)
  - b. Derive the expression for the magnetic field at the centre of the circular coil. (1 1/2)
20. A freely suspended magnet aligns in the north-south direction.
- a. What is the direction of earths magnetic field. (1/2)
  - b. Explain the magnetic elements of earth. (1)
21. The following figure is a part of a radio circuit.



- a. Identify the circuit
- b. Mention its use.
- c. Discuss the principle behind its use in radio. (3)

22. A cylindrical bar magnet is kept along the axis of a circular coil and near it. Will there be any induced emf at the terminals of the coil when the magnet is rotated.
- a. about its own axis
  - b. about an axis perpendicular to the length of the magnet. (1+1)