

Warning:- Please write your Roll No. in the space provided and sign.
(Inter Part – II) (Session 2017-19 to 2019-21)

Roll No. _____
Sig. of Student _____

Physics (Objective)

(Group II)

PAPER CODE 4478

540-I-21

Paper (II)

Maximum Marks:- 17

Time Allowed:- 20 minutes

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. Write PAPER CODE, which is printed on this question paper, on the both sides of the Answer Sheet and fill bubbles accordingly, otherwise the student will be responsible for the situation. Use of Ink Remover or white correcting fluid is not allowed.

Q. 1

- 1) In the Bohr's model of hydrogen atom, the lowest orbit corresponds to
(A) Infinite energy (B) Zero energy (C) Minimum energy (D) Maximum energy
- 2) Which of the following conservation law hold in nuclear transmutation.
(A) Mass (B) Energy (C) Momentum (D) All of these
- 3) The building blocks of protons and neutrons are
(A) Ions (B) Electrons (C) Positrons (D) Quarks
- 4) The energy density in a capacitor is directly proportional to
(A) $\epsilon_0 \epsilon_r$ (B) E^2 (C) C^2 (D) V^2
- 5) The negative sign in the expression of potential gradient $\vec{E} = -\frac{\Delta \vec{V}}{\Delta r}$ shows that, direction of \vec{E} is along.
(A) Increasing potential (B) Decreasing potential (C) Increasing strength (D) Negative potential
- 6) Colour code of 10 Ω resistance with 5% tolerance is
(A) Black, black, Brown, Silver (B) Brown, black, black, Gold (C) Black, brown, black, Gold (D) Brown, brown, black, Gold
- 7) The brightness of spot on C.R.O screen is controlled by
(A) Anodes (B) Cathodes (C) Grid (D) Plates
- 8) Magnetic flux density at a point due to current carrying coil is determined by
(A) Ampere's Law (B) Gauss's Law (C) Faraday's Law (D) Lenz's Law
- 9) The direction of induced current is always so as to oppose the change which causes the current is
(A) Faraday's Law (B) Lenz's Law (C) Ohm's Law (D) Kirchhoff's 1st rule
- 10) When current flowing through an inductor is doubled, then energy stored in it becomes.
(A) Half (B) Four times (C) One fourth (D) Double
- 11) In RLC series circuit, the current at resonance frequency is
(A) Minimum (B) Maximum (C) Zero (D) Infinite
- 12) When 10 V are applied to an A.C circuit, the current flowing in it is 100 mA, its impedance is
(A) 50 Ω (B) 75 Ω (C) 100 Ω (D) 90 Ω
- 13) If stress is increased beyond the elastic limit of a material, it becomes permanently changed, this behaviour of material is called.
(A) Elasticity (B) Plasticity (C) Yield strength (D) Ultimate tensile strength
- 14) The potential barrier of silicon at room temperature is
(A) 0.3 V (B) 0.7 V (C) 3.0 V (D) 7.0 V
- 15) The voltage gain of an amplifier having $r_{ie} = 1\Omega$, $\beta = 100$, $R_c = 20\Omega$ is
(A) 2000 (B) 1000 (C) 500 (D) 5
- 16) When a photon collide with an electron, which of following of photon increases.
(A) Frequency (B) Energy (C) Wave Length (D) Mass
- 17) Which of the following explain particle nature of light?
(A) Interference (B) Diffraction (C) Photoelectric effect (D) Polarization

1277 - 1221 ALP -- 15000 (4)

1221 Warning:- Please, do not write anything on this question paper except your Roll No.
 (Subjective) (Group II) (Session 2017-19 to 2019-21) (Inter Part - II) **Paper (II)**
 Allowed: 2.40 hours Section ----- I Maximum Marks: 68

Answer briefly any Eight parts from the followings:- **S40-I-21** **8 × 2 = 16**

- (i) How can you identify that which plate of a capacitor is positively charged?
- (ii) Do electrons tend to go to region of High potential or of low potential?
- (iii) How much energy will store in a capacitor of capacitance $1.0 \mu F$ having electrical potential of 10.0 V between the parallel plates capacitor. (iv) Define electron volt. Is it a unit of electrical potential or energy.
- (v) Is it possible to orient a current loop in a uniform magnetic field such that the loop will not tend to rotate? Explain.
- (vi) How can you use a magnetic field to separate isotopes of chemical element?
- (vii) A current carrying rectangular coil is rotating in a magnetic field. What factors does the torque of coil depend?
- (viii) How can phase difference between two voltages be obtained by Cathode Ray Oscilloscope?
- (ix) Does the induced emf in a circuit depend on the resistance of the circuit? Does the induced current depend on the resistance of the circuit? (x) Show that ε (emf) and $\frac{\Delta\phi}{\Delta t}$ have the same units.

- (xi) What will be the energy density of current carrying solenoid if magnetic field is doubled?
- (xii) Does the self inductance depend on the rate of change of current?

3. Answer briefly any Eight parts from the followings:-

8 × 2 = 16

- (i) State Kirchhoff's Rules. (ii) A sinusoidal current has rms value of 10 A. What is the maximum or peak value?
- (iii) A potential difference is applied across the ends of a copper wire. What is the effect on the drift velocity of free electrons by decreasing the length and the temperature of the wire?
- (iv) What is Wheatstone bridge? How can it be used to determine an unknown resistance?
- (v) A circuit contains an iron-cored inductor, a switch and a D.C. source arranged in series. The switch is closed and after an interval reopened. Explain why a spark jumps across the switch contacts?
- (vi) Why the choke is used in A.C. circuits? (vii) Define Retativity and coercive current.
- (viii) Write the name of four applications of superconductors.
- (ix) Explain briefly the semiconductors in terms of energy band theory. (x) Write name of applications of photodiode.
- (xi) What is the biasing requirement of the junctions of a transistor for its normal operation? Explain how these requirements are met in a common emitter amplifier.
- (xii) How does the motion of an electron in a n-type substance differ from the motion of holes in a p-type substance?

4. Answer briefly any Six parts from the followings:-

6 × 2 = 12

- (i) Can pair production takes place in vacuum? Explain. (ii) Is it possible to create a single electron from energy? Explain.
- (iii) We do not notice the de Broglie wavelength for a pitched cricket ball. Explain why?
- (iv) What do we mean when we say that the atom is excited? (v) Write down any four uses of Laser.
- (vi) What do you understand by "background radiation"? State two sources of this radiation.
- (vii) What information is revealed by the length and shape of the tracks of an incident particle in Wilson cloud chamber?
- (viii) Describe the principle of operation of a solid state detector of ionizing radiation in terms of generation and detection of charge carriers.
- (ix) Discuss the advantages and disadvantages of nuclear power compared to the use of fossil fuel generated power.

Note: Attempt any three questions.

Section ----- II

(8 × 3 = 24)

5. (a) What is Wheatstone bridge? Derive a relation for its balancing condition.
 (b) Two opposite point charges each of magnitude q are separated by a distance $2d$. What is the electric potential at a point P mid-way between them.
6. (a) Derive the expression for torque on a current carrying coil in a uniform magnetic field.
 (b) A metal rod of length 25 cm is moving at a speed of 0.5 ms^{-1} in a direction perpendicular to 0.25 T magnetic field. Find the emf produced in the rod?
7. (a) How an operational amplifier behaves as non-inverting amplifier? Derive a relation for voltage gain of the non-inverting amplifier.
 (b) An alternating source of emf 12 V and frequency 50 Hz is applied to a capacitor of capacitance $3 \mu F$ in series with a resistor of resistance $1 \text{ k } \Omega$. Calculate the phase angle.
8. (a) What are the Radiation Detectors? What do you know about "Wilson's cloud chamber"? Explain its principle, construction and working.
 (b) What stress would cause a wire to increase in length by 0.01 % if the Young's modulus of the wire is $12 \times 10^{10} \text{ Pa}$. What force would produce this Stress if the diameter of the wire is 0.56 mm.
9. (a) What is De-Broglie hypothesis of wave nature of particles? How Davisson and Germer experiment confirmed it?
 (b) Find the speed of electron in the first Bohr orbit.