

(in Words)

Superintendent Seal & Signature

FIC. No (For office use only)

121601

FIC. No (For office use only)

PHYSICS (Fresh) - II

Max: Marks: 85

Total Time: 3 Hours

Note: There are THREE Sections of this Paper i.e. A, B and C, attempt each according to the given instructions.

Time: 20 Minutes

SECTION-A

Marks: 18

Note: Attempt all parts of Section - A. Section - A must be return to the superintendent after 20 minutes even if you have not attempted any question. Overwriting/ defacing/Cutting etc is prohibited in Section-A and no credit will be given to such answer.

I. Write the correct option i.e. A/B/C/D in the empty boxes.

- i. The equivalent capacitance of parallel combination is always \_\_\_\_\_ than any individual capacitance in the combination. P  
(A) Less (B) Greater (C) Same (D) None of these
- ii. In one microfarad capacitor of a TV is subjected to 4000 V potential difference. The energy stored in capacitor is \_\_\_\_\_ A  
(A) 8 J (B) 16 J (C)  $4 \times 10^{-3}$  J (D)  $2 \times 10^{-3}$  J
- iii. \_\_\_\_\_ convert heat energy into electrical energy. A  
(A) Thermocouples (B) Solar cell (C) Batteries (D) Electrical generator
- iv. A wire of uniform cross-section, A length L and resistance R is cut into two equal parts. The resistivity of each part will be \_\_\_\_\_ C  
(A) Doubled (B) Halved (C) Remains the same (D) One fourth
- v. The unit of magnetic flux is \_\_\_\_\_ C  
(A) Tesla (B) Gauss (C) Weber (D) None of these
- vi. The torque in the coil can be increased by increasing \_\_\_\_\_ D  
(A) No. of turns (B) Current and magnetic field (C) Area of coil (D) All of these
- vii. To Measure the earth quakes we use a device which is called \_\_\_\_\_ A  
(A) Seismometer (B) EEG (C) Potentiometer (D) None of these
- viii. A wire is stretched to double of its length. The strain is \_\_\_\_\_ B  
(A) 2 (B) 1 (C) 0 (D) 0.5
- ix. Which of one has high penetrating power \_\_\_\_\_ D  
(A) X-rays (B)  $\beta$ -rays (C) Radio waves (D)  $\gamma$ -rays
- x. The average power loss in an inductive circuit is \_\_\_\_\_ A  
(A) 0 (B) 1 (C) -1 (D) 2
- xi. Which one of the following materials are weakly attracted by magnet \_\_\_\_\_ B  
(A) Ferromagnetic (B) Paramagnetic substance (C) Diamagnetic (D) All of these
- xii. A moving charge is surrounded by \_\_\_\_\_ B  
(A) 4 Fields (B) 2 Fields (C) 3 Fields (D) None of these
- xiii. In transistor the central region base is doped \_\_\_\_\_ C  
(A) Heavily (B) Moderately (C) Lightly (D) None of these
- xiv. The circuit in which current and voltage are in phase, the power factor is \_\_\_\_\_ B  
(A) Zero (B) 1 (C) -1 (D) 2
- xv. Photo electrons emission from metal surface of thresholded frequency if not and incident photons "P" will take place only if \_\_\_\_\_ A  
(A)  $f \geq f_0$  (B)  $f < f_0$  (C)  $f \leq f_0$  (D) None of these
- xvi. For an atom of hydrogen atom the radius of the first orbit is given by. \_\_\_\_\_ C  
(A)  $\frac{h}{m e^2}$  (B)  $\frac{m e}{4 h^2}$  (C)  $\frac{h^2}{4 \pi^2 k m e^2}$  (D)  $h^2 m e^2$
- xvii. Lyman series lies in \_\_\_\_\_ part of Em spectrum. D  
(A) Visible (B) Infrared (C) X-rays (D) Ultra violet
- xviii. The interaction between proton-proton and neutron-neutron is mediated through the exchange of \_\_\_\_\_ A  
(A)  $\pi^+$  mesons (B)  $\pi^0$  mesons (C) Both A and B (D)  $\pi^0$

Note: Time allowed for section B and C is 2 hours and 40 minutes.

**SECTION "B"**

Marks: 40

II. Attempt any TEN Parts out of the following. Each Part carries equal marks.

- i. The electric potential is constant through a given region of space. Is the electric field zero or non zero in this region? Explain.
- ii. Why it is not possible to measure the drift speed for electron by timing their travel along a conductor?
- iii. An electron does not suffer any deflection while passing through a region. Are you sure that there is no magnetic field?
- iv. Show that the relation is dimensionally correct  $\epsilon = -\frac{\Delta\phi}{\Delta t}$
- v. Show that reactance is measured in Ohms for both inductors and capacitors.
- vi. Describe the Mechanical properties of solids.
- vii. Explain the formation of depletion region in a PN-junction.
- viii. What happens to total radiation from black body if its absolute temperature is doubled?
- ix. Why  ${}^4_2\text{He}$  has larger ionization energy than H?
- x. Why are large nuclei unstable?
- xi. Define the term retentivity, residual flux, coercive force and reluctance.
- xii. Describe the principal of ECG.
- xiii. Describe the properties of X-rays.

**SECTION "C"**

Marks: 27

Note: Attempt any THREE questions of the following. Each question carries equal Marks.

- III. (a) State Gauss's law for electrostatic. Derive an expression for electric intensity between two oppositely charged parallel plates.  
(b) Determine the resistance and the power dissipation of resistor must be placed in series with a  $75\Omega$  resistor across  $120\text{V}$  source in order to limit the power dissipation in the  $75\Omega$  resistor to 90 watts.
- IV. (a) A current carrying  $100\text{p}$  is placed in a magnetic field. Derive an equation for the torque acting on it.  
(b) A current in a circuit falls from  $5\text{A}$  to  $0\text{A}$  in  $0.1\text{Sec}$ . If an average emf of  $200\text{V}$  induces, then give an estimate of the self-inductance of the circuit.
- V. (a) What is Compton Effect develop a mathematical relation for Compton's shift.  
(b) Electrons in X-rays tube are accelerated through potential difference of  $3000\text{V}$ . If these electrons were slowed down in a target what will be the minimum wave length of X-rays produced.
- VI. Write short note of any two of the following.  
(a) Nuclear reactor (b) Laser (c) Uncertainty principle  
(d) Full wave rectifier