

PHYSICS

Class 12th (Inter Part-II) — Group-II — For All Sessions

PART - I (OBJECTIVE)

Time: 20 Minutes

Total Questions: 17

Marks: 17

Note: Write answers to the questions on the objective answer sheet provided. Four possible answers A, B, C and D to each question are given. Which answer you consider correct, fill the corresponding circle A, B, C or D given in front of each question with marker or pen ink on the answer sheet provided.

- 1 The rest mass of photon is:
(A) Zero (B) $1.67 \times 10^{-27} \text{ kg}$
(C) $1.67 \times 10^{-31} \text{ kg}$ (D) $9.1 \times 10^{-31} \text{ kg}$
- 2 X-rays are also known as:
(A) Cathode rays (B) Positive rays (C) r-rays (D) Alpha rays
- 3 The atomic number of ${}^{141}_{56}\text{Ba}$ is:
(A) 141 (B) 56 (C) 85 (D) 92
- 4 One unified mass scale (1U) is equal to:
(A) $1.66 \times 10^{-19} \text{ kg}$ (B) $1.66 \times 10^{-27} \text{ kg}$
(C) $1.66 \times 10^{-31} \text{ kg}$ (D) $1.66 \times 10^{-28} \text{ kg}$
- 5 Value of dielectric constant for vacuum is:
(A) Less than 1 (B) Greater than 1 (C) One (D) 1.5
- 6 Gold band on resistor represent its tolerance equal to:
(A) $\pm 10\%$ (B) $\pm 5\%$ (C) $\pm 15\%$ (D) $\pm 20\%$
- 7 An apparatus placed within a metal enclosure is "shielded" from:
(A) Electric field (B) Magnetic field (C) Gravitational field (D) Electromagnetic field
- 8 The SI unit of magnetic induction is:
(A) Weber (B) Tesla (C) Newton (D) Joule
- 9 The sensitivity of Galvanometer can be increased by decreasing:
(A) C/BAN (B) B/ACN (C) CB/AN (D) NC/AB
- 10 The minus sign in Faraday's law of electromagnetic induction shows that the direction of induced emf is such that it opposes the change in:
(A) Electric flux (B) Electromagnetic flux (C) Gravitational flux (D) Magnetic flux
- 11 The emf induced in a generator is:
(A) $N\omega AB \sin\theta$ (B) $N\omega IB \sin\theta$ (C) $NAB \sin\theta$ (D) $N\omega B \sin\theta$
- 12 If I_0 is the peak value of A.C current, its average value over a complete cycle is:
(A) $\sqrt{2} I_0$ (B) $I_0 / \sqrt{2}$
(C) $\sqrt{(I_0/2)}$ (D) Zero
- 13 The value of angular frequency " ω " is equivalent to:
(A) $2\pi T$ (B) $4\pi f$ (C) $2\pi f$ (D) πf
- 14 Based on the geometrical structure and arrangement of atoms, there are ____ crystal systems:
(A) 6 (B) 5 (C) 7 (D) 8
- 15 The potential barrier for the Ge^n at room temperature is:
(A) 0.7 v (B) 1.0 v (C) 0.6 v (D) 0.3 v
- 16 The mathematical notation for exclusive OR-operation is:
(A) $X = \overline{A + B}$ (B) $X = A \overline{B} + B \overline{A}$
(C) $X = \overline{AB + BA}$ (D) $X = \overline{A - B}$
- 17 The photoelectric effect explained by:
(A) Darission (B) Gerwer (C) Hertz (D) Einstein

PHYSICS

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PART - II (SUBJECTIVE)

Time: 2:40 hours

Marks: 68

SECTION - I

2. Write short answers of any eight parts from the following:

(8 × 2 = 16)

- Differentiate between electric potential difference and electric potential energy difference and write its relation.
- Why is the potential difference between the plates of capacitor decreased when dielectric material is inserted between the plates?
- Describe the force or forces on a positive point charge when placed between parallel plates with opposite & equal charges.
- If a point charge q of mass m is released in a non-uniform electric field with field lines pointing in the same direction, will it make a rectilinear motion?
- What is the advantage of synchronization control in case of CRO?
- What is digital multimeter? Why is it easier to use?
- How can a current loop be used to determine the presence of a magnetic field in a given region of space?
- What should be the orientation of a current carrying coil in a magnetic field so that torque acting upon the coil is (a) maximum (b) minimum?
- Equal doses of different radiations do not produce same biological effect. Explain.
- Name the six quarks.
- State two sources of "background radiation"
- How can radioactivity help in the treatment of cancer?

3. Write short answers of any eight parts from the following:

(8 × 2 = 16)

- What are the difficulties in testing whether the filament of a lighted bulb obeys Ohm's law?
- What is thermistor? Write its principle.
- Explain under what condition, the wheat stone bridge is said to be balanced?
- How many times per second will an incandescent lamp reach maximum brilliance when connected to a 50Hz source?
- What is modulation signal and what are the carrier wave?
- Why the choke is used in A.C. circuits?
- What is meant by strain energy? How can it be determined from the force-extension graph?
- Differentiate between Young's modulus and Bulk's modulus
- What is hysteresis loss?
- What is a net charge on a n-type or a p-type substance?
- How is p-n junction formed?
- Calculate the gain of a non-inverting amplifier when $R_1 = \text{infinity}$ and $R_2 = 0$

4. Write short answers of any six parts from the following:

(6 × 2 = 12)

- Does the induced emf in a circuit depend on the resistance of the circuit?
- Is it possible to change both the area of the loop and magnetic field passing through the loop and still not have an induced emf in the loop?
- When does light behave as a wave? When does it acts as a particle?
- If an electron and proton have the same de-broglie wavelength, which particle has greater speed?
- How can the spectrum of hydrogen contain so many lines? when hydrogen contain one electron.
- What is the principle of A.C. generator?
- What are inertial and non-inertial frame of references?
- What is the difference between special theory of relativity and general theory of relativity?
- Differentiate between ionization energy and excitation energy.

SECTION - II

Note: Attempt any three questions. Each question carries equal marks:

(8 × 3 = 24)

- (a)** Derive a relation for electrical potential at a point due to a point charge. (5)

(b) The resistance of an iron wire at 0°C is $1 \times 10^4 \Omega$. What is resistance at 500°C , if the temperature co-efficient of resistance of iron is $5.2 \times 10^{-3} \text{K}^{-1}$? (3)
- (a)** Define transformer. Explain its principle, construction and working. (5)

(b) What current should pass through a solenoid that is 0.5 m long with 10,000 turns of copper wire so that it will have a magnetic field of 0.4T? (3)
- (a)** What is the series resonance circuit? Derive the relation of resonance frequency and write down its properties. (5)

(b) Calculate the output of the op-amp circuit shown in figure. [Figure not reproduced — the original shows an op-amp with a +5v input through $10\text{K}\Omega$, a -2v input through $4\text{K}\Omega$, and a $20\text{K}\Omega$ feedback resistor.] (3)
- (a)** Write a note on energy band theory and classify conductors, insulators and semiconductors on the basis of this theory. (5)

(b) What is the maximum wavelength of the two photons produced when a positron annihilates an electron? The rest mass energy of each is 0.51 MeV. (3)
- (a)** Define fusion reaction. Explain it in sun with the help of nuclear reactions. (5)

(b) Compute the shortest wavelength radiation in Balmer series? What value of ' n ' must be used. (3)