Roll No. _____ (To be filled in by the candidate)

(Academic Sessions 2020 – 2022 to 2022 – 2024)

PHYSICS 224-1st Annual-(INTER PART – II) Time Allowed : 20 Minutes

Q.PAPER – II (Objective Type) GROUP – I Maximum Marks : 17

PAPER CODE = 8477

Note : Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero mark in that question.

1-1	The rest mass energy of electron positron pair is :			
	(A) 0.51 MeV	(B) 0.71 MeV	(C) 1.02 MeV	(D) 2 MeV
2	The SI unit of impedance is :			
	(A) Ohm	(B) Farad	(C) Volt	(D) Ampere
3	To convert galvanometer into voltmeter, high resistance is connected to the galvanometer in :			
	(A) Parallel	(B) Series	(C) Anti parallel	(D) Perpendicular
4	In transistor, concentration of impurity is highest in :			
	(A) Collector	(B) Emitter	(C) Base and collector	(D) Base
5	At high frequency, RLC series circuit behaves like :			
	(A) R-C circuit	(B) R-L circuit	(C) RLC series circuit	(D) L-C circuit
6	If electric and gravitational forces on an electron balance each other, then electric field intensity will be :			
	(A) mgq	(B) $\frac{q}{mg}$	(C) $\frac{mg}{q}$	(D) $\frac{q}{4\pi\varepsilon_o r^2}$
7	The temperature of steam coming out of turbine in nuclear reactor is :			
	(A) 200 °C	(B) 300 °C	(C) 600 °C	(D) 1300 °C
8	The dimensions of motional emf are same as that of :			
	(A) Magnetic induction	(B) Magnetic flux		
	(C) Potential difference	(D) Magnetic force		
9	The value of Stefen's constant 'σ' is given by :			
	(A) $5.67\times10^{-8}\,Wm^{-2}K^{-2}$	(B) $5.67\times10^{-8}\,Wm^{-2}K^{-4}$		
	(C) $5.67\times10^{-8}\,Wm^{2}K^{2}$	(D) $5.67\times10^{-8}\,W^{2}m^{2}K^{-2}$		
10	A charge of 4C is placed in the field of intensity $8NC^{-1}$. The force on the charge is :			
	(A) 2 N	(B) 4 N	(C) 16 N	(D) 32 N
11	The example of crystalline solid is :			
	(A) Zirconia	(B) Natural rubber	(C) Polystrene	(D) Nylon
12	Heat sensitive resistors are called :			
	(A) Resistor	(B) Thermistor	(C) Inductor	(D) Capacitor
13	The atoms can reside in metastable state for about :			
	(A) $10^{-2}s$	(B) $10^{-3}s$	(C) $10^{-4}s$	(D) $10^{-8}s$
14	X = A + B is the mathematical notation for :			
	(A) OR gate	(B) NOR gate	(C) NOT gate	(D) NAND gate
15	Binding energy per nucleon for isotope iron-58 has a value of :			
	(A) 6.6 MeV	(B) 7.7 MeV	(C) 8.8 MeV	(D) 9.9 MeV
16	For step up transformer :			
	(A) $N_s < N_p$	(B) $N_s > N_p$	(C) $N_s = N_p$	(D) $N_s \geq N_p$
17	Brightness of screen of CRO is controlled by :			
	(A) Grid	(B) Anode	(C) Cathode	(D) Filament

SECTION – I

2. Write short answers to any EIGHT (8) questions : 16

(i) Write down dimensions of : (a) Pressure. (b) Density.

(ii) Does a dimensional analysis give any information on constant of proportionality that may appear in an algebraic expression?

(iii) Name two major types of errors.

(iv) Write down factors of prefixes atto and tera.

(v) Can magnitude of a vector have a negative value?

(vi) If $\overline{A} - \overline{B} = \overline{O}$, what can you say about the components of the two vectors?

(vii) Can you add zero to a null vector?

(viii) Motion with constant velocity is a special case of motion with constant acceleration. Is this statement true? Discuss.

(ix) An object is thrown vertically upward. Discuss sign of acceleration due to gravity relative to velocity, while the object is in air.

(x) How impulse is equal to change in momentum?

(xi) An object has 1J of potential energy. Explain what does it mean?

(xii) Prove that $P = \overline{F} . \overline{v}$ where P , $\overline{F}$ and $\overline{v}$ are power, force and velocity.

3. Write short answers to any EIGHT (8) questions : 16

(i) A wheel covers 200 m distance between two points. If its radius is 0.2 m, find the number of revolution completed by the wheel.

(ii) Describe what should be the minimum velocity for a satellite, to orbit close to the earth around it.

(iii) State the direction of the following vectors in simple situations, angular momentum and angular velocity.

(iv) When mud flies off the tyre of a moving bicycle, in what direction does it fly? Explain.

(v) A person is standing near a fast moving train. Is there any danger that he will fall towards it?

(vi) Explain the working of a carburetor of a motorcar using Bernoulli's principle.

(vii) Time period of a simple pendulum is 2.0 s and amplitude 20 cm, find its maximum speed.

(viii) What are the conditions of constructive and destructive interference of two sound waves from coherent sources?

(ix) Can we realize an ideal simple pendulum?

(x) What is the total distance travelled by an object moving with SHM in a time equal, to its period, if its amplitude is A?

(xi) Explain the terms : (i) crest. (ii) antinode.

(xii) Why does sound travel faster in solids than in gases?

(Turn Over)

4. Write short answers to any SIX (6) questions : 12

(i) Which principle is helpful to determine the shape and location of new wavefront? Explain briefly.

(ii) Explain whether the Young's experiment is an experiment for studying interference or diffraction effects of light.

(iii) What are different methods to get polarized light?

(iv) What is multimode step index fibre? Explain in short.

(v) Draw the ray diagram of compound microscope.

(vi) Describe in short the construction and working of collimator.

(vii) What will be efficiency of an engine if it performs 100 J of work and rejects 400 J of heat energy to the cold reservoir?

(viii) Why the efficiency of real heat engine is always less than one?

(ix) Give an example of a process in which no heat is transferred to or from the system but temperature of system changes.

SECTION – II

Note : Attempt any THREE questions.

5. (a) Find resultant of $\overline{A}$ and $\overline{B}$ using addition of vectors by rectangular components. 5

(b) A football is thrown upward at an angle of 30° with respect to horizontal. To throw a 40 m pass what must be the initial speed of the ball? 3

6. (a) How would you describe the analytical approach of formula of absolute P.E., also derive the formula with diagrammatic explanation. 5

(b) The frequency of the note emitted by a stretched string is 300 Hz. What will be the frequency of this note when the tension is increased by one third without changing the length of the wire? 3

7. (a) Define angular momentum and explain orbital and spin angular momentum. 5

(b) A block of mass 4.0 kg is dropped from height of 0.80 m on to a spring of spring constant k = 1960 Nm^{-1}. Find the maximum distance through which the spring will be compressed? 3

8. (a) Define pressure of gas. Prove that pressure exerted by the gas is directly proportional to the average translational kinetic energy of the gas molecules. 5

(b) How large must a heating duct be if air moving along it can replenish the air in a room of 300 m^3 volume every 15 min.? Assume the air's density remains constant. 3

9. (a) Explain Young's Double slit experiment to study the phenomenon of interference of light. 5

(b) An astronomical telescope having magnifying power of 5 consist of two thin lenses 24 cm apart. Find the focal lengths of the lenses. 3

Roll No. _____ (To be filled in by the candidate)

(Academic Sessions 2020 – 2022 to 2022 – 2024)

PHYSICS 224-1st Annual-(INTER PART – II) Time Allowed : 20 Minutes

Q.PAPER – II (Objective Type) GROUP – II Maximum Marks : 17

PAPER CODE = 8476

Note : Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero mark in that question.

1-1	What is the critical temperature of Yttrium Barium Copper Oxide ($YBa_2Cu_3.O_7$) :			
	(A) 4.2 K	(B) 110 K	(C) 163 K	(D) 7.2 K
2	One henry (H) is defined as :			
	(A) $1H = 1VS^{-1}A^{-1}$	(B) $1H = 1VSA$	(C) $1H = 1VSA^{-1}$	(D) $1H = 1VS^{-1}A$
3	Choose the photon of highest energy among the following :			
	(A) X-rays	(B) Infrared	(C) Radiowaves	(D) Gamma rays
4	A particle having a charge of 2e falls through a potential difference of 3V. The energy acquired by it will be :			
	(A) 5 eV	(B) 1.5 eV	(C) 6 eV	(D) 0.6 eV
5	SI unit of equivalent dose is :			
	(A) Sievert	(B) Gray	(C) Rad	(D) Curie
6	If peak value of AC voltage is 100 V, then the peak to peak value will be :			
	(A) 200 V	(B) 50 V	(C) 70 V	(D) 1000 V
7	The direction of magnetic lines of force around a straight current carrying conductor is found by :			
	(A) Ampere's law	(B) Coulomb's law	(C) Lenz's law	(D) Right hand rule
8	Which of the following is the correct relation between electric intensity E and potential difference ΔV :			
	(A) $E = -\frac{\Delta V}{\Delta r}$	(B) $\Delta V = -\frac{E}{\Delta r}$	(C) $E = \Delta V + \Delta r$	(D) $E = \frac{\Delta V^2}{\Delta r^2}$
9	Which of the following requires no external bias for its operation :			
	(A) LED	(B) Photo diode	(C) Photo-voltaic cell	(D) Transistor
10	The energy of K_α X-rays is :			
	(A) $hf_{k\alpha} = E_M - E_K$	(B) $hf_{k\alpha} = E_L - E_K$	(C) $hf_{k\alpha} = E_K - E_M$	(D) $hf_{k\alpha} = E_N - E_M$
11	The power factor of a series resonance circuit at resonance frequency is :			
	(A) Zero	(B) Infinite	(C) 2	(D) 1
12	In AVO meter, the part which connects the galvanometer with the relevant measuring circuit is known as :			
	(A) Range switch	(B) Diode	(C) Ground	(D) Function selector
13	How much time is required for the complete decay of a radioactive element :			
	(A) Five half lives	(B) Two half lives	(C) Ten half lives	(D) Infinite
14	Choose the device which converts electrical energy into mechanical energy :			
	(A) Motor	(B) Generator	(C) Transformer	(D) Inductor
15	The current-voltage graph of an ohmic material is :			
	(A) Curve	(B) Straight line	(C) Parabolic	(D) Circular
16	The phase shift between the input and output of a common-emitter transistor amplifier is :			
	(A) 90°	(B) 180°	(C) 60°	(D) 45°
17	Which of the following factor is called Compton Wavelength :			
	(A) $\frac{h}{m_o c}$	(B) $\frac{m_o c}{h}$	(C) $\frac{hc}{m_o}$	(D) $\frac{m_o}{hc}$

Roll No. _____ (To be filled in by the candidate)

(Academic Sessions 2020 – 2022 to 2022 – 2024)

PHYSICS 224-1st Annual-(INTER PART – II) Time Allowed : 2.40 hours

PAPER – II (Essay Type) GROUP – II Maximum Marks : 68

SECTION – I

2. Write short answers to any EIGHT (8) questions : **16**

(i) Do electrons tend to go to region of high potential or of low potential?

(ii) How can you identify that which plate of a capacitor is positively charged?

(iii) Define electric potential. Write its SI unit.

(iv) How Millikan concluded that minimum value of the charge is the charge on an electron?

(v) Why a voltmeter should have a very high resistance?

(vi) Why does the picture on a TV screen become distorted when a magnet is brought near the screen?

(vii) State Ampere's law. Write its mathematical form.

(viii) How the path of electrons is made visible in glass tube to measure e/m ratio?

(ix) What do we mean by the term critical mass?

(x) How can radioactivity help in treatment of cancer?

(xi) How do gamma rays photon interact with matter at low and high energy?

(xii) How did James Chadwick discover a neutron?

3. Write short answers to any EIGHT (8) questions : **16**

(i) How can a rheostat be used as a potential divider? Draw also diagram.

(ii) Do bends in a wire affect its electrical resistance? Explain.

(iii) Explain thermistors, their construction and shapes.

(iv) Define inductive reactance and capacitive reactance. Also write mathematical formula of each.

(v) At what frequency will an inductor of 1 H have a reactance of 500 Ω ?

(vi) How reception of a particular radio station is selected on your radio set?

(vii) Give a comparison of crystalline and amorphous solids briefly.

(viii) Differentiate between elasticity and plasticity.

(ix) What is meant by paramagnetic and ferromagnetic substances?

(x) What is the effect of forward biasing and reverse biasing of a diode on the width of depletion region?

(xi) Draw circuit diagram of full wave rectifier.

(xii) Why is the base current in a transistor very small?

4. Write short answers to any SIX (6) questions : **12**

(i) State the Lenz's law and explain the significance of -ve sign in Faraday's law.

(ii) Does the induced emf always acts to decrease the magnetic flux through a circuit?

(Turn Over)

4. (iii) What is the efficiency of a transformer? Describe methods to increase it.

(iv) As a solid is heated and begins to glow, why does it first appear red?

(v) Write two properties of intensity distribution diagram.

(vi) When does the light behave as a particle and when does it behave as a wave?

(vii) Which photon, red, green or blue carries the most (a) energy (b) momentum.

(viii) Bohr's theory of hydrogen atom is based upon several assumptions. Do any of these contradict classical physics?

(ix) Differentiate between spontaneous and stimulated emissions.

SECTION – II

Note : Attempt any THREE questions.

5. (a) Derive an expression for the energy stored in a capacitor. 5

(b) The resistance of an iron wire at 0 °C is $1\times10^{4}\Omega$. What is the resistance at 500 °C if the temperature co-efficient of resistance of iron is $5.2\times10^{-3}K^{-1}$? 3

6. (a) State Ampere's law. Calculate the magnetic field due to current carrying solenoid. 5

(b) A circular coil has 15 turns of radius 2 cm each. The plane of the coil lies at 40° to the uniform magnetic field of 0.2 T. If the field is increased by 0.5 T in 0.2 s, find the magnitude of induced emf. 3

7. (a) Discuss the behaviour of an inductor in an A.C. circuit and write expression for inductive reactance. 5

(b) In a certain circuit, the transistor has a collector current of 10 mA and a base current of 40μA. What is the current gain of transistor? 3

8. (a) What is meant by strain energy? Derive the relation for strain energy in deformed materials. 5

(b) X-rays of wavelength 22 pm are scattered from a carbon target. The scattered radiation being viewed at 85° to the incident beam. What is Compton Shift? 3

9. (a) How de-Broglie's interpret Bohr's 2nd postulate that an angular momentum is equal to integral multiple of $\frac{h}{2\pi}$? 5

(b) A sheet of lead 5.0 mm thick reduces the intensity of a beam of γ-rays by a factor 0.4. Find half value thickness of lead sheet which will reduce the intensity of half of its initial value. 3

Roll No. of Candidate : _____

PHYSICS **Intermediate Part-II , Class 12th (1stA 424- IV) Paper II Group – I**

Time: 20 Minutes **OBJECTIVE ..... Code: 8477** **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.

1. 1. Which of the following circuit is called electrical oscillator?
(A) R.L circuit (B) R.C circuit (C) R.L.C circuit (D) L.C circuit ●

2. A charged particle enters in a strong magnetic field, then its K.E
(A) remains constant ● (B) increases
(C) decreases (D) first increases then decreases

3. Turn ratio of a transformer is 50. If 220 volt A.C is applied to its primary coil, voltage in the secondary coil will be
(A) 440 V (B) 4.4 V (C) 220 V (D) 11000 V ●

4. The physical quantity related to photon, that does not change in Compton scattering is
(A) energy (B) speed ● (C) frequency (D) wavelength

5. In photoelectric effect, the number of photoelectrons depends upon
(A) wavelength of light (B) intensity of light ●
(C) threshold frequency (D) work function

6. Glass is also known as
(A) solid (B) liquid (C) solid liquid ● (D) gas

7. The unit of electric intensity other than NC^{-1} is
(A) V/A (B) V/m ● (C) V/C (D) N/V

8. The unit of $\vec{E}$ is NC^{-1} and that of $\vec{B}$ is $NA^{-1}m^{-1}$, then the unit of E/B is
(A) ms^{-2} (B) ms (C) $m^{-1}s^{-1}$ (D) ms^{-1} ●

9. The binding energy per nucleon is maximum for
(A) Helium (B) Iron ● (C) Polonium (D) Radium

10. For holography, we use a beam of
(A) r – rays (B) x – rays (C) β – rays (D) Laser ●

11. The colour of light emitted by LED depends on
(A) its forward biasing (B) the reverse biasing
(C) amount of forward current (D) type of semi-conductor material used ●

12. When current flowing through an inductor is doubled, the energy stored in it becomes
(A) half (B) four times ● (C) one fourth (D) double

13. The half-life of Radon gas is
(A) 3.8 days ● (B) 38 days (C) 3.8 months (D) 38 months

14. An ideal voltmeter would have
(A) zero resistance (B) high resistance (C) infinite resistance ● (D) low resistance

15. A parallel plate capacitor with oil having $\varepsilon_r = 2$ has a capacitance C. If the oil is removed between the plates, then capacitance of capacitor becomes
(A) C (B) C/2 ● (C) $C/\sqrt{2}$ (D) 2C

16. The voltage gain of an amplifier having $r_{ie} = 1\,\Omega$, $\beta = 100$ and $R_c = 20\,\Omega$ is
(A) 2000 ● (B) 1000 (C) 500 (D) 5

17. When we accelerate the charge, which type of waves are produced?
(A) Mechanical waves (B) Travelling waves
(C) Stationary waves (D) Electromagnetic waves ●

PHYSICS | Intermediate Part-II , Class 12th (1stA 424) | Paper: II | Group – I

Time: 2:40 Hours | SUBJECTIVE | Marks: 68

Note: Section I is compulsory. Attempt any three (3) questions from Section II.

SECTION – I

2. Write short answers to any EIGHT questions. (2 x 8 = 16)

i. Define electric field intensity. Also give its mathematical form.

ii. Define electron volt? Relate electron volt with Joule.

iii. The time constant of a series RC circuit is, t=RC. Verify that an Ohm times Farad is equal to Second.

iv. Why the resistance of an ammeter should be very low?

v. Electric lines of force never cross. Why?

vi. How can you use a magnetic field to separate isotopes of chemical elements?

vii. What do you mean by lamp-scale arrangement?

viii. What is Lorentz force?

ix. A particle which produces more ionization is less penetrating. Why?

x. How can radioactivity help in the treatment of Cancer?

xi. Differentiate between nuclear fission and nuclear fusion.

xii. Define isotopes. Write down isotopes of Hydrogen atom.

3. Write short answers to any EIGHT questions. (2 x 8 = 16)

i. Describe a circuit which will give a continuously varying potential.

ii. What is the difference between the emf and potential difference?

iii. What is the temperature co-efficient of resistance?

iv. How the reception of a particular radio station is selected on your radio set?

v. What is the principle of metal detector?

vi. Why power loss in a pure capacitance circuit is zero?

vii. What is meant by hysteresis loss? How it is used in the construction of a transformer?

viii. What is meant by Retantivity and Coercivity?

ix. How can you identify tumors and inflamed tissues using 'MRI'?

x. Why is the base current in a transistor very small?

xi. Explain OP-AMP as a comparator.

xii. What is the voltage gain of transistor?

4. Write short answers to any SIX questions. (2 x 6 = 12)

i. Name the factors upon which the self-inductance depends.

ii. Write down the methods to improve the efficiency of a transformer.

iii. Can a D.C. motor be turned into a D.C. generator? What changes are required to be done?

(Turn Over)

iv. Define work function and threshold frequency.

v. Calculate the value of Compton wavelength of electron.

vi. We do not notice a de-Broglie wavelength for a pitched cricket ball. Explain why?

vii. When does light behave as a wave and when does it behave as a particle?

viii. Describe the types of spectra and give its example.

ix. What are advantages of laser over ordinary light?

SECTION - II

5. (a) How did Millikan calculate the charge on an electron? Explain **(5)**

(b) A rectangular bar of iron is 2.0cm by 2.0cm in cross section and 40cm long. Calculate its resistance if the resistivity of iron is $11 \times 10^{-8}\ \Omega m$ **(3)**

6. (a) Define galvanometer. Explain its principle, construction and working. **(5)**

(b) The back emf in a motor is 120V when the motor is turning at 1680 rev per min. What is the back emf when the motor turns 3360 rev per min? **(3)**

7. (a) Explain Reverse Biased p-n junction and describe how depletion region increases due to Reverse Biased of p-n junction. **(5)**

(b) Find the value of the current flowing through a capacitor of capacitance $0.5\mu F$, when connected to a source of 150V at 50Hz. **(3)**

8. (a) State and explain photoelectric effect. Write down its experimental results. **(5)**

(b) The length of a steel wire is 1m and its cross-sectional area is $0.03 \times 10^{-4} m^2$. Calculate the work done in stretching the wire when a force of 100N is applied within the elastic region. Young's modulus of steel is $3.0 \times 10^{11} Nm^{-2}$. **(3)**

9. (a) Derive the expression for Quantized Energy of Hydrogen atom on the basis of Bohr's atomic model. **(5)**

(b) How much energy is absorbed by a man of mass 80Kg who receives a lethal whole body dose of 400 rem in the form of low energy neutrons for which RBE factor is 10? **(3)**

No. of Candidate : _____

PHYSICS | Intermediate Part-II , Class 12th (1stA 424 - III) | Paper: II | Group – II

Time: 20 Minutes | OBJECTIVE ..... Code: 8476 | 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.

1. 1. Using spectroscopy the helium was identified in the
(A) Earth (B) Sun ● (C) Stars (D) all of these

2. The induced emf is primarily produced at the cost of
(A) internal energy (B) mechanical energy ● (C) chemical energy (D) electrical energy

3. The reactance of an inductor at 50Hz is 10Ω. Its reactance at 100Hz is
(A) 2.5 Ω (B) 5 Ω (C) 10 Ω (D) 20 Ω ●

4. Threshold wavelength for metal having work function 40 is λ_0. What is the threshold wavelength for metal having work function 240 is
(A) 2λ (B) 4λ (C) λ/2 (D) λ/4 ●

5. The emf induced in 1mH inductor in which current changes from 5A to 3A in 1s is
(A) 2×10^{-6}V (B) 8×10^{-6}V (C) 2V ● (D) 8V

6. Two metallic spheres of radius 1cm and 2cm get equal quantity of charge. Which has greater surface charge density?
(A) 1st sphere ● (B) 2nd sphere (C) both get equal surface (D) none of these

7. The voltage gain of an amplifier having $r_{ie} = 1\,\Omega, \beta = 100, Rc = 20\,\Omega$ is
(A) 2000 ● (B) 1000 (C) 500 (D) 5

8. If the length of conductor is doubled and its cross sectional area is halved, its conductance will be
(A) increased four times (B) become one fourth ●
(C) become one-half (D) remained un-changed

9. The capacity of condenser is 4×10^{-6} Farad and its potential is 100 Volt. The energy released on discharging it fully will be
(A) 0.02 J ● (B) 0.04 J (C) 0.025 J (D) 0.05 J

10. Circulation of blood can be studied by
(A) Sodium – 24 ● (B) Strontium – 90 (C) Carbon – 14 (D) Iodine – 131

11. If a wire is stretched to double of its length then strain will be
(A) zero (B) 1 ● (C) 1/2 (D) double

12. Unit of decay constant λ is
(A) ms (B) m^{-1} (C) m (D) s^{-1} ●

13. The term transistor stands for
(A) transfer of resistance ● (B) transfer of voltage
(C) transfer of current (D) all of these

14. Force on a current carrying conductor per unit length is given by
(A) IL Sinθ (B) ILB (C) IB (D) IB Sinθ ●

15. For a current carrying solenoid the term "n" has unit as
(A) no unit (B) m (C) m^{-1} ● (D) m^{-2}

16. When applied potential difference is increased; capacitance of parallel plate capacitor
(A) increases (B) decreases (C) remains same ● (D) reduces to zero

17. In photoelectric effect the intensity of light made twice than initial value. The maximum K.E of photoelectron becomes
(A) same ● (B) double (C) half (D) four times

ICS | Intermediate Part-II , Class 12th (1stA 424) | Paper: II | Group – II

Time: 2:40 Hours | SUBJECTIVE | Marks: 68

Note: Section I is compulsory. Attempt any three (3) questions from Section II.

SECTION – I

2. Write short answers to any EIGHT questions. (2 x 8 = 16)

i. Suppose you follow an electric field line due to a positive point charge. Do electric field and the potential increase or decrease.

ii. Describe the force or forces on a positive point charge when placed between parallel plates.
   a) with similar and equal charges b) with opposite and equal charges

iii. State Gauss's Law. Write down its mathematical form.

iv. Define dielectric constant. Give its mathematical form.

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. Why the voltmeter should have a very high resistance.

vii. A sensitive galvanometer cannot be stable. Why?

viii. What should be the orientation of current carrying coil in a magnetic field so that torque acting on it is
   a) maximum b) minimum

ix. If a nucleus has a half life of 1 year, does this mean that it will be completely decayed after 2 years? Explain.

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

xi. What are baryons and mesons? How are they formed?

xii. Describe principle and working of Mass Spectrograph.

3. Write short answers to any EIGHT questions. (2 x 8 = 16)

i. Describe a circuit which will give continuously varying potential.

ii. Explain why the terminal potential difference of a battery decreases when the current drawn from it is increased.

iii. Distinguish between resistance and resistivity. Give units.

iv. How does doubling the frequency effect the resistance of an (a) Inductor (b) Capacitor

v. What is meant by A.M and F.M?

vi. Give four characteristics of series resonance circuit.

vii. What are Para and ferromagnetic substances? Give example.

viii. What is meant by Hysteresis loss? How is it used in the construction of a transformer?

ix. What are applications of Superconductors?

x. Why ordinary silicon diodes do not emit light?

xi. Why a photodiode is operated in reverse biased state?

xii. What are the characteristics of operation amplifier?

4. Write short answers to any SIX questions. (2 x 6 = 12)

i. Does the induced emf always act to decrease the magnetic flux through a circuit?

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. How the "Eddy Currents" are produced? What are their effects on the efficiency of a transformer?

iv. As a solid is heated and begins to glow, why does it first appear red?

(Turn Over)

v. Can pair production take place in vacuum? Explain.

vi. Find the relativistic mass of an object moving with speed 0.8C, where 'C' is the speed of light.

vii. Write down at least four applications of a photocell.

viii. What are the advantages of laser over ordinary light?

ix. Write down any two postulates of Bohr's theory of Hydrogen atom.

SECTION – II

5. (a) Find the charge on an electron by Millikan's method. **(5)**

(b) A rectangular bar of iron is 2.0cm by 2.0cm in cross-section and 40cm long. Calculate the resistance, if the resistivity of iron is 11×10^{-8} Ωm **(3)**

6. (a) Discuss the principle, construction and working of a Galvanometer. **(5)**

(b) A square coil of side 16cm has 200 turns and rotates in a uniform magnetic field of magnitude 0.05T. If the peak emf is 12V, what is the angular velocity of the coil? **(3)**

7. (a) Discuss the flow of A.C. through a capacitor. Explain phase relationship between current and voltage graphically and also vectorially. **(5)**

(b) The current flowing into the base of a transistor is 100μA. Find its collector current I_C, its emitter current I_E and the ratio I_C/I_E if the value of current gain β is 100. **(3)**

8. (a) Define strain energy. Derive its relation for an elastically deformed wire in terms of modulus of elasticity. **(5)**

(b) What is the de-Broglie wavelength of an electron whose Kinetic Energy is 120eV? **(3)**

9. (a) Explain the phenomenon of nuclear transmutation or radioactive decay. **(5)**

(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 transition results? **(3)**

Paper Code Number: 4477	2024 (1^{st}-A) INTERMEDIATE PART-II (12^{th} Class)	Roll No: _____ pakcity.org

PHYSICS PAPER-II GROUP-I

TIME ALLOWED: 20 Minutes	OBJECTIVE	MAXIMUM MARKS: 17

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 that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question.**

S.#	QUESTIONS	A	B	C	D
1	Two opposite point charges, separated by a distance 2d, the electric potential at mid-way between them is:	1 volt	2 volts	3 volts	Zero volt ●
2	A current carrying conductor experience maximum force in a uniform magnetic field, when it is placed:	Perpendicular to field ●	Parallel to field	At an angle $\theta = 60^{o}$ to field	At an angle of 180^{o} to field
3	Which substance of the given has greatest resistivity?	Silver	Germanium	Carbon ●	Gold
4	When the coil at rest is placed in a uniform magnetic field, then induced current would be:	Maximum	Minimum	Some time maximum some time minimum	Zero ●
5	In D.C motor the split rings act as:	● Commutator	Capacitor	Resistor	Inductor
6	In three phase A.C generator, when the voltage across the first pair of slip rings is zero, then it has the phase of:	● 0^{o}	90^{o}	120^{o}	180^{o}
7	The amplitude modulation transmission frequencies range is:	88 MHz to 108 MHz	540 kHz to 1600 kHz ●	540 MHz to 1600 MHz	88 kHz to 108 MHz
8	A temperature above 77k, any super conductor referred as:	● High temperature super conductor	Low temperature super conductor	Low temperature semi conductor	High temperature conductor
9	The symbol of NOT gate is:	Rectangle	Bubble only	Triangle and Bubble ●	Square
10	SI unit of voltage gain of NPN transistor is:	Volt	Coulomb	Farad	No unit ●
11	The materialization of energy take place in the process of:	Photo electric effect	Compton effect	Pair production	Annihilation of matter ●
12	Which one of the physical quantity is independent of relativistic speed?	Mass	Length	Time	Charge ●
13	Which one of the radiations has the most energetic photon?	T.V waves	γ – rays ●	X – rays	Microwaves
14	Electromagnetic radiation having wavelength longer than the red light is known as:	Infrared radiation ●	Ultraviolet radiation	Microwaves	Gamma rays
15	The half life of radioactive element depends upon the:	Temperature	Atmospheric pressure	Number of nucleons ●	Number of electrons
16	The unit of radiation one Becquerel is equal to:	One disintegration per second	3.7×10^{10} ● disintegration per second	Two disintegration per second	3.7 disintegration per minute
17	Due to polarization of dielectric, the electrical energy stored between the plates of capacitor when battery is connected:	Increases	Decreases ●	Remains same	May increase or decreases

INTERMEDIATE PART-II (12th Class)	2024 (1st-A)	Roll No:
PHYSICS PAPER-II GROUP-I		
TIME ALLOWED: 2.40 Hours	SUBJECTIVE	MAXIMUM MARKS: 68

NOTE: Write same question number and its parts number on answer book, as given in the question paper.

SECTION-I

2. Attempt any eight parts. **8 × 2 = 16**

(i)	What is a Test Charge? Write its any two characteristics.
(ii)	Show that an ohm times farad is equivalent to second.
(iii)	Is E necessarily zero inside a charged rubber balloon if balloon is spherical? Assume that charge is distributed uniformly over the surface.
(iv)	Is it true that Gauss's law states that the total number of lines of forces crossing any closed surface in the outward direction is proportional to the net positive charge enclosed within surface?
(v)	Find the radius of an orbit of an electron moving at a rate of $2.0\times10^{7}\,ms^{-1}$ in a uniform magnetic field of $1.20\times10^{-3}T$.
(vi)	Differentiate between Ammeter and Ohmmeter.
(vii)	A plane conducting loop is located in a uniform magnetic field that is directed along the $x-$axis. For what orientation of the loop is the flux a maximum? For what orientation is the flux a minimum?
(viii)	Is it possible to orient a current loop in a uniform magnetic field such that the loop will not tend to rotate? Explain.
(ix)	Define Mass Defect and write its formula.
(x)	Write down disadvantages of α and β-particles.
(xi)	If someone accidentally swallows an $\alpha-$source and a $\beta-$source, which would be the more dangerous to him? Explain why?
(xii)	Discuss the advantages and disadvantages of nuclear power compared to the use of fossil fuel generated power.

3. Attempt any eight parts. **8 × 2 = 16**

(i)	Describe a circuit which will give a continuously varying potential.
(ii)	Why does the resistance of a conductor rise with temperature?
(iii)	Derive the mathematical expression for the maximum power output.
(iv)	How does doubling the frequency affect the reactance of a capacitor?
(v)	At what frequency will an inductor of 1.0H have a reactance of 500Ω?
(vi)	Briefly explain the Phase Lag and Phase Lead with wave diagram.
(vii)	Draw a stress-strain curve for a ductile material, and then define the terms: Elastic limit and Yield point.
(viii)	Mention four applications of superconductors.
(ix)	Differentiate between Bulk Modulus and Shear Modulus.
(x)	What is the net charge on a n-type or a p-type substance?
(xi)	The inputs of a gate are 1 and 0. Identify the gate if its output is (a) 0, (b) 1
(xii)	How can we use OP-AMP as a comparator?

4. Attempt any six parts. **6 × 2 = 12**

(i)	Show that ε and $\frac{\Delta\phi}{\Delta t}$ have the same units.
(ii)	Does an induced emf always act to decrease the magnetic flux through a circuit?
(iii)	How can we minimize the energy losses in a practical transformer?
(iv)	What are the measurements on which two observers in relative motion will always agree upon?
(v)	We do not notice the de-Broglie wavelength for a pitched cricket ball. Explain why?
(vi)	What is reason for fundamental uncertainty associated with sub-atomic measurements?
(vii)	How did Bohr stated his complementarity principle for complete description of matter and radiation?
(viii)	Is energy conserved when an atom emits a photon of light?
(ix)	How do we differentiate orbital and free electrons on the basis of their energy?

SECTION-II

NOTE: Attempt any three questions. **3 × 8 = 24**

5.(a)	Derive a relation for electric potential at a point due to point charge.	05
(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 5.0Ω, the potential falls to $1.8V$. Calculate current and internal resistance of the battery.	03
6.(a)	What is Galvanometer? Describe the conversion of Galvanometer into ammeter.	05
(b)	An emf of $0.45V$ is induced across the ends of a metal bar due to its motion in a magnetic field of $0.22T$. How much field is required to produce $1.5V$ emf?	03
7.(a)	Describe the effect of inductance in an A.C Circuit.	05
(b)	The current flowing into the base of a transistor is $100\,\mu A$. Find its collector current I_C, its emitter current I_E, and the ratio I_C/I_E, if the value of current gain β is 100.	03
8.(a)	What is meant by strain energy? Derive the relation for strain energy from force-extension graph.	05
(b)	Yellow light of 577 nm wavelength is incident on a cesium surface. The stopping voltage is found to be 0.25V. Find (a) the maximum K.E of photoelectrons (b) the work function of cesium	03
9.(a)	What is Nuclear Reactor? Explain different parts of a power reactor.	05
(b)	Calculate the longest wavelength of radiation for the Paschen series.	03

Multan Board-2024

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Paper Code Number: 4478	2024 (1st-A) INTERMEDIATE PART-II (12th Class)	Roll No:
PHYSICS PAPER-II GROUP-II		
TIME ALLOWED: 20 Minutes	OBJECTIVE	MAXIMUM MARKS: 17

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 that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question.**

S.#	QUESTIONS	A	B	C	D
1	Half life of uranium–239 is:	24.5 min	25.5 min	23.5 min ●	26.5 min
2	The building blocks of protons and neutrons are called:	Positron	Quarks ●	Electron	Neutron
3	If the medium between the charges is not free space, then electrostatic force will:	Increase	Decrease ●	Remains constant	Infinite
4	Negative sign in equation $E = -\frac{\Delta V}{\Delta r}$ shows:	Decreasing potential ●	Increasing potential	Increasing strength	Magnitude
5	Reciprocal of resistivity is called:	Inductance	Conductance ●	Conductivity	Resistance
6	A charged particle enters in a strong magnetic field its K.E:	Increases	Infinite	Decreases	Remains same ●
7	When a charged particle is projected perpendicular to a uniform magnetic field, its path is:	Helix	Circular ●	Spiral	Ellipse
8	If the angular frequency of A.C generator is doubled, the time period will be:	Doubled	Four times	Half ●	One fourth
9	Split ring are used in:	D.C motor ●	Transformer	A.C generator	A.C motor
10	Root mean square value of voltage is:	$\sqrt{2}V_o$	$\frac{V_o}{2}$	$\frac{V_o}{\sqrt{2}}$ ●	$2V_o$
11	The phase of A.C at positive peak from origin is:	$\frac{\pi}{4}$	$\frac{\pi}{2}$ ●	$\frac{3\pi}{2}$	π
12	Which is pentavalent impurity?	Gallium	Boron	Indium	Antimony ●
13	Which component of the transistor has lowest concentration of impurity?	Base ●	Emitter	Collector	Resistor
14	Bolean expression for AND gate is:	$X = A + B$	$X = \overline{A \cdot B}$	$X = A \cdot B$ ●	$X = \overline{A + B}$
15	Compton shift for wavelength is minimum for scattering angle $\theta =$	90^o	0^o	45^o ●	270^o
16	At higher energies more then 1.02 MeV the dominant process is:	Compton effect	Photoelectric effect	Fission process	Pair production ●
17	Electron normally can reside in excited state for about:	$10^{-8}s$	$10^{-3}s$ ●	$10^{-6}s$	$10^{8}s$

INTERMEDIATE PART-II (12th Class)	2024 (1st-A)	Roll No:
PHYSICS PAPER-II GROUP-II		
TIME ALLOWED: 2.40 Hours	SUBJECTIVE	MAXIMUM MARKS: 68

NOTE: Write same question number and its parts number on answer book, as given in the question paper.

SECTION-I

2. Attempt any eight parts. $8 \times 2 = 16$

(i)	Describe the force or forces on a positive point charge when placed between parallel plates. (a) with similar and equal charges (b) with opposite and equal charges
(ii)	Do electrons tend to go to region of high potential or of low potential?
(iii)	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?
(iv)	Sketch the graphs for charging and discharging of a capacitor.
(v)	How can a current loop be used to determine the presence of a magnetic field in a given region of space?
(vi)	How can you use a magnetic field to separate isotopes of chemical element?
(vii)	How can a galvanometer be converted into an ammeter? Also write down the formula to adjust the shunt resistance.
(viii)	Define CRO and write down its principle.
(ix)	If a nucleus has half-life of 1 year, does this mean that it will be completely decayed after 2 years? Explain.
(x)	What do you understand by "background radiation"? State two sources of this radiation.
(xi)	Explain the effects of low level radiation and high level radiation.
(xii)	Explain the p-p reaction in the sun with the help of equations.

3. Attempt any eight parts. $8 \times 2 = 16$

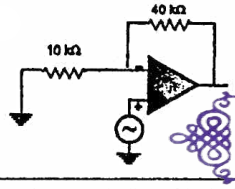
(i)	Give two differences between Electromotive force and Potential difference.
(ii)	What is Open circuit and Closed circuit?
(iii)	Calculate the terminal potential difference across an external resistance when a current 0.5A flowing in a circuit. The emf is 2V and source of emf has internal resistance 1Ω.
(iv)	Name the device that will (a) permit flow of direct current but oppose the flow of alternating current (b) permit flow of alternating current but not the direct current
(v)	How the reception of a particular radio station is selected on your radio set?
(vi)	Find the capacitance required to construct a resonance circuit of frequency 1000kHz with an inductor of 5mH.
(vii)	Define Proportional limit and Ultimate tensile strength.
(viii)	How n-type semi conductor is formed by the process of doping?
(ix)	What is the difference between Ferromagnetic and Paramagnetic substances?
(x)	What is Electronics? Write down only names of electronic devices (at least two).
(xi)	Why +ve terminal of a battery is connected with p-type and –ve terminal with n-type region.
(xii)	Explain briefly Light emitting diode.

4. Attempt any six parts. $6 \times 2 = 12$

(i)	What is to be done in order to enhance the magnetic flux in transformer?
(ii)	In a certain region, the earth's magnetic field points vertically down. When a plane flies due north, which wingtip is positively charged?
(iii)	Four unmarked wires emerge from a transformer. What steps would you take to determine the turns ratio?
(iv)	State Stefen-Boltzmann law and write its mathematical relation.
(v)	The classical theory cannot explain the threshold frequency of light. Why? Explain.
(vi)	If an electron and a proton have the same de Broglie wavelength, which particle has greater speed?
(vii)	What advantages an electron microscope has over an optical microscope?
(viii)	How line spectra can be used for the identification of elements? Explain.
(ix)	Explain why laser action cannot occur without population inversion between atomic levels?

SECTION-II

NOTE: Attempt any three questions. $3 \times 8 = 24$

5.(a)	Define Xerography. Draw the schematic diagram of a photocopier and explain its working.	05
(b)	How many electrons pass through an electric bulb in one minute if the 300 mA current is passing through it?	03
6.(a)	State Ampere's law. Apply it to find magnetic field inside the solenoid.	05
(b)	A D.C motor operates at 240V and has a resistance of 0.5Ω. When the motor is running at normal speed, the armature current is 15A. Find the back emf in the armature.	03
7.(a)	Describe the A.C through R.C series circuit.	05
(b)	Calculate the gain of non-inverting amplifier as shown in given figure: 	03
8.(a)	What is Compton effect? Derive relation for Compton shift? Also discuss it for $\theta=0°$ and $\theta=90°$	05
(b)	The length of a steel wire is 1.0 m and its cross-sectional area is $0.03 \times 10^{-4} m^2$. Find the work done in stretching the wire when a force of 100N is applied on it. Where $Y = 3.0 \times 10^{11} Nm^{-2}$.	03
9.(a)	What is Nuclear Reactor? Describe function of its main parts.	05
(b)	The wavelength of $K\ X-$ ray from copper is $1.377 \times 10^{-10} m$. What is the energy difference between the two levels from which this transition results?	03

☆☆☆☆	Roll No. _____

HSSC-(P-II)-A-2024
(For All Sessions)

Paper Code	8	4	7	7

Physics (Objective)

(GROUP-I) **Time: 20 Minutes** **Marks : 17**

Note: Write Answers to the Questions on the objective answer sheet provided. Four possible answers A, B, C and D to each question are given. Which answer you consider correct, fill the corresponding circle A, B, C or D given in front of each question with Marker or Pen ink on the answer sheet provided.

1.1 One henry is equal to:
(A) $V\,S^{-1}\,A^{-1}$ (B) $V\,S\,A^{-1}$ ● (C) $V\,S^{-1}\,A$ (D) $V^{-1}\,S\,A$

2. When motor is overloaded, the magnitude of back emf is:
(A) Constant (B) Increases (C) Decreases ● (D) Infinite

3. In capacitor circuit phase between current and charge is:
(A) Parallel (B) In phase (C) Anti parallel (D) Out of phase ●

4. At resonance frequency the impedence of RLC series circuit is:
(A) Minimum ● (B) Maximum (C) Both (A) and (B) (D) Infinite

5. Which has least hysteresis loop area?
(A) Soft iron ● (B) Steel (C) Wrought iron (D) Cobalt

6. During negative half cycle of A.C. , $p-n$ junction has:
(A) Low resistance (B) No resistance (C) High resistance ● (D) Remain same

7. Device which converts low voltage or current to high voltage or current is:
(A) Rectifier (B) Transformer ● (C) Inductor (D) Amplifier

8. The momentum of photon is represented by the equation:
(A) $p = mv$ (B) $p = \frac{h}{\lambda}$ ● (C) $p = \frac{\lambda}{h}$ (D) $p = h\lambda$

9. The energy needed by photon to create electron-positron pair is:
(A) $1.02\ MeV$ ● (B) $0.52\ MeV$ (C) $0.051\ MeV$ (D) $1.51\ MeV$

10. Bremsstrauhlung radiations are example of
(A) Molecular spectra (B) Atomic spectra (C) Continuous spectra ● (D) Discrete spectra

11. 1 rem is equal to:
(A) $0.1\ SV$ (B) $0.01\ SV$ ● (C) $2.04\ SV$ (D) $3.06\ SV$

12. Radiotherapy is generally done with γ-rays emitted from:
(A) Iodine-131 (B) Strontium-90 (C) Sodium-24 (D) Cobalt-60 ●

13. Charge on the Droplet can be calculated by:
(A) $q = \frac{mg}{vd}$ (B) $q = \frac{v}{mgd}$ (C) $q = \frac{mgd}{v}$ ● (D) $q = \frac{d}{mgd}$

14. If the distance between two charges is halved, Force becomes:
(A) One fourth (B) Four times ● (C) Half (D) Double

15. The minimum power is delivered to across the resistor R, when:
(A) $r = \infty$ ● (B) $r = 0$ (C) $r = R$ (D) $r = {}^{R}/_{4}$

16. A positive charge is moving away from observer. Direction of magnetic induction will be:
(A) Anticlockwise ● (B) Towards right (C) Towards left (D) Clockwise

17. Shunt resistance is:
(A) Low resistance ● (B) High resistance (C) Zero resistance (D) Impedence

Roll No _____

Physics (Subjective)

HSSC-(P-II)- A-2024
(For All Sessions)
(GROUP-I)

Marks : 68
Time: 2:40 hours

SECTION-I

2. Write short answers of any eight parts from the following: (8x2=16)

i. Define electric polarization and electric dipole. ii. Sketch the graphs for charging and discharging of a capacitor.
iii. The potential is constant throughout a given region of space. Is the electric field zero or non-zero in this region? Explain
iv. How can you identify that which plate of a capacitor is positively charged?
v. Can an electron at rest be set in motion with a magnet? Explain.
vi. How does the graph pattern appear stationary on the screen of CRO? Explain the condition.
vii. What should be the orientation of a current carrying coil in a magnetic field so that torque acting upon the coil is (a) maximum (b) minimum?
viii. Why the voltmeter should have a very high resistance? ix. What factors make a fusion reaction difficult to achieve?
x. What information is revealed by the length and shape of the tracks of an incident particle in Wilson cloud chamber?
xi. What is meant by dose of radiation? What is its S.I. unit? xii. Why Geiger counter is not suitable for fast counting?

3. Write short answers of any eight parts from the following: (8x2=16)

i. Why does the resistance of a conductor rise with temperature? ii. What is meant by A.M. and F.M.?
iii. Describe a circuit which will give a continuously varying potential.
iv. Why potentiometer is a better instrument than a voltmeter to measure potential difference? Explain briefly.
v. In an R.L circuit, will the current lag or lead the voltage? Illustrate your answer by a vector diagram.
vi. When a 100v are applied to an A.C. circuit, the current flowing in it is 100mA. Find its impedance.
vii. What is meant by para, dia and ferromagnetic substance? Give examples for each.
viii. Define curie temperature. Also write the value of curie temperature for iron.
ix. Differentiate between elasticity and plasticity of a material. x. Why ordinary silicon diodes do not emit light?
xi. Evaluate the gain of a non-inverting amplifier for external resistances $R_1 = 5K\Omega$ and $R_2 = 20K\Omega$.
xii. Draw characteristic curves for the forward biased and reverse biased $p-n$ junction diode.

4. Write short answers of any six parts from the following: (6x2=12)

i. Show that ε and $\frac{\Delta\phi}{\Delta t}$ have the same units. ii. Write any four applications of photocell.
iii. Can a D.C. motor be turned into a D.C. generator? What changes are required to be done?
iv. What is the main difference between A.C. generator and D.C. generator in its construction?
v. What are the measurements on which two observers in relative motion will always agree upon?
vi. Will bright light eject more electrons from a metal surface than dimmer light of the same colour?
vii. Is it possible to create a single photon in annihilation of matter? Explain briefly.
viii. Can the electron in the ground state of hydrogen absorb a photon of energy $13.6\ eV$ and greater than $13.6\ eV$
ix. Differentiate between excited state and metastable state. Also write the residing times for each state.

SECTION-II

Note Attempt any three questions. Each question carries equal marks: (8x3=24)

5. (a) Derive the relation for energy stored in a capacitor. Calculate the energy density. (5)
(b) A platinum wire has a resistance of 10Ω at 0°C and 20Ω at 273°C. Find the value of temperature coefficient of resistance of platinum. (3)

6. (a) What is alternating current generator? Find the value of instantaneous induced current by it. (5)
(b) A power line 10 m high carries a current 200A. Find the magnetic field of the wire at the ground? (3)

7. (a) Derive an expression for resonance frequency in R-L-C series circuit. Also write down the properties of the series resonance. (5)
(b) The current flowing into the base of a transistor is $100\mu A$. find its collector current I_c, its emitter current I_E and the ratio I_c/I_E, if the value of current gain β is 100. (3)

8. (a) Explain "Energy Band Theory" of solids. How does it help to distinguish between conductors, insulators & semi conductors? (5)
(b) What is the maximum wavelength of two photons produced when a positron annihilates an electron? The rest mass energy of each is $0.51\ MeV$. (3)

9. (a) What are inner shell transition? Also discuss the production of x-rays. (5)
(b) If ${}^{233}_{92}U$ decays twice by ∝-emission, what is the resulting isotopes? (3)

☆☆	Roll No _____	HSSC-(P-II)-A-2024 (For All Sessions)	Paper Code	8	4	7	4

Physics (Objective)

(GROUP-II) **Time: 20 Minutes** **Marks : 1**

Note: Write Answers to the Questions on the objective answer sheet provided. Four possible answers A, B, C and D to each question are given. Which answer you consider correct, fill the corresponding circle A, B, C or D given in front of each question with Marker or Pen ink on the answer sheet provided.

1.1 The rest mass of photon is:

(A) $Zero$ ● (B) $1.67 \times 10^{-27}\ kg$ (C) $1.67 \times 10^{-31}\ kg$ (D) $9.1 \times 10^{-31}\ kg$

2. X-rays are also known as:

(A) Cathode rays (B) Positive rays (C) r-rays ● (D) Alpha rays

3. The atomic number of $^{141}_{56}$Ba is:

(A) 141 (B) 56 ● (C) 85 (D) 92

4. One unified mass scale (1U) is equal to:

(A) $1.66 \times 10^{-19}\ kg$ (B) $1.66 \times 10^{-27}\ kg$ ● (C) $1.66 \times 10^{-31}\ kg$ (D) $1.66 \times 10^{-28}\ kg$

5. Value of dielectric constant for vacuum is:

(A) Less than 1 (B) Greater than 1 (C) One ● (D) 1.5

6. Gold band on resistor represent its tolerance equal to:

(A) $\pm 10\%$ (B) $\pm 5\%$ ● (C) $\pm 15\%$ (D) $\pm 20\%$

7. An apparatus placed within a metal enclosure is "shielded" from:

(A) Electric field ● (B) Magnetic field (C) Gravitational field (D) Electromagnetic field

8. The SI unit of magnetic induction is:

(A) Weber (B) Tesla ● (C) Newton (D) Joule

9. The sensitivity of Galvanometer can be increased by decreasing:

(A) C/BAN ● (B) B/ACN (C) CB/AN (D) NC/AB

10. The minus sign in Faraday's law of electromagnetic induction shows that the direction of induced emf is such that it opposes the change in:

(A) Electric flux (B) Electromagnetic flux (C) Gravitational flux (D) Magnetic flux ●

11. The emf induced in a generator is:

(A) $N\omega AB\ Sin\theta$ ● (B) $N\omega\ IB\ Sin\theta$ (C) $NAB\ Sin\theta$ (D) $N\omega B\ Sin\theta$

12. If I_0 is the peak value of A.C current, its average value over a complete cycle is:

(A) $\sqrt{2}\ I_0$ (B) $I_0/\sqrt{2}$ (C) $\sqrt{\frac{I_0}{2}}$ (D) Zero ●

13. The value of angular frequency "ω" is equivalent to:

(A) $2\pi T$ (B) $4\pi f$ (C) $2\pi f$ ● (D) πf

14. Based on the geometrical structure and arrangement of atoms, there are ____ crystal systems:

(A) 6 (B) 5 (C) 7 ● (D) 8

15. The potential barrier for the Ge^n at room temperature is:

(A) 0.7 v (B) 1.0 v (C) 0.6 v (D) 0.3 v ●

16. The mathematical notation for exclusive OR-operation is:

(A) $X = \overline{A + B}$ (B) $X = A\overline{B} + B\overline{A}$ ● (C) $X = \overline{AB + BA}$ (D) $X = \overline{A - B}$

17. The photoelectric effect explained by:

(A) Darission (B) Gerwer (C) Hertz ● (D) Einstein

Roll No _____

Physics (Subjective)

HSSC-(P-II)- A-2024

(For All Sessions)

(GROUP-II)

Marks : 68

Time: 2:40 hours

SECTION-I

2. Write short answers of any eight parts from the following: (8x2=16)

i. Differentiate between electric potential difference and electric potential energy difference and write its relation.

ii. Why is the potential difference between the plates of capacitor decreased when dielectric material is inserted between the plates?

iii. Describe the force or forces on a positive point charge when placed between parallel plates with opposite & equal charges.

iv. 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?

v. What is the advantage of synchronization control in case of CRO?

vi. What is digital multimeter? Why is it easier to use?

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

viii. What should be the orientation of a current carrying coil in a magnetic field so that torque acting upon the coil is (a) maximum (b) minimum?

ix. Equal doses of different radiations do not produce same biological effect. Explain.

x. Name the six quarks.

xi. State two sources of "background radiation"

xii. How can radioactivity help in the treatment of cancer?

3. Write short answers of any eight parts from the following: (8x2=16)

i. What are the difficulties in testing whether the filament of a lighted bulb obeys Ohm's law?

ii. What is thermistor? Write its principle.

iii. Explain under what condition, the wheat stone bridge is said to be balanced?

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

v. What is modulation signal and what are the carrier wave?

vi. Why the choke is used in A.C. circuits?

vii. What is meant by strain energy? How can it be determined from the force-extension graph?

viii. Differentiate between Young's modulus and Bulk's modulus

ix. What is hysteresis loss?

x. What is a net charge on a n-type or a p-type substance?

xi How is p-n junction formed?

xii. Calculate the gain of a non-inverting amplifier when $R_1 = infinity$ and $R_2 = 0$

4. Write short answers of any six parts from the following: (6x2=12)

i. Does the induced emf in a circuit depend on the resistance of the circuit?

ii. Is it possible to change both the area of the loop and magnetic field passing through the loop and still not have an induced emf in the loop?

iii. When does light behave as a wave? When does it acts as a particle?

iv. If an electron and proton have the same de-broglie wavelength, which particle has greater speed?

v. How can the spectrum of hydrogen contain so many lines? when hydrogen contain one electron.

vi. What is the principle of A.C. generator?

vii. What are inertial and non-inertial frame of references?

viii. What is the difference between special theory of relativity and general theory of relativity?

ix. Differentiate between ionization energy and excitation energy.

SECTION-II

Note **Attempt any three questions. Each question carries equal marks:** (8x3=24)

5. (a) Derive a relation for electrical potential at a point due to a point charge. (5)

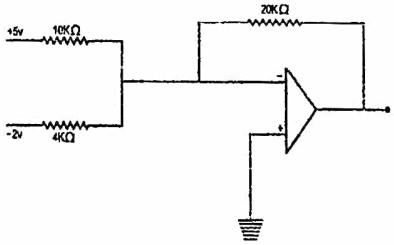
(b) The resistance of an iron wire at $0°C$ is $1 \times 10^4 \Omega$. What is resistance at $500°C$, if the temperature co-efficient of resistance of iron is $5.2 \times 10^{-3}\ k^{-1}$? (3)

6. (a) Define transformer. Explain its principle, construction and working. (5)

(b) What current should pass through a solenoid that is 0.5 m long with 10,000 turns of copper wire so that it will have a magnetic field of 0.4T? (3)

7. (a) What is the series resonance circuit? Derive the relation of resonance frequency and write down its properties. (5)

(b) Calculate the output of the op-amp circuit shown in figure: (3)



8. (a) Write a note on energy band theory and classify conductors, insulators and semiconductors on the basis of this theory. (5)

(b) What is the maximum wavelength of the two photons produced when a positron annihilates an electron? The rest mass energy of each is 0.51 MeV. (3)

9. (a) Define fusion reaction. Explain it in sun with the help of nuclear reactions. (5)

(b) Compute the shortest wavelength radiation in Balmer series? What value of 'n' must be used. (3)

Sargodha Board-2024

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**

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) $Q = \sqrt{\frac{UC}{2}}$

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 $5\times10^{-2}\ \Omega$, 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

1224 **Warning:- Please, do not write anything on this question paper except your Roll No.**

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

Time Allowed: 2.40 hours **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

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 II)** **Paper (II)**
Time Allowed:- 20 minutes **PAPER CODE 4472** **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) If the distance between two point charge is halved, the electric intensity becomes
(A) Half (B) $\frac{1}{4}$ times (C) Double (D) 4 times ●

2) Current which flows from high potential to low potential is
(A) Electric current (B) Conventional current ● (C) Eddy current (D) Remain constant

3) The value of permeability of free space is
(A) $4\pi\times10^{-9}WbA^{-1}m^{-1}$ (B) $4\pi\times10^{-7}WbA^{-1}m^{-1}$ ● (C) $4\pi\times10^{-10}WbA^{-1}m^{-1}$ (D) $4\pi\times10^{7}WbA^{-1}m^{-1}$

4) Lenz's law applies on
(A) Magnitude of emf (B) Direction of emf (C) Direction of induced current ● (D) Resistance

5) The mean value of A.C in a cycle is
(A) 1 (B) 0 ● (C) I_o (D) $\frac{I_o}{\sqrt{2}}$

6) Which one is a ductile substance.
(A) Glass (B) Wood (C) Lead ● (D) Oxygen

7) Reverse current flows due to
(A) Majority charge carrier (B) Minority charge carrier ● (C) Electrons (D) Holes

8) Earth orbital speed is
(A) 10 km/s (B) 20 km/s (C) 30 km/s ● (D) 40 km/s

9) Which of the series of hydrogen atom lies in ultraviolet region
(A) Laymen series ● (B) Balmer series (C) Paschen series (D) Bracket series

10) The binding energy per nucleon is maximum for
(A) Helium (B) Iron ● (C) Polonium (D) Radium

11) Which one is photo conductor
(A) Copper (B) Selenium ● (C) Mercury (D) Aluminium

12) If the length and turns of a solenoid is doubled, strength of magnetic field will be
(A) Doubled (B) Half (C) Constant ● (D) Four times

13) Energy stored in inductor is
(A) $\frac{1}{2}LI^2$ ● (B) $\frac{1}{2}LI$ (C) $\frac{1}{2}L^2I$ (D) $\frac{1}{2}L^2I^2$

14) In case of A.C through resistor, voltage and current are
(A) 0° ● (B) 90° (C) 180° (D) 270°

15) A diode characteristic curve is plotted between
(A) Current and Resistance (B) Voltage and Time (C) Voltage and current ● (D) Current and Time

16) At low temperature, Body emitts radiation of
(A) Short wavelength (B) Long wavelength ● (C) High frequency (D) Both (A) and (C)

17) Which one is not affected by Electric and magnetic field.
(A) β – rays (B) γ – rays ● (C) α – rays (D) Electrons

Sargodha Board-2024

1224 **Warning:- Please, do not write anything on this question paper except your Roll No.**

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

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

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

(i) How can you identify that which plate of a capacitor is positively charged?

(ii) Electric lines of force never cross. Why? (iii) State Coulomb's law. Also write its mathematical form

(iv) Write down at least two properties of electric field lines.

(v) Suppose that a charge 'q' is moving in a uniform magnetic field with a velocity v. Why is there no work done by the magnetic force that acts on the charge q?

(vi) Why does the picture on a T.V screen become distorted when a magnet is brought near the screen?

(vii) Define right hand rule for determining the direction of magnetic field in a current carrying conductor.

(viii) Find the value of the magnetic field that will cause a maximum force of 2.0×10^{-3} N on a 10 cm straight wire carrying a current of 5A.

(ix) Why are heavy nuclei unstable? (x) What factor make a fusion reaction difficult to achieve.

(xi) Define mass defect and binding energy. Also write their mathematical expressions.

(xii) Show that 1u = 931 MeV by using the relation $E = mc^2$.

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

(i) Do bends in a wire effect its electrical resistance? Explain.

(ii) Why heat is produced in a conductor due to flow of current.

(iii) What are the difficulties in testing whether the filament of a lighted bulb obeys ohm's Law?

(iv) A sinusoidal current has rms value of 20 A. What is the maximum or peak value?

(v) How many times per minutes will be an incandescent Lamp reach maximum brilliance when connected to 50 Hz Source.

(vi) What is power factor in an A.C circuit? Explain. (vii) Define stress and strain. What are their SI units?

(viii) Define modulus of elasticity. Show that the units of modulus of elasticity and stress are the same.

(ix) What is squids and where it is used? (x) Define the current gain of a Transistor . Give Mathematical expression.

(xi) Why a photo diode is operated in reverse biased state?

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

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

(i) In transformer, output power is less than input power. Why? Explain.

(ii) Can an electric motor be used to drive an electric generator with the output from the generator being used to operate the motor?

(iii) Does the induced emf always act to decrease the magnetic flux through a circuit?

(iv) What is frame of reference? Also differentiate between inertial and non-inertial frames of reference.

(v) Write the postulates upon which special theory of relativity is based.

(vi) Will higher frequency light eject greater number of electrons than low frequency light?

(vii) Is it possible to create a single electron from energy? Explain.

(viii) State two postulates of Bohr's model of the Hydrogen atom.

(ix) What are the advantages of lasers over ordinary light?

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

5. (a) Derive the expressions for electrical power and power dissipated in resistors.

(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) Derive an expression of force acting on a moving charge in a magnetic field.

(b) An ideal step down transformer is connected to main supply of 240 V. It is desired to operate a 12 V, 30 W lamp. Find the current in the primary and the transformation ratio.

7. (a) What is transistor? How can we use it as an amplifier. Find an expression for gain of an amplifier.

(b) A circuit has an inductance of $\frac{1}{\pi}H$ and resistance of 2000 Ω. A 50 Hz A.C is supplied to it. Calculate the reactance and impedance offered by the circuit.

8. (a) Define photoelectric effect? Discuss it when the intensity of incident light remain constant.

(b) A 1.5 cm diameter cylinder is subjected to a load of 2500 kg. Calculate the stress on the bar in mega pascals.

(a) Explain the term mass defect and binding energy with an example.

(b) Compute the shortest wavelength radiation in the Balmer series? What value of n must be used?

Physics	(D)	L.K.No. 1463	Paper Code No. 8477
Paper II	(Objective Type)	Inter (Ist - A - Exam - 2024)	
Time :	20 Minutes	Inter (Part - II)	(Group Ist)
Marks :	17	Session (2020 – 22) to (2022 – 24)	

Note : Four choices A , B , C ,D to each question are given. Which choice is correct fill that circle in front of that Question No. on the Objective Bubble Sheet. Use Marker or Pen to fill the circles. Cutting or filling two or more circles will result in Zero Mark in that Question.

Q.No.	
Q.No.1 (1)	Force between two point charges 10 μC and 40 μC is 9000 N. Then distance between them is : (A) 2 cm ● (B) 20 cm (C) 20 m (D) 400 m
(2)	In case of Torque on a Current carrying coil , ' α ' is angle between : (A) $\bar{B}$ and $\bar{A}$ (B) Pole faces and Plane of Coil ● (C) $\bar{B}$ and Plane of Coil (D) None of these
(3)	A wire of resistance 9 Ohm is cut into three equal parts and these are connected in parallel. The Equivalent Resistance is : (A) 1 Ohm ● (B) 3 Ohm (C) 9 Ohm (D) 27 Ohm
(4)	By Introducing a Dielectric between the plates of a Charged Capacitor , energy stored will be : (A) Increased (B) ● Decreased (C) Remain Constant (D) Nothing Can Be Said
(5)	The restoring couple in moving coil Galvanometer is due to : (A) Current in the coil (B) Magnetic Field (C) Material of Coil (D) Twist In Wire ●
(6)	A parallel resonance circuit has resonance frequency ' f ' . If Capacitance of this circuit is increased four times , then resonance frequency becomes : (A) 2 f (B) 4 f (C) f /4 (D) f/2 ●
(7)	A Transformer consists of 500 turns in Primary and 200 turns in Secondary. When a battery of emf 9V is connected at the Primary , The Voltage obtained at Secondary is : (A) ● 3 . 6 V (B) 22 . 4 V (C) 9 V (D) Zero Volt
(8)	A steady current of 1 A in a coil of 1000 turns generates a flux of 10^{-4} Wb to pass through the loop of the coil. The energy stored in the inductor is : (A) 5 J (B) 0 . 05 J (C) ● 0 . 5 J (D) 50 J
(9)	Power factor is 1 for : (A) Pure Inductor (B) Pure Capacitor (C) ● Pure Resistor (D) Both Capacitor and Inductor
(10)	A Transistor has a base current of 1mA and emitter current 100 mA . The current gain of the transistor is : (A) 1 (B) ● 99 (C) 100 (D) 101
(11)	The phase difference between input voltage and output voltage of the Transistor Amplifier is : (A) 0^{o} (B) 90^{o} (C) ● 180^{o} (D) 120^{o}
(12)	In Hysteresis Loop, lagging of magnetism behind magnetizing current is called : (A) Saturation (B) Retentivity (C) ● Hysteresis (D) Coercivity
(13)	The momentum of a Photon of frequency ' f ' is : (A) hc / f (B) c / hf (C) f / hc (D) hf / c ●
(14)	In a Nuclear Reactor , Cadmium rods are used to : (A) Speed Up Electrons (B) Slow Down Neutrons (C) Absorb Neutrons ● (D) Produce Neutrons
(15)	In laser , the excited atom returns to its ground state from its meta stable state is about : (A) 10^{-10} s (B) 10^{-8} s (C) 10^{-5} s (D) 10^{-3} s ●
(16)	The de-Broglie wavelength of a particle of mass ' m ' moving with Kinetic energy ' E ' is : (A) $\sqrt{h/2mE}$ (B) ● $h/\sqrt{2mE}$ (C) h / 2mE (D) $\sqrt{h}$ / 2mE
(17)	Which of the following detectors can count fast and operate at low voltage : (A) Geiger Counter (B) Wilson Cloud Chamber (C) Solid State Detector ● (D) Scintillation Counter

Roll No.	1463 - 20,000	Inter (Part – II)	Session (2020 –22) to (2022 – 24)
Physics (Subjective)	Inter (Ist – A– Exam – 2024)	Group Ist	Time 2 : 40 Hours Marks : 68

Note : It is compulsory to attempt any (8 – 8) Parts each from Q.No. 2, Q.No.3 and attempt any (6) Parts from Q.No.4. Attempt any (3) Questions from Part – II .Write the Same Question Number and its Part Number as given in the Question Paper

Make Diagram where necessary. | Part - I | | 22 x 2 = 44

Q.No.2	(i)	The Potential is constant throughout a given region of space. Is the Electric Field zero or non-zero in this region ? Explain.
	(ii)	Electric lines of force never cross. Why?
	(iii)	Differentiate between Electric Field and Electric Field Intensity .
	(iv)	What are the properties of Electric Field Lines?
	(v)	How can a Current Loop be used to determine the presence of a Magnetic Field in a given region of space?
	(vi)	Why the Resistance of an Ammeter should be very low?
	(vii)	What are the uses of CRO?
	(viii)	What is Lorentz Force? Give its Mathematical expression.
	(ix)	A Particle which produces more Ionization is less penetrating. Why?
	(x)	What is meant by Critical Mass?
	(xi)	Distinguish between Nuclear Fission and Nuclear Fusion.
	(xii)	What is meant by Radiography?
Q.No.3	(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)	A wire of Resistivity ρ is stretched to twice of its length . What will be the new Resistivity?
	(iii)	Define Tolerance . Give one example.
	(iv)	How many times per second will an Incandescent Lamp reach maximum brilliance when connected to a 50 Hz source?
	(v)	Write any three characteristics of Series Resonance Circuit.
	(vi)	What is the main reason for the world wide use of A.C ?
	(vii)	Distinguish between Crystalline and Amorphous Solids.
	(viii)	What is meant by Para , Dia and Ferromagnetic Substances? Give examples for each.
	(ix)	Define UTS and Plasticity.
	(x)	What is the Net Charge on a n – type or a p – type substance?
	(xi)	Why a Photodiode is operated in Reverse Biased State?
	(xii)	A Transistor has I_C = 10 mA and I_B = 40 µA , calculate the Current gain.
Q.No.4	(i)	What are the factors due to which induced emf can be increased ?
	(ii)	The turns Ratio of a Step up Transformer is 50 . Find the number of turns in Secondary Coil , if the number of turns in Primary Coil is 10.
	(iii)	Four Unmarked wires emerge from a Transformer. What steps would you take to determine the Turns Ratio ?
	(iv)	The life time of an electron in an excited state is about 10^{-8} s. What is its Uncertainty in energy during this time?
	(v)	As a Solid is heated and begins to glow , why does it first appear red?
	(vi)	What happens to total radiation from a black body if its absolute temperature is doubled?
	(vii)	What is NAVSTAR Navigation System?
	(viii)	Write down the Biological Effects of X-Rays.
	(ix)	Explain why Laser action could not occur without Population Inversion between Atomic levels?

P.T.O.

L.K.No.1463 | **(Part – II)** | pakcity.org | **3 x 8 = 24**

Q.No.5	(a)	What is Wheatstone Bridge? How it can be used to find the unknown resistance?	(5)
	(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.	(3)
Q.No.6	(a)	Derive the expression for energy stored in an inductor in terms of Magnetic Field. Also find the Energy Density.	(5)
	(b)	A velocity selector has a Magnetic Field of 0.30 T. If a perpendicular Electric Field of 10,000 Vm^{-1} is applied, what will be the speed of the particle that will pass through the selector?	(3)
Q.No.7	(a)	Write a note on Transistor as an Amplifier. Calculate its Voltage Gain and give significance of negative sign.	(5)
	(b)	Find the value of the current flowing through a Capacitance 0.5 µF when connected to a source of 150 V at 50 Hz.	(3)
Q.No.8	(a)	What is Hysteresis Loop ? Discuss in detail.	(5)
	(b)	The life time of an electron in an excited state is about 10^{-8} s. What is its uncertainty in energy during this time?	(3)
Q.No.9	(a)	Give the postulates of BOHR'S Atomic Model. Describe Hydrogen Emission Spectrum by using BOHR'S Atomic Model.	(5)
	(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 : (a) The Absorbed Energy in Joules (b) The Equivalent dose in rem.	(3)

04-04-2024

Physics	(D)	L.K.No.1464	Paper Code No. 8478
Paper II	(Objective Type)	Inter (Ist - A - Exam - 2024)	
Time :	20 Minutes	Inter (Part – II)	Group 2nd
Marks :	17	Session (2020 – 22) to (2022 – 24)	

Note : Four choices A , B , C ,D to each question are given. Which choice is correct fill that circle in front of that Question No. on the Objective Bubble Sheet. Use Marker or Pen to fill the circles. Cutting or filling two or more circles will result in Zero Mark in that Question.

Q.No.1 (1)	The SI unit of Electric Flux is : (A) Nm^2C^{-1} (B) $Nm^{-2}C$ (C) Nm^2C^{-2} (D) NmC^{-2}
(2)	The relation between Current ' I ' and angle of deflection ' θ ' in a moving coil Galvanometer is : (A) $I \propto \theta$ (B) $I \propto \frac{1}{\theta}$ (C) $I \propto \sin\theta$ (D) $I \propto \cos\theta$
(3)	The Potential Difference between the head and tail of an Electric EEL can be up to : (A) 200 V (B) 500 V (C) 600 V (D) 1000 V
(4)	The Force between two point charges in the presence of air is 80 N. When a dielectric "Germanium" of dielectric constant 16 is placed between them , the force reduces to : (A) 2N (B) 5N (C) 10N (D) 32N
(5)	Torque on a Current Carrying coil placed in a uniform magnetic field is minimum when angle between plane of coil and magnetic field is : (A) 0° (B) 30° (C) 45° (D) 90°
(6)	The Slope of $q - t$ Curve at any instant of time when A.C passes through a capacitor represents : (A) Current (B) Voltage (C) Inductance (D) Capacitance
(7)	The Inductor Stores energy in : (A) Electric Field (B) Magnetic Field (C) Gravitational Field (D) Nuclear Field
(8)	When the motor is just started , the back emf is : (A) Maximum (B) Minimum (C) Almost Zero (D) Equal to Current
(9)	The Impedance of a parallel resonance circuit at resonance is : (A) Resistive (B) Capacitive (C) Inductive (D) Zero
(10)	The size of base in a transistor is of the order of : (A) 10^{-4} m (B) 10^{-6} m (C) 10^{-8} m (D) 10^{-10} m
(11)	A Photodiode can turn its current ON and OFF in : (A) Milli Seconds (B) Micro Seconds (C) Nano Seconds (D) Mega Seconds
(12)	Which of the following is a brittle substance : (A) Lead (B) Copper (C) Glass (D) Wrought Iron
(13)	In Photoelectric Effect , the Photoelectric Current can be increased by : (A) Increasing the Frequency of Light (B) Decreasing the Frequency of Light (C) Increasing the Intensity of Light (D) Decreasing the Intensity of Light
(14)	The range of weak nuclear force is of the order of : (A) 10^{-9} m (B) 10^{-10} m (C) 10^{-17} m (D) 10^{-15} m
(15)	K_α X – rays are produced due to transition of electron from : (A) K to L Shell (B) L to K Shell (C) M to K Shell (D) M to L Shell
(16)	When a platinum wire is heated , it becomes white at about : (A) $900^\circ C$ (B) $1100^\circ C$ (C) $1300^\circ C$ (D) $1600^\circ C$
(17)	In Karachi Nuclear Power Plant (KANUP) , the moderator used is : (A) Graphite (B) Carbon (C) Heavy Water (D) Boron Rod

Roll No.	1464 - 20,000	Inter (Part – II)	Session (2020 –22) to (2022 – 24)
Physics (Subjective)	Inter (Ist – A – Exam – 2024)	Group 2nd	Time 2 : 40 Hours Marks : 68

Note : It is compulsory to attempt any (8 – 8) Parts each from Q.No. 2, Q.No.3 and attempt any (6) Parts from Q.No.4. Attempt any (03) Questions from Part – II .Write the Same Question Number and its Part Number as given in the Question Paper

Make Diagram where necessary. | Part - I | | 22 x 2 = 44

Q.No.2	(i)	Compare between Electric Forces and Gravitational Forces .
	(ii)	A Particle carrying a charge of 2e falls through a Potential Difference of 3 . 0 V . Calculate the energy acquired by it.
	(iii)	Is it true that Gauss's Law States that the total number of lines of forces crossing any closed surface in the outward direction is proportional to the net positive charge enclosed within the surface ?
	(iv)	What is Electric Polarization of Dielectrics?
	(v)	Explain Digital Multimeter.
	(vi)	What should be the orientation of a current carrying coil in a magnetic field , so that torque acting upon the coil is : (a) Maximum (b) Minimum ?
	(vii)	Two Charged Particles are projected into a region where there is a magnetic field perpendicular to their velocities . If the charges are deflected in opposite directions , what can you say about them ?
	(viii)	What is the function of Sweep Time Base Generator in Cathode Ray Oscilloscope ?
	(ix)	Show that IU = 931 MeV by using the relation $E = mc^2$.
	(x)	Define decay constant of Radioactive Element. What is its Unit?
	(xi)	Name two Processes take place at low energy and at high energy radiation.
	(xii)	Name the Particle which has high Penetrating Power . Give reason.
Q.No.3	(i)	Why some of the Electrons are free in Conductors?
	(ii)	Describe a Circuit which will give a continuously varying potential.
	(iii)	How many electrons pass through an electric bulb in one minute if the 300 mA current is passing through it?
	(iv)	In Parallel Resonant Circuits , at resonance, the branch currents I_L and I_C may each be larger than the source current I_r . Why?
	(v)	In a R – L Circuit , will the current lag or lead the voltage ? Illustrate your answer by a vector diagram .
	(vi)	Explain the conditions under which Electromagnetic Waves are produced from a source.
	(vii)	Distinguish between Forbidden Energy States and Forbidden Energy Gap.
	(viii)	How would you obtain n – type and p – type material from pure Silicon ? Illustrate it by schematic diagram .
	(ix)	What is meant by Para , Dia and Ferromagnetic Substances ? Give examples for each.
	(x)	What is Current gain of transistor? Write its relation.
	(xi)	Why a Photodiode is operated in reverse biased state ?
	(xii)	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 ?
Q.No.4	(i)	Is it possible to change both the area of the loop and the magnetic field passing through the loop and still not have an induced emf in the loop?
	(ii)	What is Ideal Transformer? Also draw the symbol of Transformer.
	(iii)	Define One Henry (1H) .
	(iv)	Photon A has twice the energy of Photon B . What is the ratio of momentum of A to that of B?
	(v)	What advantages an Electron Microscope has over an Optical Microscope?
	(vi)	Calculate the de Broglie Wavelength of an electron moving at 40 ms^{-1} .
	(vii)	Explain Planck's assumption about the energy distribution curves of Black Body Radiation .
	(viii)	How can the Spectrum of Hydrogen contain so many lines when Hydrogen contains one electron?
	(ix)	Differentiate between Excitation Potential and Ionization Potential .

P.T.O.

L.K.No. 1464 | **(Part – II)** | pakcity.org | **3 x 8 = 24**

Q.No.5	(a)	Write a note on Construction , working and uses of Potentiometer.	(5)
	(b)	Determine the Electric Field at the position $\vec{r} = (4\hat{i} + 3\hat{j})$ m caused by a point charge $q = 5.0 \times 10^{-6}$ C placed at origin.	(3)
Q.No.6	(a)	Differentiate between Motor and Generator. Is Back Motor effect in generators in accordance with the law of Conservation of Energy ? Explain.	(5)
	(b)	A Galvanometer having an Internal Resistance $R_g = 15.0\ \Omega$ gives full scale deflection with Current $I_g = 20.0$ mA . It is to be converted into an Ammeter of range 10 . 0 A . Find the value of Shunt Resistance R_s .	(3)
Q.No.7	(a)	What is the Principle of Virtual Ground ? Apply it to find the gain of an Inverting Amplifier.	(5)
	(b)	A 10 mH , 20 Ω coil is connected across 240 V and 180/π Hz Source. How much Power does it dissipate?	(3)
Q.No.8	(a)	Explain Intensity Distribution diagram of Black Body Radiation .	(5)
	(b)	The length of a Steel Wire is 1 . 0 m and its cross-sectional area is $0.03 \times 10^{-4}\ m^2$. Calculate the work done in stretching the wire when a force of 100 N is applied within the elastic region. Young's Modulus of Steel is $3.0 \times 10^{11}\ Nm^{-2}$.	(3)
Q.No.9	(a)	What is Nuclear Reactor ? Describe the functions of its main parts.	(5)
	(b)	Electrons in an X-ray tube are accelerated through a Potential Difference of 3000 V. If these electrons were slowed down in a target , what will be the minimum Wavelength of X-rays produced ?	(3)

PAPER CODE – 8471

12th CLASS – 1st Annual 2024

PHYSICS		TIME : 20 MINUTES
GROUP : FIRST		MARKS :17

OBJECTIVE

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 marks in that question.

QUESTION NO. 1

1 A particle of mass m and charge q is released from rest in a uniform of electric field E. The K.E attained by the particle after moving a distance ' d ' is

(A) $\frac{Ed}{q}$ (B) qE^2d (C) qEd ● (D) $\frac{qE}{d^2}$

2 Two charges are placed at a certain distance a part in vacuum. If a dielectric slab is placed between them , the force between them

(A) Will increase (B) Will decrease ● (C) Will remain unchanged (D) May increase or decrease depending on the material of the slab

3 If the current passing through a conductor is reduced to half, then heat produced becomes

(A) 2 times (B) Remains the same (C) $^1/_4$ times ● (D) Becomes half

4 Weber ampere per meter is equal to

(A) Joule (B) Newton ● (C) Tesla (D) Henry

5 An electron is moving in a circle of radius ' r ' in a uniform magnetic field B suddenly the field is reduced to $\frac{B}{2}$ .The radius of circle now becomes

(A) $^r/_2$ (B) $^r/_4$ (C) 2 r ● (D) $^4/_r$

6 Which of the following quantity remains unchanged in a transformer ?

(A) Voltage (B) Current (C) Power (D) Frequency ●

7 Maximum motional emf in a conductor is given by ' vBL '. At which angle the conductor moves in magnetic field such that emf in it becomes half then its maximum value

(A) 0^o (B) 30^o ● (C) 45^o (D) 60^o

8 In R-L-C series circuit the phase angle between X_L and X_C is

(A) $Tan^{-1}\left(\frac{WL}{R}\right)$ (B) $Tan^{-1}\frac{1}{WRC}$ (C) $Tan^{-1}\left(\frac{Z}{R}\right)$ (D) π ●

9 The power factor of an A.C circuit has

(A) SI unit ampere (B) SI unit volt (C) SI unit watt (D) Zero ●

10 Curie temperature for iron is about

(A) 750 K (B) 570 K (C) 1023 K ● (D) 378 K

11 The value of input resistance of op – amp is of the order of

(A) Few Ohms (B) Milli Ohms (C) Kilo Ohms (D) Mega Ohms ●

12 A device which converts a physical quantity into voltage is called a

(A) Sensor ● (B) Inverter (C) Amplifier (D) Photodiode

13 We can never accurately describe all aspects of subatomic particles simultaneously. It is correct according to

(A) Uncertainty principle (B) de – Broglie theory (C) Einstein theory (D) Photoelectric effect

14 If one photon is obtained in annihilation of matter then which of the following conservation law not hold

(A) Energy (B) Momentum (C) Charge (D) All these law would not hold

15 In the Bohr's model of the hydrogen atom , the lowest orbit corresponds to

(A) Infinite energy (B) Maximum energy (C) Minimum energy (D) Zero energy

16 Mass equivalent of 931 Mev energy is

(A) 6.02×10^{-31} Kg (B) 1.66×10^{-27} Kg (C) 1.67×10^{-27} Kg (D) 6.02×10^{-27} Kg

17 If energy of γ-radiation is less than 0.5 Mev the dominant process is

(A) Photoelectric effect (B) Compton effect (C) Pair production (D) Black body radiation

PHYSICS
GROUP : FIRST

TIME: 2 HRS 40 MINUTES
MARKS: 68

SUBJECTIVE PART

SECTION – I

QUESTION NO. 2 Write short answers any Eight (8) of the following 16

i	What is the effect of medium between the charges on Coulomb's force ? Explain
ii	Describe four properties of electric field lines.
iii	Electric lines of force never cross. Why ?
iv	Do electrons tend to go to region of high potential or of low potential ?
v	Define magnetic flux and magnetic flux density.
vi	Define right hand rule for the determination of direction of magnetic field of current carrying wire.
vii	How can a current loop be used to determine the presence of magnetic field in a given region of space ?
viii	How can you use a magnetic field to separate isotopes of chemical element ?
ix	For what purpose bromine is mixed in principal gas in Geiger tube ?
x	Write down two advantages of solid state detector.
xi	What do we mean by the term critical mass ?
xii	A particle which produces more ionization is less penetrating. Why ?

QUESTION NO. 3 Write short answers any Eight (8) of the following 16

i	What is Wheatstone bridge ? How it can be used to determine unknown resistance ?
ii	What are the difficulties in testing whether the filament of a lighted bulb obeys Ohm's law ?
iii	Give some application of thermistor ?
iv	Explain the conditions under which electromagnetic waves are produced from the source ?
v	How the reception of a particular radio station is selected on your radio set ?
vi	What is choke ? Give its uses.
vii	Discuss the mechanism of electrical conduction by Holes and electrons in a pure semiconductor element.
viii	Differentiate between intrinsic and extrinsic semiconductor.
ix	What are crystalline and polymeric solids.
x	Why is the base current in a transistor is very small ?
xi	Why charge carrier are not present in the depletion region ?
xii	How reverse biasing of semiconductor diode occure ? Show by diagram.

QUESTION NO. 4 Write short answers any Six (6) of the following 12

i	Four unmarked wires emerge from a transformer. What steps would you take to determine the turns ratio ?
ii	Can an electric motor be used to drive an electric generator with the output from the generator being used to operate the motor ?
iii	Find the energy stored in an inductor of inductance 100 mH carrying a current of 2 A.
iv	Which has the lower energy quanta ? Radiowaves or x – rays
v	Is it possible to create a single electron from energy ? Explain.
vi	State uncertainty principle in terms of position and momentum of a particle. Also write its mathematical expression.
vii	Write down the postulates of special theory of relativity.
viii	Is energy conserved when an atom emits a photon of light ?
ix	Find the speed of an electron in the first Bohr orbit.

SECTION-II

Note: Attempt any Three questions from this section (Part A = 5 Marks & Part B = 3 Marks 8 x 3 = 24)

Q.5.(A)	What is Electromotive force ? Derive the relation of terminal potential difference.
(B)	In Bohr's atomic model of Hydrogen atom, the electron is in an orbit around the nuclear proton at a distance of 5.29×10^{-11} m with a speed of 2.18×10^{6} ms^{-1}. Find the electric potential that a proton exerts at this distance.
Q.6.(A)	State Ampare's law. Calculate the magnetic field due to current carrying solenoid.
(B)	A solenoid has 250 turns and its self inductance is 2.4 mH. What is the flux through each turn when the current is 2 A ? What is the induced emf when the current changes at 20 As^{-1} ?
Q.7.(A)	Prove that the closed loop gain of OP – AMP as inverting amplifier is given by $G = -\frac{R_2}{R_1}$
(B)	An iron core coil of 2.0 H and 50 Ω is placed in series with a resistance of 450 Ω. An A.C supply of 100V , 50 Hz is connected across the circuit. Find the current flowing in the coil.
Q.8.(A)	Define magnetic hysteresis. Write a note on hysteresis loop, its main features and its applications.
(B)	What is the mass of a 70 kg man in a space rocket traveling at 0.8 c from us as measured from earth
Q.9.(A)	How does uncertainty principle explain that electrons cannot exist inside the nucleus ?
(B)	The half life of $_{38}Sr^{91}$ is 9.70 hours. Find its decay constant.

PAPER CODE – 8478

12th CLASS – 1st Annual 2024

PHYSICS		TIME : 20 MINUTES
GROUP : SECOND		MARKS :17

OBJECTIVE

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 marks in that question.

QUESTION NO. 1

1 Second postulate of special theory of relativity is
(A) Wrong (B) Virtual (C) Experimental fact (D) Sometimes correct

2 For low energy quanta, dominant properties are
(A) Particle nature (B) Wave nature (C) Dual nature (D) Multi nature

3 Longest wavelength of Paschen series is (R_H = Rydberg's constant)
(A) $^{9}/_{R_H}$ (B) $^{144}/_{7R_H}$ (C) $^{1}/_{R_H}$ (D) $^{400}/_{9R_H}$

4 For a radioactive sample of initial population No, decayed fraction after 4 half – lives is
(A) $^{1}/_{16}$ (B) $^{1}/_{4}$ (C) $^{3}/_{4}$ (D) $^{15}/_{16}$

5 The energy output per nucleon in fusion is greater than energy output per nucleon in fission
(A) 25 times (B) 6 to 7 times (C) 17 times (D) 200 times

6 A test charge experiences force due to applied electric field
(A) Parallel (B) Anti - Parallel (C) Perpendicular (D) Oblique

7 Unit +ve charge is placed over a spherical hollow surface, flux crossing it outwards is
(A) $\frac{1}{\varepsilon_o}$ (B) Zero (C) $\frac{2}{\varepsilon_o}$ (D) $2\,\varepsilon_o$

8 Heat energy is converted to electrical energy by
(A) Primary cells (B) Thermo-couples (C) Solar cells (D) Generators

9 A high speed graph plotting device is
(A) Voltmeter (B) Galvanometer (C) Ammeter (D) C.R.O

10 Lamp and scale arrangement is used in galvanometers to measure deflection
(A) Stable (B) Dead beat (C) Sensitive (D) Astatic

11 The behaviour is like resistors in alternating current
(A) Capacitor (B) Motor (C) Inductor (D) Generator

12 A transformer with many secondary coils is used for
(A) Door bell (B) TV receiver (C) Power transmission (D) Transistor radio

13 An alternating quantity can be represented by a
(A) Static vector (B) Rotating vector (C) Scalar (D) Straight line

14 At resonance, the voltage of inductor and capacitor in series RLC circuit are
(A) In phase (B) Out of phase (C) Perpendicular (D) Oblique

15 The reverse current to reduce the magnetization to zero is called
(A) Retentive (B) Remanance (C) Coercive (D) Magnetization

16 A fast switching device responding in nano – seconds is
(A) PN Junction (B) Photo diode (C) LED (D) Photo – voltaic cell

17 When output of non – inverting amplifier is fed back directly to inverting input, gain is
(A) Zero (B) $^{R_2}/_{R_1}$ (C) One (D) $1 - \frac{R_2}{R_1}$

PHYSICS		TIME: 2 HRS 40 MINUTES
GROUP : SECOND	SUBJECTIVE PART	MARKS: 68

SECTION – I

QUESTION NO. 2 Write short answers any Eight (8) of the following 16

i	Summarize the properties of electric field lines.
ii	Find electric field intensity inside a hallow charged spheres.
iii	The potential is constant throughout a given region of space. Is the electric field zero or non zero in this region ? Explain
iv	Define capacitance of a capacitor. Also define its unit.
v	Draw circuit diagram of conversion of galvanometer into an Ohm meter.
vi	Write down any two uses of C.R.O
vii	How can we use a magnetic field to separate isotopes of chemical element ?
viii	Why the voltmeter should have a high resistance ?
ix	If someone swallow an α - source and a β- source which would be more dangerous to him ? Explain Why ?
x	Why are heavy nuclei unstable ?
xi	Comment on some radiations in the environment added by human activities.
xii	What is radiography ? Explain briefly.

QUESTION NO. 3 Write short answers any Eight (8) of the following 16

i	Describe the circuit which will give a continuously varying potential ?
ii	Why does the resistance of a conductor rise with temperature ?
iii	What is temperature coefficient of resistance ? Give its mathematical form.
iv	What is inductor ? When does it behave as a choke ?
v	Write the properties of parallel resonance circuit at resonant frequency.
vi	What is meant by A.M and F.M
vii	Define crystal lattice. Illustrate yours answer with example.
viii	Distinguish between crystalline, amorphous and polymeric substances ?
ix	What is coercivity in a ferromagnetic materials ?
x	Define rectification. How many types of rectification ?
xi	Give the truth table of XOR – Gate ?
xii	Why ordinary silicon diodes do not emit light ?

QUESTION NO. 4 Write short answers any Six (6) of the following 12

i	Is it possible to change both the area of the loop and the magnetic field passing through the loop and still not have an induced emf in the loop ?
ii	Derive an expression $\mathcal{E} = -N\frac{\Delta\Phi}{\Delta t}$
iii	What is the cause of induced emf ?
iv	Photon A has twice the energy of photon B. What is the ratio of the momentum of A to that of B ?
v	What advantages an electron microscope has over an optical microscope ?
vi	Write some important results of photoelectric effect.
vii	An electron is accelerated through a potential difference of 50 V. Calculate its de-Broglie wavelength.
viii	What is meant by a line spectrum ? Explain , how line spectrum can be used for the identification of elements ?
ix	What do you mean by spectroscopy ? What are the main types of spectra ?

SECTION-II

Note: Attempt any Three questions from this section (Part A = 5Marks & Part B=3Marks 8 x 3 = 24)

Q.5.(A)	What is Electromotive force and terminal potential difference ? Explain
(B)	A capacitor has a capacitance of 2.5×10^{-8} F. In the charging process , electrons are removed from one plate and placed on the other one. When potential difference between the plates is 450 V, how many electrons have been transferred ? ($e = 1.6 \times 10^{-19}$ C)
Q.6.(A)	State Lenz's law. Explain how energy conserved in case of movement of bar magnet and metal rod placed on parallel metal rails in uniform magnetic field.
(B)	How fast must a proton move in magnetic field of 2.50×10^{-3} T. Such that the magnetic force is equal to its weight.
Q.7.(A)	Define rectification. Explain half wave rectification and full wave rectification in detail.
(B)	What is the resonance frequency of a circuit which includes a coil of inductance 2.5 H and a capacitance 40 μF ?
Q.8.(A)	What is Compton effect ? Calculate the Compton wavelength OR Compton shift at an angle $\theta = 90^{\circ}$
(B)	A 1.0 m long copper wire is subjected to stretching force and its length increases by 20 cm. Calculate the tensile strain and the percent elongation which the wire undergoes.
Q.9.(A)	What is nuclear reactor ? Describe function of its main parts.
(B)	An electron jumps from a level $E_i = -3.5 \times 10^{-19}$ J to $E_f = -1.20 \times 10^{-18}$ J. What is the wavelength of the emitted light ?

Roll No. : _____

Objective
Paper Code
8475

Intermediate Part Second

PHYSICS (Objective) GROUP - I

Time: 20 Minutes Marks: 17

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	$X=\overline{A+B}$	$X=\overline{A\cdot B}$
17	An example of donor impurity is:	Silicon	Germanium	Phosphorous	Aluminum

 Intermediate Part Second Roll No: .....

PHYSICS (Subjective) GROUP - I

Time: 02:40 Hours Marks: 68

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 $11\times10^{-8}\ \Omega m$. 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

Roll No. : _____

Objective
Paper Code
8474

Intermediate Part Second

PHYSICS (Objective) GROUP - II

Time: 20 Minutes Marks: 17

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	Unit of radioactivity is curie (Ci). Which is equal to _____ disintegration per second.	3.74×10^{9}	3.7×10^{10}	3.64×10^{9}	4.5×10^{9}
2	The dead time for G.M counter is:	10^{-3}s	10^{-4}s	10^{-5}s	10^{-8}s
3	The radius of second Bohr radius for hydrogen atom is:	0.053 nm	0.212 nm	0.106 nm	0.848 nm
4	The minimum energy required for pair production is:	0.51 MeV	1.51 MeV	1.02 MeV	0.051 MeV
5	The slope of the maximum K.E of photoelectrons versus light frequency graph represents:	Momentum	Planck's constant	Maximum wavelength	Work function
6	$X = A \cdot \bar{B} + \bar{A} \cdot B$ is the mathematical mutation for:	NOR gate	NAND gate	XOR gate	XNOR gate
7	In case of non-inverting operational amplifier, if $R_1 = \frac{R_2}{2}$, then:	$V_{out} = 2 V_{in}$	$V_{in} = 2 V_{out}$	$V_{out} = 3 V_{in}$	$V_{in} = 3 V_{out}$
8	The units of modulus of elasticity are the same as those of:	Stress	Strain	Power	Work done
9	The power factor in a series resonance circuit at resonance is:	0	1	–1	Infinity
10	The unit of impedance is:	Ohm	Farad	Volt	$(Ohm)^{-1}$
11	Eddy currents are setup in a direction:	Parallel to flux	Antiparallel to flux	Perpendicular to flux	At an angle 45° to the flux
12	Lenz's law is in accordance with the law of conservation of:	Charge	Mass	Momentum	Energy
13	An alpha particle of charge 2e enters a uniform magnetic field of 0.1T with velocity 10ms^{-1} perpendicularly, the magnetic force acting on it will be:	1.6×10^{-19}N	3.2×10^{-19}N	6.4×10^{-19}N	Zero
14	Output waveform of sweep or time base generator is:	Saw tooth wave	Sinusoidal wave	Square wave	Digital wave
15	The charge carriers in electrolyte are:	Free electrons	Positive and negative ions	Free electrons and ions	Electrons and holes
16	In a capacitor energy is stored in:	Electric field	Magnetic field	Gravitational field	Nuclear field
17	A particle carrying a charge of 2e falls through a potential difference of 10V. The energy acquired by it is:	2eV	5eV	10eV	20eV

Intermediate Part Second Roll No. _____

PHYSICS (Subjective) GROUP - II

Time: 02:40 Hours Marks: 68

SECTION – I

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

(i) Define dielectric coefficient of capacitance.
(ii) Show that Ohm × Farad = Second.
(iii) Electric lines of force never cross. Why?
(iv) In the presence of dielectric why potential difference decreases?
(v) Why does the picture on a T.V screen becomes distorted when a magnet is brought near the screen?
(vi) What is Lorentz force? Give the role of electric and magnetic force in this regard.
(vii) Do two long and parallel current carrying wires attract each other? Explain.
(viii) A power line 20m high carries a current 200 A. Find the magnetic field of the wire at the ground.
(ix) If decay constant of a radioactive isotope is 0.3465 hr^{-1}. What will be its half-life?
(x) What is nuclear transmutation? Give one example.
(xi) What is radiography? Write its one use.
(xii) Discuss the advantages and disadvantages of nuclear power compared to the use of fossil fuel generated power.

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

(i) Write names of two devices in which resistance decreases due to increase in temperature.
(ii) Do bends in a wire affect its electrical resistance? Explain.
(iii) What are the difficulties in testing whether the filament of a lighted bulb obeys Ohm's law?
(iv) In RLC series circuit, the impedance of the circuit at resonance is resistive. Why?
(v) A sinusoidal current has rms value of 10A. What is the maximum or peak value?
(vi) Name the device that will (a) permit flow of direct current but oppose the flow of alternating current (b) permit flow of alternating current but not the direct current.
(vii) Differentiate between glossy solids and polymeric solids.
(viii) Define modulus of elasticity. Show that the units of modulus of elasticity and stress are the same.
(ix) What is meant by strain energy.
(x) Summarize the advantages of photo diode.
(xi) What is net charge on a n-type or a p-type substance?
(xii) Why charge carriers are not present in the depletion region?

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

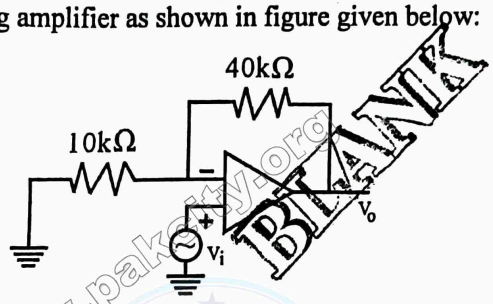
(i) Four unmarked wires emerge from a transformer. What steps would you take to determine the turns ratio?
(ii) How would you position a flat loop of wire in a changing magnetic field so that there is no emf induced in the loop?
(iii) Define motional emf. Write its expression.
(iv) What happens to total radiation from a black body if its absolute temperature is doubled?
(v) Is it possible to create a single electron from energy? Explain.
(vi) State the two postulates of special theory of relativity.
(vii) What is work function? Write its mathematical relation with threshold frequency.
(viii) Mention any four applications of LASER.
(ix) Can X-rays be reflected, refracted, diffracted and polarized just like any other waves? Explain.

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

5. (a) Define absolute potential. Derive its relation due to a point charge at a distance r from it. 05
(b) A charge of 90C passes through a wire in 1 hour and 15 minutes. What is the current in the wire? 03

(Continued P/2)

6. (a) Discuss the principle, construction and working of an alternating current generator. Also find expression for induced emf and induced current. 05
   (b) What current should pass through a solenoid that is 0.5m long with 10000 turns of copper wire, so that it will have a magnetic field of 0.4T? 03
7. (a) Describe the flow of A·C·through resistor and through capacitor. 05
   (b) Calculate the gain of non-inverting amplifier as shown in figure given below: 03



8. (a) What is photoelectric effect? Explain it on the basis of quantum theory. 05
   (b) A 1.25cm diameter cylinder is subjected to a load of 2500kg. Calculate the stress on the bar in mega pascals. 03
9. (a) What is meant by half-life of a radioactive element? How it can be determined by the decay of radioactive element? 05
   (b) Compute the shortest wavelength radiation in the Balmer series. What value of n must be used? 03