Objective
Paper Code
8475

Intermediate Part Second
PHYSICS (Objective) **GROUP - I**
Time: 20 Minutes   Marks: 17 FSD-1-29

Q.No.1 You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill the relevant circle in front of that question number on computerized answer sheet. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero marks in that question. Attempt as many questions as given in objective type question paper and leave other circles blank.

S.#	Questions	A	B	C	D
1	At high frequencies, a R-L-C series circuit behaves like:	R-C circuit	R-L circuit	Capacitive circuit	Parallel resonance circuit
2	At what frequency will an inductor of 1H have a reactance of 500Ω ?	500Hz	250Hz	350Hz	80Hz
3	The back motor effect in generators is in agreement with the law of conservation of:	Charge	Momentum	Energy	Mass
4	The turns ratio $\frac{N_s}{N_p}$ of a step-up transformer is:	Greater than 1	Less than 1	Equal to 1	Equal to zero
5	Lorentz force is given by:	$\vec{F} = q(\vec{v} \times \vec{B})$	$\vec{F} = q\vec{E} + q(\vec{v} \times \vec{B})$	$\vec{F} = q\vec{E}$	$\vec{F} = I\,(\vec{L} \times \vec{B})$
6	The SI unit of permeability of free space is:	Wb	Wbm^{-2}	$WbA^{-1}m^{-1}$	It has no unit
7	The charge carriers in electrolytes are:	Free electrons	Holes	Protons	Positive and negative ions
8	If time constant of R-C circuit is small, the capacitor is charged or discharged:	Rapidly	Slowly	Intermediately	At constant rate
9	When an insulating medium is placed between two charges, the Coulomb's force:	Increases	Decreases	Becomes double	Remains same
10	The half life of radon gas is:	1620 years	23.5 minutes	3.8 days	4.5×10^9 years
11	Which basic force of nature has only repulsive nature?	Weak nuclear force	Strong nuclear force	Gravitational force	Electric force
12	The radius of 3rd orbit in hydrogen atom is:	0.477 nm	0.053 nm	0.212 nm	0.159 nm
13	A black body is:	Ideal radiator	Ideal reflector	Poor absorber	Poor radiator
14	Position was discovered by:	De Broglie	Heisenberg	Compton	Anderson
15	The current flowing into the base of a transistor is 25 microA while its collector current is 5mA. The current gain of transistor will be:	2000	200	500	1000
16	The Boolean expression of OR gate is:	X = A+B	X = A·B	X = $\overline{A+B}$	X = $\overline{A·B}$
17	An example of donor impurity is:	Silicon	Germanium	Phosphorous	Aluminum

SECTION – I

2. **Write short answers to any EIGHT parts.**   16

   (i)   The potential is constant throughout a given region of space. Is the electrical field zero or non-zero in this region? Explain.
   (ii) Electric lines of force never cross. Why?
   (iii) Why Gauss's law is used in electrostatics? How shape of Gaussian surface is chosen?
   (iv) What is meant by potential gradient? How it is mathematically related to electric field?
   (v)   How can a current loop be used to determine presence of magnetic field in a given region of space?
   (vi) How can you use magnetic field to separate isotopes of chemical element?
   (vii) What is the working principle of a galvanometer?
   (viii) What is meant by synchronization in CRO? How it is achieved to make the pattern stationary on screen of CRO?
   (ix) Why are heavy nuclei unstable?
   (x)   What factors make a fusion reaction difficult to achieve?
   (xi) How a Wilson Cloud chamber is used to determine information about charge, mass and energy of a radiating particle?
   (xii) How can we justify emission of electron from inside of a nucleus during beta decay?

3. **Write short answers to any EIGHT parts.**   16

   (i)   Define source of current. Write any two sources of current.
   (ii) Starting from left first colour band is Red, second band is of violet colour, third band is of orange colour and fourth band is of silver colour. Calculate resistance and tolerance.
   (iii) Describe a circuit which will give continuously varying potential.
   (iv) Define amplitude modulation (A.M). Draw waveform of amplitude modulated wave.
   (v)   How does doubling the frequency affect the reactance of a capacitor and an inductor?
   (vi) Explain the conditions under which electromagnetic waves are produced from a source.
   (vii) Differentiate between glossy solids and polymeric solids.
   (viii) Define stress and strain. Show that units of modulus of elasticity and stress are the same.
   (ix) Differentiate between conductors and insulators with the help of energy band theory.
   (x)   Write Boolean expression and truth table of exclusive OR gate.
   (xi) What are the biasing requirements for the junction of a transistor for its normal operation? Also draw circuit diagram of a common emitter amplifier.
   (xii) What is the net charge on N-type and P-type substance?

4. **Write short answers to any SIX parts.**   12

   (i)   Show that ε and $\frac{\Delta\phi}{\Delta t}$ have the same units.
   (ii) What is hysteresis loss? Write methods used to decrease the hysteresis loss.
   (iii) Define alternating current. What is the time period of alternating current?
   (iv) Give the statement of special theory of relativity.
   (v)   What is Compton wavelength and give its numerical value?
   (vi) When does light behave as a wave and when does it behave as a particle?
   (vii) Will higher frequency light eject greater number of electrons than low frequency light?
   (viii) What are the advantages of lasers over ordinary light?
   (ix) Is energy is conserved when an atom emits a photon of light?

SECTION – II	Attempt any THREE questions. Each question carries 08 marks.

5. (a) Derive an expression for capacitance of a parallel plate capacitor.   05
   (b) A rectangular bar of iron is 2.0 cm by 2.0 cm in cross section and 40 cm long. Calculate its resistance if the resistivity of iron is 11×10^{-8} Ωm.   03

6. (a) What is transformer? Describe its principle, construction and working in detail.   05
   (b) A power line 10 m high carries a current of 200 A. Find the magnetic field of the wire at the ground.   03

7. (a) What is p-n junction? Describe forward and reverse biased p-n junction. Discuss its characteristic curve.   05
   (b) A 10mH, 20Ω coil is connected across 240V and $\frac{180}{\pi}$ Hz source. How much power does it dissipates?   03

8. (a) Describe energy band theory. Discuss the kinds of solids on the basis of energy band theory.   05
   (b) An electron is placed in a box about the size of an atom that is about 1.0×10^{-10}m. What is the velocity of the electron?   03

9. (a) Write the principle of mass spectrograph. Show that mass of ion is directly proportional to square of magnetic field applied.   05
   (b) The wavelength of K x-ray from copper is 1.377×10^{-10}m. What is the energy difference between the two levels from which this transition results?   03