

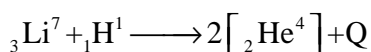
# I.P.E. SECOND YEAR MODEL PAPER-2016

## SECTION – I

**I. Answer all the following questions.**

**10 x 2 = 20**

1. Write the formulae for the speed of sound in solids and gases?
2. The electric lines of force do not intersect. Why?
3. How do you convert moving coil galvanometer into ammeter?
4. A coil of 20 turns has an area of 800mm<sup>2</sup> and carries a current of 0.5A. If it is placed in a magnetic field of intensity 0.3T with its plane parallel to the field, what is the torque that it experiences?
5. The sequence of bands marked on a carbon resistor are yellow, violet, Brown, Gold. What is its resistance and tolerance?
6. State Faraday's law of electromagnetic induction?
7. What is the phase difference between AC emf and current in the following: pure resistor, pure inductor and pure capacitor?
8. Bombardment of lithium with protons gives rise to following reaction.



Find the a value of the reaction. The atomic masses of lithium, proton and helium are 7.016 u, 1.008 u and 4.008u respectively.

9. Draw the circuit symbols for p-n-p and n-p-n transistor?
10. Define modulation. Why is it necessary?

## SECTION – II

**II. Answer any Six of the following questions.**

**6 x 4 = 24.**

11. Define critical angle. Explain total internal reflection using a neat diagram?
12. Discuss the intensity of transmitted light when a polaroid sheet is rotated between two crossed polaroids?
13. Derive an expression for magnetic field induction on the equatorial line of a bar magnet?
14. Derive an expression for the equivalent capacity when capacitors are connected in series?
15. State kirchoffs law for an electrical net work. Using these laws conditions deduce the condition for balance in a wheatstone bridge.
16. Write a short note on Debroglie's explanation of Bohr's second postulate of quantization?
17. Write a short note on Discovery of neutron?
18. Describe how a semiconductor diode is used as a half wave rectifier?

## SECTION – III

**III. Answer any Two of the following questions.**

**2 x 8 = 16**

19. (a) Explain the formation of stationary waves in stretched string and hence deduce the laws of transverse waves in stretched string?  
(b) A steel wire 0.6m long has a mass of  $6 \times 10^{-3}$ kg. If the wire under a tension of 100N. What is the speed of transverse waves on the wire?
20. (a) Describe the construction and working of moving coil galvanometer. Obtain the relation between current and deflection of the coil?  
(b) The resistance of M.C.G is  $5\Omega$ . The maximum current it measure is 0.015A. How would you convert it into voltmeter to measure 1.5volt?
21. (a) Explain the principle and working of a nuclear reactor with help of labelled diagram?  
(b) How much  $\text{U}^{235}$  is consumed in a day in an atomic power house operating at 200 MW, provided the whole of mass  $\text{U}^{235}$  is converted into energy?

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**I. D** *Answer any 4 questions* **° d'Q' Q'=0.**

10 x 2 = 20

1. „ $\rho$ ,  $\Delta Y$ ,  $\Delta X$ “  $\rho = 0.8$ ,  $\Delta X = 10$ ,  $\Delta Y = ?$
2.  $q = \frac{1}{4} \dot{Y}$ ,  $\theta Y = Y_0 - OK_{t-1} - \delta Z_0 + \dot{Y}$
3.  $Q = P \cdot C = P \cdot J \cdot g^{\circ} \cdot \dot{Y} \cdot Z \dots$
4.  $20 \text{ K} \cdot \text{A} \cdot 800 \text{ mm}^2$ ,  $I = 0.5 \text{ A}$ ,  $q = \frac{1}{4} \dot{Y}$ ,  $\rho = 0.8$ ,  $\Delta X = 10$ ,  $\Delta Y = ?$
5.  $H = \frac{1}{2} \dot{Y}$ ,  $\theta Y = Y_0 - OK_{t-1} - \delta Z_0 + \dot{Y}$ ,  $\rho = 0.8$ ,  $\Delta X = 10$ ,  $\Delta Y = ?$
6.  $\dot{Y} = \frac{1}{4} \dot{Y}$ ,  $\theta Y = Y_0 - OK_{t-1} - \delta Z_0 + \dot{Y}$ ,  $\rho = 0.8$ ,  $\Delta X = 10$ ,  $\Delta Y = ?$
7.  $U = \frac{1}{2} \dot{Y}$ ,  $\theta Y = Y_0 - OK_{t-1} - \delta Z_0 + \dot{Y}$ ,  $\rho = 0.8$ ,  $\Delta X = 10$ ,  $\Delta Y = ?$
8.  $ek \dot{Y} = \frac{1}{2} \dot{Y}$ ,  $\theta Y = Y_0 - OK_{t-1} - \delta Z_0 + \dot{Y}$ ,  $\rho = 0.8$ ,  $\Delta X = 10$ ,  $\Delta Y = ?$

**II. D** *Answer any 4 questions* **° d'Q' Q'=0.**

6 x 4 = 24

11.  $\rho = 0.8$ ,  $\Delta X = 10$ ,  $\Delta Y = ?$
12.  $U = \frac{1}{2} \dot{Y}$ ,  $\theta Y = Y_0 - OK_{t-1} - \delta Z_0 + \dot{Y}$ ,  $\rho = 0.8$ ,  $\Delta X = 10$ ,  $\Delta Y = ?$
13.  $\dot{Y} = \frac{1}{4} \dot{Y}$ ,  $\theta Y = Y_0 - OK_{t-1} - \delta Z_0 + \dot{Y}$ ,  $\rho = 0.8$ ,  $\Delta X = 10$ ,  $\Delta Y = ?$
14.  $X = \frac{1}{2} \dot{Y}$ ,  $\theta Y = Y_0 - OK_{t-1} - \delta Z_0 + \dot{Y}$ ,  $\rho = 0.8$ ,  $\Delta X = 10$ ,  $\Delta Y = ?$
15.  $H = \frac{1}{2} \dot{Y}$ ,  $\theta Y = Y_0 - OK_{t-1} - \delta Z_0 + \dot{Y}$ ,  $\rho = 0.8$ ,  $\Delta X = 10$ ,  $\Delta Y = ?$
16.  $H = \frac{1}{2} \dot{Y}$ ,  $\theta Y = Y_0 - OK_{t-1} - \delta Z_0 + \dot{Y}$ ,  $\rho = 0.8$ ,  $\Delta X = 10$ ,  $\Delta Y = ?$
17.  $\# \frac{1}{2} \dot{Y} = \frac{1}{4} \dot{Y}$ ,  $\theta Y = Y_0 - OK_{t-1} - \delta Z_0 + \dot{Y}$ ,  $\rho = 0.8$ ,  $\Delta X = 10$ ,  $\Delta Y = ?$
18.  $J = \frac{1}{2} \dot{Y}$ ,  $\theta Y = Y_0 - OK_{t-1} - \delta Z_0 + \dot{Y}$ ,  $\rho = 0.8$ ,  $\Delta X = 10$ ,  $\Delta Y = ?$

**III. D** *Answer any 8 questions* **° d'Q' Q'=0.**

2 x 8 = 16

19. (a)  $Q = \frac{1}{2} \dot{Y}$ ,  $\theta Y = Y_0 - OK_{t-1} - \delta Z_0 + \dot{Y}$ ,  $\rho = 0.8$ ,  $\Delta X = 10$ ,  $\Delta Y = ?$
19. (b)  $0.6 \text{ m}$ ,  $\dot{Y} = \frac{1}{4} \dot{Y}$ ,  $\theta Y = Y_0 - OK_{t-1} - \delta Z_0 + \dot{Y}$ ,  $\rho = 0.8$ ,  $\Delta X = 10$ ,  $\Delta Y = ?$
20. (a)  $H = \frac{1}{2} \dot{Y}$ ,  $\theta Y = Y_0 - OK_{t-1} - \delta Z_0 + \dot{Y}$ ,  $\rho = 0.8$ ,  $\Delta X = 10$ ,  $\Delta Y = ?$
20. (b)  $H = \frac{1}{2} \dot{Y}$ ,  $\theta Y = Y_0 - OK_{t-1} - \delta Z_0 + \dot{Y}$ ,  $\rho = 0.8$ ,  $\Delta X = 10$ ,  $\Delta Y = ?$
21. (a)  $\# \frac{1}{2} \dot{Y} = \frac{1}{4} \dot{Y}$ ,  $\theta Y = Y_0 - OK_{t-1} - \delta Z_0 + \dot{Y}$ ,  $\rho = 0.8$ ,  $\Delta X = 10$ ,  $\Delta Y = ?$
21. (b)  $200 \text{ MW}$ ,  $\dot{Y} = \frac{1}{4} \dot{Y}$ ,  $\theta Y = Y_0 - OK_{t-1} - \delta Z_0 + \dot{Y}$ ,  $\rho = 0.8$ ,  $\Delta X = 10$ ,  $\Delta Y = ?$