1224   Warning:- Please write your Roll No. in the space provided and sign. Roll No----------------
(Inter Part – II)   (Session 2020-22 to 2022-24)   Sig. of Student   ----------------
Physics   (Objective)   (Group I)   Paper (II)
Time Allowed:- 20 minutes   **PAPER CODE 4471**   Maximum   Marks:-
17   SGD-1-24

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) The capacitance of a charged capacitor is 'c' and energy stored on the account of charge is U then quantity of charge on the capacitor will be

   (A) Zero   (B) Q = CV   (C) $Q = \sqrt{2UC}$ (D) $Q = \sqrt{\dfrac{UC}{2}}$

2) If 4×10^{20} ev of energy is required to move a charge of 1C between two points then potential difference between the point is

   (A) 4×10^{20} v   (B) 64×10^{19} v   (C) 64×10^{18} v   (D) 64 v

3) A car battery has emf 12 v and internal resistance 5×10^{-2} Ω , if it draws 60 A current , the terminal voltage of battery will be

   (A) 3 V   (B) 5 V   (C) 9 V   (D) 12 V

4) The resistance of the coil of ammeter is R the shunt required to increase its range n times should have a resistance

   (A) R/n+1   (B) R/n-1   (C) nR   (D) R/n

5) When electron moves through a magnetic field, then change occurs in

   (A) Speed   (B) Direction   (C) Energy   (D) Mass

6) The emf linked with same coil when the rate of change of current in the coil is unity is equal to

   (A) Self induction   (B) Mutual induction   (C) Self inductance   (D) Mutual inductance

7) A coil having 500 square 100 ps each of side 10 cm is placed normal to the magnetic field which is increasing at the rate of 0.1 tesla per second. The induced emf is

   (A) 0.1 v   (B) 0.5 v   (C) 1 v   (D) 5 v

8) During frequency modulation when amplitude of signal is zero, the frequency of the carrier wave is

   (A) Normal   (B) Zero   (C) Minimum   (D) Maximum

9) In RC series circuit voltage drops across resistor is 30 v and across capacitor is 40 v then the applied voltage must be

   (A) 70 v   (B) 10 v   (C) 50 v   (D) 120 v

10) A Force F is needed to break a copper wire having radius R. The force needed to break a copper wire of same length and radius 2R will be

    (A) F/2   (B) 2F   (C) 4F   (D) F/4

11) In common emitter transistor amplifier the input signal and output signal are always

    (A) Have same magnitude   (B) Have same phase   (C) Negative   (D) Out of phase by 180°

12) The term inverter is used for

    (A) NOR gate   (B) NAND gate   (C) NOT gate   (D) All gates

13) A proton and α-particle are accelerated through same voltages the ratio of their de-Broglie wavelength will be

    (A) 1 : 2   (B) $2\sqrt{2}$: 1   (C) $\sqrt{2}$: 1   (D) 2 : 1

14) When a photon collide with an electron which of the following of photon increases

    (A) Wavelength   (B) Energy   (C) Frequency   (D) All of these

15) The ratio of the longest and shortest wavelength of the Lyman series is approximately

    (A) 4/3   (B) 9/4   (C) 9/5   (D) 16/7

16) The SI unit of radiation dose is

    (A) Rem   (B) Gray   (C) Becquerel   (D) Roentgen

17) Leptons are particles that do not experience

    (A) Strong nuclear force (B) Electric force   (C) Weak nuclear force (D) Magnetic force

Physics (Subjective) (Group I) (Session 2020-22 to 2022-24) (Inter Part - II) Paper (II)

Time Allowed: 2.40 hours SGD-1-24 Section --------- I   Maximum Marks: 68

2. Answer briefly any Eight parts from the followings:-   8 × 2 = 16

(i) What is RC time constant. Prove that unit of RC is second.   (ii) Define potential gradient. Give its direction and units.

(iii) 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?

(iv) Is E necessarily zero inside a charged rubber balloon if balloon is spherical? Assume that charge is distributed uniformly over the surface.   (v) Define current sensitivity of a galvanometer.

(vi) Why is there no work done by the magnetic force that acts on the charge.

(vii) If a charged particle moves in a straight line through some region of space, can you say that magnetic field in this region is zero?

(viii) Why the resistance of an ammeter should be very low.   (ix) What is the function of cadmium rods in a nuclear reactor.

(x) What is meant by dead time for G.M. counter. Give its value for G.M. tube.

(xi) How can radioactivity help in the treatment of cancer?

(xii) What is a radioactive tracer? Describe one application each in medicine, agriculture and industory.

3. Answer briefly any Eight parts from the followings:-   8 × 2 = 16

(i) Is the filament resistance lower or higher in a 500 W, 220 V light bulb than in a 100 W, 220 V bulb?

(ii) In a R – L circuit , will the current Lag or Lead the voltage? Illustrate you answer by a vector diagram.

(iii) Draw a stress strain curve for ductile material and define yield point.

(iv) How does the motion of an electron in a n-type substance differ from the motion of holes in a p-type substance?

(v) What is drift velocity? Give its value.   (vi) What is the phenomenon of electroplating.

(vii) Give two uses of three phase A.C supply.   (viii) What is phase of A.C? How you express it by vector diagram.

(ix) Differentiate between unit cell and crystal lattice.   (x) Differentiate between elasticity and plasticity of a material.

(xi) What is normal operation of transistor? Show by diagram.   (xii) Can a transistor work as a switch? Explain.

4. Answer briefly any Six parts from the followings:-   6 × 2 = 12

(i) In a certain region the earth's magnetic field points vertically down. When a plane flies due north, Which wingtip is positively charged?

(ii) Does the induce emf always act to decrease the magnetic flux through a circuit?

(iii) Name the factors upon which the self inductance depends.

(iv) Does the brightness of a beam of light primarily depends on the frequency of photons or on the number of photons?

(v) What advantages an electron microscope has over an optical microscope?

(vi) Define stopping potential and threshold frequency in photoelectric effect.

(vii) Show that Compton shift is equal to Compton wavelength at an angle of 90°.

(viii) Is energy conserved when an atom emits a photon of light?   (ix) Differentiate between K_α X – rays and K_β X – rays.

Note: Attempt any three questions.   Section ------------- II   (8 × 3 = 24)

5. (a) State Gauss's Law. Calculate the electric intensity due to an infinite sheet of charge.

(b) The potential difference between the terminals of a battery in open circuit is 2.2 V, when it is connected across a resistance of 5.0 Ω, the potential falls to 1.8 V. Calculate the current and the internal resistance of the battery.

6. (a) What is transformer? Describe its principle, construction and working in detail.

(b) The resistance of a galvanometer is 50.0 Ω and reads full scale deflection with a current of 2.0 mA. Show by a diagram how to convert this galvanometer into voltmeter reading 200 V full scale

7. (a) How can we use comparator as a Night Switch? Explain with the help of diagram.

(b) A 10 mH, 20 Ω coil is connected across 240 V and $\frac{180}{\pi}$ Hz source. How much power does it dissipate?

8. (a) Write a note on Compton effect.

(b) A 1.0 m long copper wire is subjected to a stretching force and its length increases by 20 cm. Calculate the tensile strain and the percent elongation which the wire undergoes.

9. (a) What is He – Ne Laser? Explain. Also write uses of laser in medicine and industry.

(b) A 75 Kg person receives a whole body radiation dose of 24 m-rad, delivered by α – particles for which RBE factor is 12. Calculate (i)absorbed energy in Joules (ii)Equivalent dose in rem