

Roll No. of Candidate : \_\_\_\_\_

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PHYSICS

Intermediate Part-II, Class 12<sup>th</sup> (1<sup>st</sup>A 423 - II) Paper II Group - I

Time: 20 Minutes

OBJECTIVE ..... Code: 8473

Marks: 17

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question.

Grvj-12-1-23

1. The orbital electron has  
(A) fixed energy (B) 3.4 ev energy  
(C) any amount of energy (D) infinite energy
2. The circuit used for smoothing the pulsating voltage is called  
(A) resistor (B) filter (C) rectifier (D) grid
3. In reaction  ${}^2_1\text{H} + {}^3_1\text{H} \rightarrow {}^4_2\text{He} + \text{X} + 17.6 \text{ MeV}$ , X will be  
(A) proton (B) electron (C) neutron (D)  $\alpha$  particle
4. In reverse biased PN junction, its resistance is  
(A) several mega ohms (B) zero (C) infinite (D) few ohms
5. The radiations which are not deflected by magnetic field are  
(A)  $\beta$ -rays (B)  $\alpha$ -rays (C)  $\gamma$ -rays (D) cathode rays
6. Addition of impurity of 3<sup>rd</sup> group in the semiconductor causes the production of  
(A) holes (B) protons (C) electrons (D) positron
7. The materialization of energy takes place in the process of  
(A) Photoelectric effect (B) Compton's effect (C) Pair production (D) Pair annihilation
8. Work done by magnetic force is  
(A)  $Fd\cos\theta$  (B) positive (C) negative (D) zero
9. The factor  $\frac{h}{m_0c^2}$  has the unit of  
(A) second square (B) second (C) J.S. (D)  $\text{JS}^{-1}$
10. By increasing the length of current carrying solenoid, the magnetic field will  
(A) increase (B) decrease (C) not change (D) be uniform
11. At high frequency, the current in pure inductor is  
(A) low (B) high (C) moderate (D) zero
12. Semiconductor diode is an example of  
(A) super conductor (B) ohmic device (C) non ohmic device (D) ferromagnetic
13. If the frequency of A.C. is doubled then capacitive reactance will be  
(A) half (B) two times (C) four times (D) one fourth
14.  $\frac{\Delta v}{\Delta r}$  has the unit of  
(A) electric flux (B) magnetic flux (C) magnetic field (D) electric field
15. The windings of electromagnetic in generator are called  
(A) primary coils (B) field coils (C) secondary coils (D) inductors
16. Gaussian surface should be  
(A) spherical (B) cubical (C) circular (D) close
17. The expression for energy stored in an inductor is  
(A)  $\frac{1}{2}L^2I$  (B)  $L^2I$  (C)  $\frac{1}{2}LI^2$  (D)  $LI^2$

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Note: Section I is compulsory. Attempt any three (3) questions from Section II.

## SECTION – I

## 2. Write short answers to any EIGHT questions.

(2 x 8 = 16)

- i. What is meant by time constant?
- ii. What is the effect of dielectric medium on electrical force, when it is placed between two point charges?
- iii. How can you identify that which plate of a capacitor is positively charged?
- iv. If a point charge 'q' of mass 'm' is released in a non-uniform electric field with field pointing in the same direction, will it make a rectilinear motion?
- v. State the Lenz's law and write its expression.
- vi. How can a current loop be used to determine the presence of a magnetic field in a given region of space?
- vii. What should be the orientation of a current carrying coil in a magnetic field so that the torque acting upon the coil is: (i) maximum (ii) minimum
- viii. Is it possible to orient a current loop in a uniform magnetic field such that the loop will not tend to rotate? Explain.
- ix. Describe a brief account of interaction of various types of radiations with matter.
- x. How can radioactivity help in the treatment of cancer?
- xi. Write down nuclear reactions occur in the sun.
- xii. What is meant by half-life, also write down the relation, which exists between decay constant and half-life?

## 3. Write short answers to any EIGHT questions.

(2 x 8 = 16)

- i. Explain why the terminal potential difference of a battery decreases when the current drawn from it is increased?
- ii. Under what conditions the terminal potential difference of a battery is (a) equal (b) less than, the emf of the battery.
- iii. A potential difference is applied across the ends of a copper wire. What is the effect on the drift velocity of electrons by decreasing the length and temperature of the wires?
- iv. In R-L circuit, will the current lag or lead the voltage? Illustrate your answer by a vector diagram.
- v. What is the three phase A.C. supply? Write down its two uses.
- vi. A sinusoidal current has rms value of 10A. What is the peak value of sinusoidal current?
- vii. Describe briefly the feature "coercivity" of magnetic material in the study of hysteresis loop.
- viii. Distinguish between Intrinsic and Extrinsic semiconductors.
- ix. What is "Domains" region which exists in ferromagnetic material?
- x. What is the net charge on a n-type or p-type substance? Explain.
- xi. Write down four uses of operational amplifier.
- xii. Why a photo diode is operated in reverse biased state?

## 4. Write short answers to any SIX questions.

(2 x 6 = 12)

- i. When an electric motor, such as electric drill, is being used, does it also act as a generator? If so, what is the consequence of this?
- ii. Can a step-up transformer increase the power level?
- iii. In a transformer, there is no transfer of charge from the primary to the secondary. How is, then the power transfer?
- iv. As a solid is heated and begins to glow, why does it first appear red?
- v. Will higher frequency light eject greater number of electrons than low frequency light?
- vi. When a light shines on a surface, is momentum transferred to the metal surface?

(Turn Over)

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- vii. Explain wave-particle duality.
- viii. Write down two uses of x-rays.
- ix. Explain, how line spectrum can be used for the identification of elements?

(SECTION - II)

Note: Attempt any three (3) questions.

- 5. (a) Derive the relation for energy stored in a capacitor in terms of electric field intensity. (5)  
(b) A rectangular bar of iron is 2.0 cm by 2.0 cm in cross section and 40 cm long. Calculate the resistance if the resistivity of iron is  $11 \times 10^{-8} \Omega\text{m}$ . (3)
- 6. (a) Define Motional EMF and derive its relation. (5)  
(b) A coil of  $0.1\text{m} \times 0.1\text{m}$  and of 200 turns carrying a current of 1.0 mA is placed in a uniform magnetic field of 0.1 T. Calculate the maximum torque that acts on the coil. (3)
- 7. (a) What is RLC parallel circuit? Find its impedance diagram and resonance frequency. (5)  
Give its two properties.  
(b) The current flowing into the base of transistor is  $100 \mu\text{A}$ . Find its collector current  $I_c$ , its emitter current  $I_E$  and the ratio  $\frac{I_c}{I_E}$ . The value of current gain  $\beta$  is 100. (3)
- 8. (a) What is meant by strain energy? Derive the relation for strain energy in a deformed material. (5)  
(b) What is the mass of a 70 kg man in a space traveling at  $0.8c$  from us to measure from Earth? (3)
- 9. (a) Define laser. Explain laser operation. Give some uses of laser. (5)  
(b) A 75 kg person receives a whole body radiation dose of 24 m-rad, delivered by  $\alpha$ -particles for which RBE factor is 12. Calculate (a) The absorbed energy in joules (b) equivalent dose in rem. (3)

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**PHYSICS**

**Intermediate Part-II , Class 12<sup>th</sup> (1<sup>st</sup>A 423 - II) Paper: II Group – II**

**Time: 20 Minutes**

**OBJECTIVE ..... Code: 8474** *374-12-2-23* **Marks: 17**

**Note:** You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question.

1. Most penetrating among the followings are  
(A) Alpha rays (B) Beta rays (C) Neutrons (D) Gamma rays
2. Switching time of a photo diode is in  
(A)  $10^{-9}$  s (B)  $10^{-4}$  s (C)  $10^{-6}$  s (D)  $10^{-15}$  s
3. Most stable isotope among the followings is  
(A)  $\text{Fe}^{58}$  (B)  $\text{U}^{235}$  (C)  $\text{Pu}^{239}$  (D)  $\text{Pb}^{82}$
4. The diode in a half wave rectifier conducts for \_\_\_\_\_ during a complete AC cycle.  
(A)  $90^\circ$  (B)  $180^\circ$  (C)  $360^\circ$  (D)  $45^\circ$
5. For Lyman series, longest wavelength is emitted when  $n =$  \_\_\_\_\_  
(A) 1 (B) 2 (C)  $\infty$  (D) 5
6. Highest occupied band in solids is \_\_\_\_\_ band.  
(A) conduction (B) forbidden (C) core (D) valence
7. Wavelength of radiations emitted from a thermal object depends only on  
(A) temperature (B) colour of surface (C) size of surface (D) nature of surface
8. When plane of coil is placed parallel to magnetic field, torque on it is  
(A) zero (B) maximum (C) intermediate (D) infinite
9. No inertial frame of reference is preferred over another inertial frame  
(A) false (B) true  
(C) true for static frames (D) true for dynamic frames
10. When a solenoid containing steady current is gently pressed, magnetic field inside it,  
(A) increases (B) decreases (C) vanishes (D) remains same
11. \_\_\_\_\_ charges produce electromagnetic waves.  
(A) static (B) steadily moving (C) heavy (D) oscillating
12. Velocity of free electrons in metals at room temperature is of the order of  
(A)  $10^5$  m/s (B)  $10^8$  m/s (C)  $10^3$  m/s (D)  $10^{-3}$  m/s
13. In a capacitor, voltage \_\_\_\_\_ current by \_\_\_\_\_.  
(A) lags,  $\pi$  (B) leads,  $\pi/2$  (C) lags,  $\pi/2$  (D) leads,  $\pi$
14. Inside a charged metallic box, electric field intensity is  
(A) zero (B) strong (C) weak (D) variable
15. \_\_\_\_\_ uses a transformer with many secondary coils  
(A) TV receiver (B) door bell (C) Transistor radio (D) AC generator
16. When applied potential difference is increased; capacitance of parallel plate capacitor  
(A) increases (B) decreases (C) remains same (D) reduces to zero
17. Average output power of an AC generator for resistive load is \_\_\_\_\_ if peak current and voltage are  $I_0$  &  $V_0$  respectively  
(A)  $V_0 I_0$  (B)  $\frac{V_0 I_0}{2}$  (C) zero (D)  $2 V_0 I_0$

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Note: Section I is compulsory. Attempt any three (3) questions from Section II.

## SECTION – I

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## 2. Write short answers to any EIGHT questions.

(2 x 8 = 16)

- The potential is constant throughout a given region of space. Is the electrical field zero or non-zero in this region?
- Describe the force or forces on a positive charged particle when placed between two parallel plates with similar and equal charges.
- Distinguish between conductor and photo-conductor.
- How does a capacitor work in an electrical circuit?
- If a charged particle moves in a straight line through some region of space, can you say that the magnetic field in the region is zero?
- A loop of wire is suspended between the poles of a magnet with its plane parallel to the pole faces. What happens if a direct current is put through the coil? What happens if an alternating current is used instead?
- How does the beam of electrons is focused and deflected in CRO?
- Differentiate between stable and sensitive galvanometer.
- Write down two interactions of matter with energy.
- If you swallowed an alpha-particle source and  $\beta$ - source which would be the more dangerous to you? Explain.
- Explain the working of control rods in nuclear reactor.
- For what purpose alcohol or bromine is mixed with principal gas in GM-tube?

## 3. Write short answers to any EIGHT questions.

(2 x 8 = 16)

- Describe a circuit which will give continuously varying potential.
- How does doubling the frequency affect the reactance of capacitor?
- What is para substance? Give example.
- Why ordinary silicon diodes do not emit light?
- Why photodiode is operated in reverse biased state?
- Explain the conditions under which electromagnetic waves are produced from the source?
- Define the term (i) Elastic limit (ii) Ultimate tensile stress from stress strain curve.
- Explain why the terminal potential difference of battery decreases when current drawn from it, is increased?
- What do you mean by tolerance with reference to carbon resistor?
- What is power factor in A.C. circuit? Explain.
- Energy dissipated per cycle is more for steel as compared to iron. Why?
- Give two characteristics of op-amplifier.

## 4. Write short answers to any SIX questions.

(2 x 6 = 12)

- Does the induced emf in a circuit depends on the resistance of the circuit?
- Show that  $\epsilon$  and  $\frac{\Delta\phi}{\Delta t}$  have the same unit.
- Can a step-up transformer increase the power level?
- What do you understand by work function?

(Turn Over)

- v. As a solid is heated and begins to glow, why does it first appear red?
- vi. Which photon, red, green or blue carries the most (a) energy and (b) momentum?
- vii. When light shines on a surface, is momentum transferred to the metal surface?
- viii. What is meant by line spectrum? Explain line spectrum can be used for the identification of element.
- ix. Can the electron in the ground state of hydrogen absorb a photon of energy 13.6 eV and greater than 13.6 eV?

**SECTION - II**

**Note: Attempt any three (3) questions.**

- 5. (a) Define absolute P.E and derive expression of absolute potential due to a point charge. (5)
- (b) Resistance of an iron wire at  $0^{\circ}\text{C}$  is  $1 \times 10^4$  ohm. What is the resistance at  $500^{\circ}\text{C}$  if temperature co-efficient of resistance of iron is  $5.2 \times 10^{-3} \text{ K}^{-1}$ . (3)
- 6. (a) Derive an expression for torque on current carrying coil in uniform magnetic field. (5)
- (b) The back emf in a motor is 120V when the motor is turning at 1680 rev/min. What is the back emf when the motor turns 3360 rev/min? (3)
- 7. (a) What is operational amplifier? How does it work as inverting amplifier and also find its gain? (5)
- (b) Find the value of current and inductive reactance when A.C. voltage of 220 V at 50 Hz is passed through an inductor of 10 H. (3)
- 8. (a) Define intrinsic and extrinsic semiconductor. How N-type and P-type substances are formed? (5)
- (b) What is the maximum wavelength of the two photons produced when a positron annihilates an electron? The rest mass energy of each particle is 0.51 MeV. (3)
- 9. (a) Write Bohr's second postulate and find out formula for Bohr quantized radii. (5)
- (b) Find the mass defect and binding energy of the deuteron nucleus. The experimental mass of deuteron is  $3.3435 \times 10^{-27}$  kg. (3)

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