1222 Warning:- Please write your Roll No. in the space provided and sign. Roll No----------------
(Inter Part – II)   (Session 2018-20 to 2020-22)   Sig. of Student   ----------------
Physics   (Objective)   (Group II) **SAO 92-22**   Paper (II)
Time Allowed:- 20 minutes   **PAPER CODE 4478**   Maximum 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. 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) Production of X-rays is the reverse process of
   (A) Photoelectric effect (B) Compton effect   (C) Inhalation   (D) Pair Production
2) The Binding energy for Helium is given by
   (A) 30.2 MeV   (B) 2.25 MeV   (C) 2.28 MeV   (D) 28.2 MeV
3) After two half-lives the number of decayed nuclei of an element are
   (A) N/4   (B) N/2   (C) 3N/4   (D) N
4) Photo copier and injek printer are the application of :
   (A) Magnetism   (B) Electricity   (C) Electro magnetism (D) Electro static
5) SI unit of electric flux is:
   (A) $Nm^2 c^{-1}$ (B) Nmc^{-1} (C) $Nm^{-1} c^{-1}$ (D) $Nm^3 c^{-2}$
6) When the internal resistance of source is equal to the load maximum power dissipated is
   (A) $E/4r$ (B) $E/4r^2$ (C) $E^2/4r$ (D) $E^2/4r^2$
7) Unit of magnetic flux density is
   (A) $wb\, m^{-2}$ (B) $N\, A^{-1}\, m^{-1}$ (C) Tesla   (D) All of above
8) When a charge is projected perpendicular to uniform magnetic field its path is:
   (A) Spiral   (B) Circular   (C) Helix   (D) Ellipse
9) If the angular frequency of A.C Generator increased to double, the time period would become
   (A) Half   (B) Double   (C) 4 Times   (D) $\frac{1}{4}$ Times
10) "Eddy current" are set up in a direction:
   (A) parallel to flux   (B) anti parallel to flux (C) at $45°$ to flux   (D) perpendicular to the flux
11) When effective value of current is 10. What is its peak value?
   (A) 10   (B) 14.2   (C) 12   (D) 13
12) Which are the Substance called _____ which undergo plastic deformation until they break.
   (A) Brittle   (B) Ductile   (C) Amorphous   (D) Polymeric
13) Choke consumes extremly small.
   (A) Current   (B) Charge   (C) Power   (D) Potential
14) The size of base in a transistor is
   (A) $10^{-6}\, m$ (B) $10^{-8}\, m$ (C) $10^{-7}\, m$ (D) $10\, m$
15) _____ is the building block of every complex electronic circuit.
   (A) Resistor   (B) Capacitor   (C) Amplifier   (D) Diode
16) The unit of work function is
   (A) volt   (B) joule   (C) watt   (D) Farad
17) Compton's Shift will be maximum at the angle of
   (A) $90°$ (B) $360°$ (C) $180°$ (D) $60°$

Physics (Subjective)   **Group (II)**   (Session 2018-20 to 2020-22)   **Paper (II)**

Time Allowed: 2.40 hours   **Section ------------------ I**   (Inter Part - II) Maximum Marks: 68

2.   Answer briefly any Eight parts from the followings:- ~~S4D-42-22~~ 8 ×2 = 16

(i)   How the capacitance is increased by placing a dielectric b/w the plates of a capacitor?

(ii)   Prove that time constant is equal to R×C, where R is resistance and 'C' is capacitance.

(iii)   Calculate the force b/w two similar charges of unit magnitude placed 1 meter apart in air.

(iv)   The potential is constant throughout a given region of space. Is the electric field zero or non-zero in this region? Explain.

(v)   Can an electron at rest be set in motion by bringing a magnet close to that electron? Explain.

(vi)   A current in a conductor produces a magnetic field, which can be calculated using Ampere's Law. Since current is defined as the rate of flow of charge, what can you conclude about the magnetic field due to stationary charges? What about moving charges.

(vii)   How can a current loop be used to determine the presence of a magnetic field in a given region of space.

(viii)   Why the resistance of an ammeter should be very low?

(ix)   Mass defect for helium is 0.03034u. Calculate its binding energy in (eV).

(x)   What fraction of a radioactive sample decays after two half lives have elapsed?

(xi)   Describe the interaction of beta radiations with matter.

(xii)   A particle which produces more ionization is less penetrating. why?

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

(i)   Define thermistors. Write its one application.

(ii)   Starting from left a carbon resistance has colour bands in the order Red, violet, orange and silver. Calculate the value of resistance with tolerance.

(iii)   Do bends in a wire affect its electrical resistance?   **(iv)** Define Choke.

(v)   How many times per second will an incandescent lamp reach maximum brilliance when connected to a 50 Hz source?

(vi)   How does doubling the frequency affect the reactance of (a) an inductor (b) a capacitor

(vii)   What is meant by paramagnetic and diamagnetic substances. Give examples for each.

(viii)   On the basis of energy band theory distinguish between insulators and conductors.

(ix)   Define retentivity and Coercivity.   **(x)** What is Photodiode? Write down its two applications.

(xi)   Write down the Truth table and symbol of NAND gate.

(xii)   Why Photo diode is operated in reverse biased state?

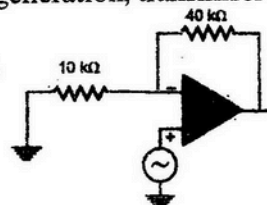**4.   Answer briefly any Six parts from the followings:-**   6 × 2 = 12

(i)   Show that ε and $\dfrac{\Delta\phi}{\Delta t}$ have the same units.

(ii)   How would you position a Flat loop of wire in a changing magnetic Field so that there is no emf induced in the loop?

(iii)   What are the dimensions of mutual Inductance?   **(iv)** State Faraday's Law. Write its Mathematical expression

(v)   Which Photon, red, green or blue carries the most: (a) energy   (b) momentum

(vi)   Why can red light be used in a photographic dark room when developing Films, but not blue or white light?

(vii)   Define Photoelectric effect and Pair Production.   **(viii)** What are the advantages of lasers over ordinary light?

(ix)   What is biological effects of X-rays?

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

5.   (a)   What is potentiometer? How it can be used as, (i) Potential divider (ii) Measuring of emf of a cell.

(b)   Two point charges $q_1 = -1.0\times10^{-6}C$ and $q_2 = 4.0\times10^{-6}C$,are separated by a distance of 3.0 m. Find and justify the zero-field location?

6.   (a)   Describe the method to determine the e/m of an electron.

(b)   A circular coil has 15 turns of radius 2cm each. The plane of the coil lies at 40° to a uniform magnetic field of 0.2 T. If the field is increase by 0.5 T in 0.2 s. Find Magnitude of the Induce emf.

7.   (a)   What is the band theory of solids. Differentiate between insulator, conductor and semiconductor on the basis of this theory.

(b)   A 50 keV photon is Compton scattered by a quasi-free electron. If the scattering angle of photon is 45°, what is its wavelength of the scattering.

8.   (a)   Describe the production of X-rays. Write down the use of X-rays to visualize the fractured bones and defects in structural steel.

(b)   The half life of $^{91}_{33}Sr$ is 9.70 hours. Find the decay constant.

9.   (a)   What are electromagnetic waves. How can you explain principle of generation, transmission and reception of electromagnetic waves.

(b)   Calculate the gain of non-Inverting amplifier shown in figure below.

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