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) *SAD 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:-   ~~54 D-92-22~~ 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 retantivity 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 $q_1 = -1.0 \times 10^{-6} C$ and $q_2 = 4.0 \times 10^{-6} C$, 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.
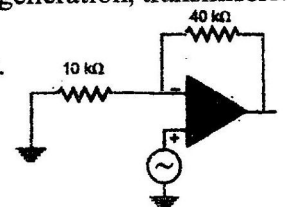
1222 Warning:- Please write your Roll No. in the space provided and sign. Roll No-------------------
(Inter Part – II) (Session 2018-20 to 2020-22) Sig. of Student ---------------
Physics (Objective) (Group I) SADGI-22 Paper (II)
PAPER CODE 4471 Maximum Marks:- 17
Time Allowed:- 20 minutes

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) A rubber ball of radius 2 cm has a charge of 5 µc on its surface, which is uniformly distributed. The value of E at its Centre is
   (A) 10 NC^{-1} (B) Zero   (C) 2.5 NC^{-1} (D) 5×10^{-6} NC^{-1}

2) The minimum value of charge on free particle is
   (A) $\frac{2}{3}e$ (B) $\frac{1}{3}e$ (C) $\frac{-2}{3}e$ (D) e

3) During danger the 'eel' turn itself into a living battery. Then the potential difference between its head and tail can be upto
   (A) 600 V   (B) 440 V   (C) 220 V   (D) 160 V

4) The sum of electric and magnetic force is called
   (A) Maxwell force   (B) Newton's force   (C) Lorentz force   (D) Centripetal force

5) Output waveform of sweep or time base generator is
   (A) Saw tooth wave   (B) Digital wave   (C) Sinusoidal wave   (D) Square wave

6) Emf is induced due to change in
   (A) Electric flux   (B) Magnetic flux   (C) Electric potential   (D) Electric current

7) When the motor is just started, its back emf is
   (A) Maximum   (B) Minimum   (C) Almost zero   (D) Equal to current

8) An A.C Voltmeter reads 220V, its peak value will be
   (A) 255 V   (B) 311.12 V   (C) 300 V   (D) 200 V

9) When we acclerate the charge, which type of waves are produced?
   (A) Mechanical waves   (B) Travelling waves   (C) Stationary waves   (D) Electromagnetic waves

10) A device used to detect very weak magnetic fields produced by brain is named as
    (A) MRI   (B) CAT Scans   (C) SQUIDS   (D) C.R.O

11) The magnitude of voltage gain of an amplifier having r_{ie}=1 ohm, $\beta = 100$ and R_c=200 ohm is
    (A) 2000   (B) 1000   (C) 500   (D) 5

12) Which one is used as temperature sensor in electrical circuit?
    (A) Capacitor   (B) diode   (C) LDR   (D) Thermistor

13) The rest mass of photon is
    (A) infinite   (B) zero   (C) 1.6×10^{-27} kg   (D) 3×10^8 kg

14) The materialization of energy takes place in the process of
    (A) photoelectric effect   (B) Compton effect   (C) Pair Production   (D) Annihilation of matter

15) The unit of Rydberg's constant R_H is
    (A) ms^{-1} (B) m   (C) m^2 (D) m^{-1}

16) The unit of decay constant is
    (A) Second   (B) $(Second)^{-1}$ (C) m^{-1} (D) m.K

17) Half life of radioactive isotope of Iodine-131 is
    (A) 6 days   (B) 8 days   (C) 10 days   (D) 12 days

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

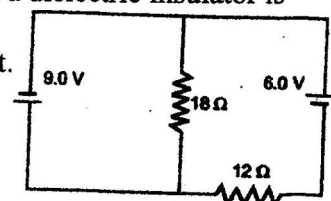Time Allowed: 2.40 hours   **Section --------- I**   Maximum Marks: 68

2.   **Answer briefly any Eight parts from the followings:-**   ~~SGD-GI-22~~8 × 2 = 16
- **(i)** How can you identify that which plate of a capacitor is positively charged?
- **(ii)** Suppose that you follow an electric field line due to positive point charge. Do electric field and the potential increase or decrease?
- **(iii)** What is meant by EEG and ECG?   **(iv)** Show that $1 \, eV = 1.6 \times 10^{-19} J$
- **(v)** Why the voltmeter should have a very high resistance?
- **(vi)** Is it possible to orient a current loop in a uniform magnetic Field such that the loop will not tend to rotate? Explain.
- **(vii)** Write any two uses of CRO.   **(viii)** What is dead beat galvanometer?
- **(ix)** What factors make a fusion reaction difficult to achieve?
- **(x)** What do you understand by "background" radiations? State two sources of this radiation.
- **(xi)** Define mass defect and binding energy.   **(xii)** What are basic forces of nature?

3.   **Answer briefly any Eight parts from the followings:-**   8 × 2 = 16
- **(i)** A charge of 90 C passes through a wire in 1 hour and 15 minute. What is the current in the wire.
- **(ii)** Why does the resistance of a conductor rise with temperature?
- **(iii)** Differentiate between electro motive force (EMF) and potential difference?
- **(iv)** What do you mean by phase lag and phase lead?
- **(v)** How does doubling the frequency affect the reactance of (a) an inductor (b) a capacitor
- **(vi)** Explain the conditions under which electromagnetic waves are produced from a source?
- **(vii)** Differentiate between ductile and brittle substances; Give Examples?
- **(viii)** Define retentivity and coercive current?
- **(ix)** What is meant by para, dia and ferromagnetic substances? Give examples for each.
- **(x)** The anode of diode is 0.2 V positive with respect to its cathode. Is it forward biased?
- **(xi)** Why a photodiode is operated in reverse biased state?
- **(xii)** Define rectification. Draw a circuit diagram of half wave rectification.

4.   **Answer briefly any Six parts from the followings:-**   6 × 2 = 12
- **(i)** Write any two methods in which current induce in a coil.
- **(ii)** Show that $\in$ and $\dfrac{\Delta\phi}{\Delta t}$ have same units.   **(iii)** Why the motor is overloaded? Give its Reason.
- **(iv)** Does the induce emf always act to decrease the Magnetic flux through the circuit?
- **(v)** What are the measurement on which two observers in relative motion will always agree upon?
- **(vi)** As a solid is heated and begin to glow, why does it first appear red?
- **(vii)** Write two postulates of special theory of relativity.
- **(viii)** Can X-rays be reflected, refracted Diffracted and Polarized just like any other waves? Explain.
- **(ix)** Is energy conserved when an atom emit a photon of light.

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

5.   **(a)** What is motional emf. Derive an expression for it.
    (b) How fast must a proton move in a magnetic field of 2.50×10^{-3} T such that magnetic force is equal to its weight.

6.   **(a)** What is the behaviour of A.C. current and voltage in an inductor? Discuss power loss through an inductor over a period.
    (b) The current flowing into the base of a transistor is 100 μA. Find its collector current and its emitter current, if the value of current gain is 100.

7.   **(a)** Explain Photo electric effect. Write its experimental results, also the failure of classical theory.
    (b) What stress would cause a wire to increase in length by 0.01%, if the Young's modulus of wire is 12×10^{10} Pa. What force would produce this stress, if the diameter of wire is 0.56 mm.

8.   **(a)** What is meant by half life of radioactive element? How it can be determined by the decay of radioactive element.
    (b) An Electron jumps a level $E_i = -3.5 \times 10^{-19}$ J to $E_f = -120 \times 10^{-18}$ J What is the wavelength of emitted light?

9.   **(a)** Explain capacitance of parallel plate capacitor. What happens when a dielectric insulator is placed between the plates?
    (b) Find the current which flows in all the resistance of the given circuit.

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