☆☆☆☆	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.

RWP-1-24

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

RWP-1-24

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 $\propto$-emission, what is the resulting isotopes? (3)

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Physics (Objective)

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

RWP-2-24

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. Whic 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

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(For All Sessions)

(GROUP-II)

Physics (Subjective)

Marks : 68

Time: 2:40 hours

SECTION-I

RWP-2-24

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)

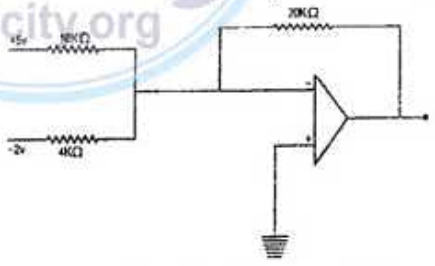
(b) The resistance of an iron wire at $O°C$ is $1 \times 10^4 \Omega$. What is resistance at $500°C$, if the temperature co-efficient of resistance of iron is $5.2 \times 10^{-3}\ k^{-1}$? (3)

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)

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(For All Sessions)

Physics (Objective) Rup-12-1-23 (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. The basic circuit element in a D.C circuit is:

(A) Capacitor (B) Inductor (C) Battery (D) Resistor

2. The critical temperature of mercury is:

(A) 4.2 k (B) 1.18 k (C) 3.72 k (D) 7.2 k

3. The open loop gain of op-amplifier is of the order of:

(A) 10^2 (B) 10^3 (C) 10^5 (D) 10^4

4. $X = A + B$ is the mathematical notation for:

(A) AND gate (B) OR gate (C) NOR gate (D) NAND gate

5. The momentum of a moving photon is:

(A) $P = h/\lambda$ (B) $P = \lambda/h$ (C) $P = hf$ (D) $P = mc^2$

6. Pair production can take place by using:

(A) X − rays (B) $\propto -rays$ (C) $\beta -rays$ (D) $\gamma - rays$

7. The value of Ryd berg's constant is:

(A) $1.0974 \times 10^7 m^{-1}$ (B) $1.0974 \times 10^{-7} m^{-1}$ (C) $1.0974 \times 10^{-7} m$ (D) $1.0974 \times 10^7 m$

8. Half life of uranium −238 is:

(A) 4.5×10^{12} years (B) 4.5×10^{11} years (C) 4.5×10^{10} years (D) 4.5×10^9 years

9. The potential difference between anode and cathode in a neon bromine filled G.M counter is:

(A) 200 v (B) 300 v (C) 400 v (D) 220 v

10. The number of electron in one coulomb charge is:

(A) 6.2×10^{18} (B) 1.6×10^{-19} (C) 6.2×10^{21} (D) 1.6×10^{-27}

11. The S-I unit of electric flux is:

(A) Nmc^{-1} (B) Nm^2c^{-1} (C) Nm^2c (D) $Nm^{-2}c^{-1}$

12. A rheostat can be used as:

(A) Transformer (B) Amplifier (C) Oscillator (D) Potential divider

13. Lorentz force is known as:

(A) $\vec{F} = I(\vec{L} \times \vec{B})$ (B) $\vec{F} = q(\vec{v} \times \vec{B})$ (C) $\vec{F} = q\vec{E} + q(\vec{v} \times \vec{B})$ (D) $\vec{F} = q\vec{E}$

14. DMM stands for:

(A) Digital millimeter (B) Digital multimeter (C) Digital measuring meter (D) Digital ammeter

15. When the back emf in a circuit is zero it draws:

(A) Zero current (B) Steady average current (C) Minimum current (D) Maximum current

16. The principle of AC generator is based on:

(A) Mutual induction (B) Self induction (C) Electromagnetic induction (D) All of these

17. The graph between A.C voltage with time is:

(A) Cosine curve (B) Tangent curve (C) Sine curve (D) Cot curve

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Physics (Subjective) Rwp-12-1-23 (GROUP-I) Time: 2:40 hours

SECTION-I

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

i. Electric lines of force never cross. why?
ii. Draw the circuit diagram of charging and discharging of a capacitor.
iii. Suppose that you follow an electric field line due to a positive point charge. Do electric filed and electric potential increase or decrease?
iv. How Millikan's measured the radius of Droplet during measuring the charge on an electron?
v. Is it possible to orient a current loop in a uniform magnetic field such that loop will not tend to rotate? Explain.
vi. How lamp and scale arrangement is used to measure the angle of deflection of a coil of galvanometer?
vii. Why the 'Voltmeter' should have very high resistance?
viii. What is the use of 'Grid' in cathode ray oscilloscope?
ix. What do you understand by back ground radiation? State the two sources of this radiation.
x. Why thermal nuclear reactor so called thermal?
xi. What factors make a fusion reaction difficult to achieve?
xii. Describe briefly about 'Leptons'.

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

i. What is a short circuit and an open circuit?
ii. Write the equation of balanced Wheatstone Bridge and draw its diagram.
iii. Why has a thin filament of light bulb more possibility to burn than the thicker one?
iv. Explain why a spark jumps across a switch contacts when it is reopened in a circuit with D.C source?
v. Describe frequency modulation with diagram.
vi. Explain the relation between frequency of A.C signal and inductive reactance.
vii. What is strain energy? How it can be calculated from the force-extension graph?
viii. Differentiate elasticity and plasticity of materials.
ix. Illsutrate by diagram, the energy bands for conductors and insulators.
x. What are the semi conductors? Give their examples.
xi. Draw diagrams of n-p-n transistor with (a): Common-Emitter and (b): Common-Base Configurations.
xii. What is an operational amplifier? Draw its diagram.

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

i. How power is transferred in a transformer without transfer of charge?
ii. In a certain region, earth's magnetic field points vertically down. When a plane flies due south, which wing is negatively charged?
iii. What are the field coils in DC motor? How are they connected with armature coil?
iv. Calculate Compton shift for scattering angle of 180°.
v. Define work function. Write its SI unit.
vi. What are advantages of an electron microscope over an ordinary optical microscope?
vii. Why radio waves show wave nature while gamma rays do not?
viii. Why resonant cavity is necessary to sustain laser action?
ix. Can the electron in ground state of hydrogen absorb a photon of energy 13.6eV and greater than 13.6eV?

SECTION-II

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

5. (a) Define resistivity and write its unit. And derive temperature coefficient in terms of resistivity. 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
6. (a) Define motional emf. Explain how emf induced by motion of conductor across magnetic field. 5
(b) A power line 10.0 m high carries a current 200A. Find the magnetic field of wire at the ground. 3
7. (a) What is meant by Rectification? Explain the action of semi conductor diode as Half-wave and Full-wave rectification. 5
(b) What is the resonant frequency of a circuit, which includes a coil of inductance 2.5 H and a capacitance 40 μF? 3
8. (a) Define and explain photoelectric effect. Give Einstein's explanation of photoelectric effect. 5
(b) A 1.25 cm diameter cylinder is subjected to a load of 2500 kg . Calculate the stress on the bar in mega Pascal. 3
9. (a) What is laser? Write down its properties. Explain how Helium-neon laser works? 5
(b) How much energy is absorbed by a man of mass 80Kg who receives a lethal whole body equivalent dose of 400 3

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(For All Sessions)

Physics (Objective) (Group-II)

Rwp-12-2-23

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. LDR becomes necessary when op-amplifier is used as:

(A) Comparator (B) Rectifier (C) Inverter (D) Night switch

2. If velocity of body becomes equal to 'C' then its mass becomes:

(A) 0 kg (B) $m = m_0$ (C) $m \to \infty$ (D) $m = {}^{mo}/_{2}$

3. Which one is low energy photon?

(A) Visible light (B) Infrared light (C) Ultraviolet light (D) x-ray

4. In Helium – Neon Laser, the percentage of Helium is:

(A) 75% (B) 65% (C) 60% (D) 85%

5. The number of neutron present in the nucleus is given by:

(A) $N = A - Z$ (B) $N = A + Z$ (C) $N = Z - A$ (D) $N = A \times Z$

6. The binding energy per nucleon is maximum for:

(A) Radium (B) Polonium (C) Iron (D) Helium

7. Electric flux through a closed surface depends upon:

(A) Charge (B) Medium (C) Charge & Medium (D) Geometry

8. The negative of potential gradient is:

(A) Electrostatic force (B) Electric field intensity (C) Potential difference (D) Electromotive force

9. Charge carrier in electrolyte are:

(A) Positive & negative ion (B) Protons (C) Electron (D) Holes

10. The sum of electric and magnetic force is called:

(A) Maxwell force (B) Lorentz force (C) Newton force (D) Centripetal force

11. Current passing through the coil of galvanometer is:

(A) $\frac{CN\theta}{BA}$ (B) $\frac{NAB\theta}{C}$ (C) $\frac{AN}{BC}$ (D) $\frac{C\theta}{BAN}$

12. Induced emf can be increased by:

(A) Increase resistance of coil (B) Decrease resistance of coil (C) Increase number of turns (D) Decrease magnetic flux

13. The working principle of transformer is:

(A) Self induction (B) Faraday Law (C) Mutual induction (D) Electromagnetic induction

14. The wave form of alternating voltage is a:

(A) Sine curve (B) Tan curve (C) Cotangent curve (D) Cosine curve

15. The main advantage of use of A.C is:

(A) Minimum line losses (B) Long distance (C) Step up to required voltage (D) Step up to required current

16. Which of the following does not go plastic deformation:

(A) Copper (B) Wrought iron (C) Lead (D) Glass

17. The output voltage of rectifier is:

(A) Smooth (B) Pulsating (C) Perfectly direct (D) Alternating

Physics (Subjective) (GROUP-II) Time: 2:40 hours

SECTION-I

Rwp-12-2-23

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

i. What are the photo conductors?
ii. Show that v/m = N/C.
iii. Do electrons tend to go region of high potential or of low potential?
iv. Electric lines of force never cross why?
v. Describe the change in magnetic field inside a solenoid carrying a steady current 'I'. If the number of turns is double, but length remains same?
vi. Why does the picture on a TV screen becomes distorted when a magnet is brought near screen?
vii. Why the resistance of an ammeter should be very low?
viii. What is Lorentz force? Give the role of electric and magnetic force in this regard.
ix. How can radioactivity help in the treatment of cancer?
x. What do we mean by the term critical mass?
xi. What do you understand by "background radiation"? State two sources of radiation.
xii. What is the self-quencing in Geiger Muller Counter?

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. Write down the statement of Kirchoff's current rule and Kirdoff's voltage rule.
iii. What is meant by temperature coefficient of resistance? Give its S-I unit.
iv. Draw diagram and wave shape of three phase A.C generator.
v. How does doubling of frequency affect the reactance of: (a): An inductor (b): A capacitor
vi. In a R-L circuit, will the current log or lead the voltage? Illustrate your answer by a vector diagram.
vii. Discuss the mechanism of electrical conduction by holes and electrons in a pure semi-conductor element.
viii. What are high temperature super conductors? Give some examples.
ix. Define hysteresis and draw hysteresis curve.
x. Why ordinary silicon diode do not emit light?
xi. Draw diagram and explain working of transistor as a switch in its 'ON' state.
xii. Write down two characteristics of an operational amplifier.

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

i. What is electromagnetic induction?
ii. Does the induced emf always act to decrease the magnetic flux through a circuit?
iii. How would you position a flat loop of wire in a changing magnetic field so that there is no emf induced in the loop?
iv. The period of a pendulum is measured to be 3.0 s in the inertial reference frame of the pendulum. What is its period measured by an observer moving at a speed of 0.95 c with respect to the pendulum?
v. Define Compton effect and write relation for its wavelength.
vi. Which has the lower energy Quanta? Radio waves or X-rays.
vii. Can pair production take place in vacuum? Explain.
viii. State postulates of Bohr's model of hydrogen atom.
ix. What are the advantages of lasers over ordinary light?

SECTION-II

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

5. (a) Derive en expression for the energy stored in the electric field of a capacitor. 5

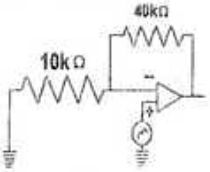
(b) A platinum wire has a resistance of 10Ω at 0°C and 20Ω at 273°C. Find the volume of temperature co-efficient of resistance of this wire. 3

6. (a) Derive an expression for self induce emf i.e. $\varepsilon = vBL \sin\theta$. Define unit of self induction. 5

(b) A power line 10.0 m high carries a current 200 A . Find the magnetic field of wire at the ground. 3

7. (a) Find out expression of resonance frequency for the case of series resonance circuit. Also describe its properties? (1+4)

(b) Calculate the gain of non-inverting amplifier shown in figure. 3



8. (a) What is wave nature of particle? How this ideas was confirmed by Davison and Germer? 1+4

(b) A wire 2.5 m long and coress section area $10^{-5}m^2$ is stretched 1.5mm by a force of 100N in the elastic region calculate (i) Strain (ii) Young's modules. 3

9. (a) *Write a note on construction and working of Wilson Cloud Chamber to detect unknown radiations.* 5

(b) Calculate the longest wavelength of radiations for the Paschen Series. 3

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Roll No. _____ to be filled in by the candidate.

Inter. (Part-II)-A-2022

(For all Sessions)

Paper Code	8	4	7	3

Physics (Objective Type)

Time: 20 Minutes **Group-I** RwP-91-22 **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 more circles will result in zero mark in that question. Attempt as many questions as given in objective type question paper and leave others blank.

1. 1. An A.C voltmeter has rms value 220 V, its peak value is _____ .

(A) 300 V (B) 210 V (C) zero (D) 311.12 V

2. For higher frequency, the inductive reactance will be _____ .

(A) high (B) low (C) zero (D) infinite

3. At 0 K, semiconductor is _____ .

(A) conductor (B) insulator

(C) perfect insulator (D) perfect diamagnetic and paramagnetic

4. A PN junction cannot be used as _____ .

(A) amplifier (B) capacitor (C) rectifier (D) light emitting diod

5. The portion of the transistor with greater concentration is _____ .

(A) base (B) collector (C) emitter (D) insulator

6. The maximum energy of photo-electron depends upon _____ .

(A) frequency (B) intensity (C) power (D) illumination

7. Compton shift in wavelength is zero when scattering angle of photon is _____ .

(A) 30° (B) 60° (C) 0° (D) 90°

8. In population inversion, atoms can reside in metastable state for _____ .

(A) 10^{-10} sec (B) 10^{-3} sec (C) 10^{-8} sec (D) 10^{-12} sec

9. The percentage of original quantity of radioactive material left after five half-lives is nearly _____ .

(A) 6% (B) 5% (C) 10% (D) 3%

10. Which of the following is used as moderator is nuclear reactor?

(A) heavy water (B) boron (C) cadmium (D) aluminum

11. If the distance between charges is halved and each charge is also doubled, then the force between two changes becomes _____ times.

(A) two (B) sixteen (C) eight (D) four

12. The force between two charges is 36 N and if the dielectric constant 3.6 value is inserted, then force reduces to _____ .

(A) zero (B) 72 N (C) 25 N (D) 10 N

13. A thermistor with positive temperature of co-efficient is heated then its resistance will _____ .

(A) decrease (B) increase (C) not be affected (D) become half

14. The magnetic force on a neutron in the magnetic field of 10 T is _____ .

(A) zero (B) 1.6×10^{-18} N (C) 100 N (D) 1.6×10^{-19} N

15. A charge particle cannot be accelerated in _____ field.

(A) electric (B) gravitational (C) magnetic (D) scalar

16. The energy stored in the inductor becomes four times if _____ .

(A) self-inductance is doubled (B) current is doubled

(C) both inductance and current are doubled (D) current is halved

17. Which type of energy is stored in inductor?

(A) electric energy (B) magnetic energy (C) potential energy (D) gravitational energy

Roll No. to be filled in by the Candidate.

Inter . (Part-II)-A-2022

Physics (Essay Type) **(For All Sessions)**

Time: 2:40 Hours **Group-I** **Marks: 68**

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

SECTION – I

RwP. 91-22

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

i. Electric lines of force never cross why?
ii. Prove that 1 ohm x 1 farad = 1 second.
iii. Distinguish between electric field and electric field intensity.
iv. How can you identify that which plate of a capacitor is positively charged?
v. What is the function of the grid in a CRO?
vi. Why the voltmeter should have a very high resistance?
vii. How can you make an electronic trajectory visible?
viii. Why does the picture on a T.V screen become distorted when a magnet is brought near the screen?
ix. How does radioactivity help in the treatment of cancer?
x. Why are heavy nuclei unstable?
xi. Distinguish between a thermal reactor and a fast reactor.
xii. Define self-quenching.

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

i. Do bends in a wire affect its electrical resistance? Explain.
ii. A charge of 9C passes through a conductor in one hour. What is the current in the conductor?
iii. Define temperature co-efficient of resistivity. Give its unit.
iv. How many times per second will an incandescent lamp reach maximum brilliance when connected to 50 Hz source?
v. What do you mean by phase lag and phase lead?
vi. Explain the power factor in A.C circuit.
vii. Write down a note on super conductor.
viii. Distinguish between intrinsic and extrinsic semi-conductor.
ix. Define curie temp. What is its value for iron?
x. Why ordinary silicon diodes do not emit light?
xi. Draw the symbol and truth table of NAND gate.
xii. Why charge carries are not present in the depletion region?

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

i. Can an electric motor be used to drive an electric generator with the output from the generator being to operate the motor?
ii. Does the induced emf always act to decrease the magnetic flux through a circuit?
iii. Can a step-up transformer increase the power level?
iv. How would you position a flat loop of wire in a changing magnetic field, so that there is no emf induced in the loop?
v. Can pair production take place in vacuum? Explain.
vi. Photon 'A' has twice the energy of photon 'B' What is the ratio of momentum of "A" to that of "B"?
vii. Will bright light ejected more electrons from metal surface than dimmer light of same colour.
viii. What do we mean when we say that the atom is excited?
ix. Is energy conserved when an atom emits a photon of light?

SECTION - II

Note: Attempt any THREE (3) questions from Section II.

5. (a) What is capacitor? Derive a relation for the energy density in terms of electric field in the capacitor? **(5)**

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

6. (a) Define motional emf. Derive an expression for motional emf. **(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)**

7. (a) What is a transistor? Describe the use of transistor as a amplifier and calculate its voltage gain. **(5)**

(b) What is the resonance frequency of the circuit, which includes a coild of inductance 2.5 H and a capacitance 40 μF. **(3)**

8. (a) Define strain energy. Derive a relation for strain energy in deformed material? **(5)**

(b) What is the energy of a photon in a beam of infrared radiation of wavelength 1240 nm? **(3)**

9. (a) State Bohr's model of hydrogen atom. Derive relation for quantized energies for hydrogen atom. **(5)**

(b) Radiation from a point source obeys the inverse square law. If the count rate at a distance of 1.0 m from Geiger counter is 360 counts per minute. What will be its count rate at 3.0 m from the source? **(3)**

Roll No. 707357 to be filled in by the candidate.

Inter. (Part-II)-A-2022

(For all Sessions)

Paper Code	8	4	7	6

Physics (Objective Type)

Time: 20 Minutes RWP-G2022

Group-II

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. Attempt as many questions as given in objective type question paper and leave others blank.

1. 1. Which one is not a ductile material?
   (A) lead (B) copper (C) steel (D) iron
   2. Open loop gain of operational amplifier is of the order of _____ .
   (A) 10^6 (B) 10^3 (C) 10^7 (D) 10^5
   3. Gain of inverting amplifier with external resistance $R_1 = 10\ k\Omega$ and $R_2 = 100\ k\Omega$, is given as _____ .
   (A) −10 (B) 10 (C) −100 (D) 100
   4. All motions are _____ .
   (A) absolute (B) uniform (C) relative (D) variable
   5. If an object moves with the speed of light, its mass will be _____ .
   (A) zero (B) maximum (C) infinity (D) minimum
   6. Which of the following has the largest de Broglie wavelength at same speed?
   (A) proton (B) α – particles (C) carbon atom (D) electron
   7. The dead time of G.M tube is _____ .
   (A) 10^{-3} sec (B) 10^{-6} sec (C) 10^{-4} sec (D) 10^{-8} sec
   8. Slow neutrons can cause fission in _____ .
   (A) uranium - 238 (B) uranium - 235 (C) neptunium (D) lithium
   9. SI unit of electric flux is _____ .
   (A) $N\,m^2\,C^{-1}$ (B) $N\,m^2\,C$ (C) $N\,m^{-1}\,C^{-1}$ (D) NC^{-1}
   10. A proton is moved from low potential to high potential between two points having potential difference of 1 volt energy gained by proton is _____ .
   (A) 1 ev (B) 2 ev (C) 1.6×10^{-19} ev (D) 1.6 ev
   11. A rheostat can be used as _____ .
   (A) potential divider (B) variable resistance (C) amplifier (D) both (A) & (B)
   12. Magnetic field due to current carrying straight varies as _____ .
   (A) $\frac{1}{r^2}$ (B) r^2 (C) $\frac{1}{r}$ (D) r
   13. Charge to mass ratio of neutron is _____ .
   (A) zero (B) $9.53 \times 10^9\ C\,kg^{-1}$ (C) $1.758 \times 10^4\ C\,kg^{-1}$ (D) $1.775 \times 10^{-11}\ C\,kg^{-1}$
   14. The motional emf depends upon _____ .
   (A) length of conductor (B) magnetic field (C) speed (D) all of these
   15. Lenz's law is the manifestation of conservation of _____ .
   (A) current (B) voltage (C) energy (D) all of these
   16. The reactance of an inductor is given as _____ .
   (A) ωL (B) $\frac{1}{\omega L}$ (C) $\frac{\omega}{L}$ (D) $\frac{L}{\omega}$
   17. The reactance of an inductor increases with increase in _____ .
   (A) frequency (B) voltage (C) resistance (D) capacitance

Roll No._____ to be filled in by the Candidate.

Inter. (Part-II)-A-2022

Physics (Essay Type)

(For All Sessions)

Time: 2:40 Hours

Group-II

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 electron volt (ev). Show that 1 ev = 1.6×10^{-19} J.

ii. Show that $\frac{1 \text{ volt}}{1 \text{ meter}} = \frac{1 \text{ newton}}{1 \text{ coulomb}}$.

iii. Is $\vec{E}$ necessarily zero inside a charged rubber balloon, if balloon is spherical? Assume that charge is uniformly distributed over the surface.

iv. Prove that ohm x farad = second.

v. How can a galvanometer is made more sensitive? Explain briefly.

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

vii. Draw a circuit diagram of current measuring part of avometer.

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. What do you understand by back ground radiations? State any two sources of radiation.

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

xi. Differentiate between mass defect and binding energy.

xii. Define nuclear fission and nuclear fusion.

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

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

ii. A wire of length 10 m has resistance 100 Ω. If the wire is stretched to increase its length three times. What will be its new resistance?

iii. What is meant by an electromotive force (emf)? Give its unit.

iv. Explain the condition under which electromagnetic waves are produced from a source.

v. What is meant by phase difference?

vi. Write four properties of parallel resonance circuit.

vii. Differentiate between paramagnetic and ferromagnetic substances.

viii. Define modulus of elasticity. Write down its three kinds.

ix. Why a photo diode is operated in reverse biased state?

x. Distinguish between soft magnetic material and hard magnetic material.

xi. What is solar cell? Give its uses.

xii. Draw the symbol of pnp and npn transistors six parts.

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

iii. How fluctuations of the output can be reduced in D.C generator?

iv. What is meant by efficiency of transformer? Write few steps to improve the efficiency.

v. Which has the lower energy quanta? Radio waves or x – rays.

vi. Why don't we observe a Compton effect with visible light?

vii. Find the mass m of a moving object with speed 0.8 C.

viii. Find the speed of electron in the first Bohr orbit.

ix. Is energy conserved when an atom emits a photon of light?

SECTION - II

Note: Attempt any THREE (3) questions from Section II.

5. (a) Define electric potential. Derive the relation of an electric potential at a point due to point charge. (5)

(b) A platinum wire has resistance of 10 ohm at 0°C and 20 ohm at 273 °C. Find the value of temperature co-efficient of resistance of platinum. (3)

6. (a) What is transformer? How does it work? Explain its use in transmission of electric load to long distances. (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 0.4 T ? (3)

7. (a) What is comparator circuit? How can it be used as a night switch? (5)

(b) A 10 mH, 20 Ω coil is connected across 240 v and $\frac{180}{\pi}$ Hz source. How much power does it dissipate? (3)

8. (a) What is meant by strain energy? How can it be determined from the force extension graph? (5)

(b) Assuming you radiate as does a black body at your body temperature about 37 °C , at what wavelength do you emit the most energy? (3)

9. (a) What is LASER? Describe its working, population inversion and laser action. (5)

(b) Find the mass defect and the binding energy for tritium, if the atomic mass of tritium is 3.016049 u. (3)

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Roll No. 24488 to be filled in by the candidate.

(For all sessions)

Paper Code	8	4	7	1

Physics (Objective Type)

RWP-21

Time: 20 Minutes

Marks: 17

NOTE: Write answers to the questions on objective answer sheet provided. Four possible answers A,B,C & 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. Unit of electric flux is:
(A) Nm^2C^{-2} (B) Nm^2C^{-1} (C) $N^{-1}m^2C^{-1}$ (D) $Nm^{-2}C$

2. The statement $\Phi_e = \frac{1}{\varepsilon_e}Q$ was given by:
(A) Faraday (B) Dersted (C) Gauss (D) Coulomb

3. Reciprocal of resistance is:
(A) Capacitance (B) Conductance (C) Inductance (D) Resistance

4. Lorentz force is given by:
(A) $\vec{F} = \vec{I}(\vec{L} \times \vec{B})$ (B) $\vec{F} = q(\vec{V} \times \vec{B})$ (C) $\vec{F} = q\vec{E} + q(\vec{V} \times \vec{B})$ (D) $\vec{F} = q\vec{E}$

5. A power line 10m high carries a current 200A. The magnetic field of the wire at the ground is:
(A) $4x10^{-6}T$ (B) $40x10^{-6}T$ (C) $4x10^{-4}T$ (D) $4x10^{-3}T$

6. Relation for energy density in case of an inductor is:
(A) $\frac{B^2}{2\mu_o}$ (B) $\frac{\mu_o}{2B^2}$ (C) $\frac{B}{2\mu_o}$ (D) $\frac{B}{2\mu_o^2}$

7. The Lenz's law is also a statement of:
(A) Law of conservation of momentum (B) Law of conservation of charge
(C) Law of conservation of energy (D) Faraday's law

8. Peak to Peak value of an alternating voltage is:
(A) $2V_o$ (B) 0 (C) $\frac{V_o}{\sqrt{2}}$ (D) V_o

9. In RLC series resonance circuit, the condition for resonance is:
(A) $X_L = X_C$ (B) $X_L < X_C$ (C) $X_L > X_C$ (D) $X_L > Z$

10. Young's modulus of lead is:
(A) $1.5x10^{19}Nm^{-2}$ (B) $7.7x10^{9}Nm^{-2}$ (C) $5.6x10^{9}Nm^{-2}$ (D) $2.2x10^{9}Nm^{-2}$

11. Number of diodes used in half wave rectifier is:
(A) 4 (B) 3 (C) 2 (D) 1

12. S.I unit of current gain of transistor is:
(A) Coulomb (B) Ampere (C) Farad (D) No unit

13. When platinum wire is heated, it appears cherry red at:
(A) 1300°C (B) 1100°C (C) 900°C (D) 500°C

14. The value of Wein's constant is:
(A) $2.9x10^{3}mK$ (B) $2.9x10^{-3}mK$ (C) 2.9mK (D) $2.9x10^{-2}mK$

15. In Helium-Neon laser, the value of Helium is:
(A) 85% (B) 75% (C) 65% (D) 60%

16. Half life of Uranium-238 is:
(A) $4.5x10^{12}$ years (B) $4.5x10^{11}$ years (C) $4.5x10^{10}$ years (D) $4.5x10^{9}$ years

17. The dead time of the counter is:
(A) $\sim10^{-7}S$ (B) $\sim10^{-6}S$ (C) $\sim10^{-5}S$ (D) $\sim10^{-4}S$

Physics (Essay Type)

RWP-21

Time: 2:40 Hours

Section - I

Marks: 68

2- Write short answers of any eight parts from the following. 2 x 8 =16

i. How can you identify that which plate of a capacitor is positively charged?
ii. Is it true that Gauss's law states that the total number of lines of force crossing a closed surface in the outward direction is proportional to the net positive charge enclosed within surface?
iii. Give a comparison of electric and gravitational force.
iv. Describe the process of charging of a capacitor in short.
v. Describe the function of two sets of deflecting plates in cathode ray oscilloscope.
vi. In an AVO meter,how can a single galvanometer perform the function of measuring current,voltage and resistance?Explain.
vii. If a charged particle moves in a straight line through some region of space,can you say that the magnetic field in the region is zero?
viii. How can a current loop be used to determine the presence of a magnetic field in a given region of space?
ix. How an emf is induced in a coil placed in a constant magnetic field?(Hint:Basic principle used in electric generators)
x. What is the significance of negative sign used in Faraday's law of magnetic induction? $\varepsilon = -N\frac{\Delta\phi}{\Delta t}$
xi. In a certain region the earth's magnetic field point vertically down.When a plane flies due north,which wing tip is positively charg
xii. 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?

3- Write short answers of any eight parts from the following. 2 x 8 =16

i. Explain the term phase of A.C.
ii. Describe a circuit which will give a continuously varing potentia
iii. Explain the elastic constants.
iv. How the comparison of two emfs of cells can be made?
v. Why ordinary silicon diodes do not emit light?
vi. Write down the characteristics of Op-amplifier.
vii. What is meant by Retantivity and Coercivity?
viii. Why a photodiode is operated in reversed biased state?
ix. Why does the resistance of a conductor rise with temperature?
x. 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.
xi. When 10V are applied to an A.C circuit, the current flowing in it is 100mA.Find its impedance.
xii Draw a stress strain curve for a ductile material and then define the term yield point and ultimate tensile stress

4- Write short answers of any six parts from the following. 2 x 6 =12

i. What do you mean by quark?
ii. Can pair production take place in vacuum?Explain.
iii. What is fission chain reaction?
iv. Define ionization energy and ionization potential.
v. Explain why LASER action cannot occur without population inversion between atomic levels?
vi. What do you understand by background radiation?State two sources of this radiation.
vii. A particle which produce more ionization is less penetrating.Why?
viii. What happens to total radiation from a black body if its absolute temperature is doubled?
ix. Define work function and threshold frequency.

Section - II

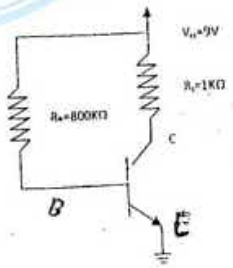
8x3=24

NOTE: Answer any three questions from the following.

5. (a) What is Wheatstone Bridge?Give its principle,construction and working.How can it be used to determine unknown resistance? 05
(b) A particle having a charge of 20 electrons on it falls through a potential difference of 100 volts.Calculate the energy acquired by it in electron volt. 03

6. (a) State and explain Ampere's Law.Calculate the magnetic field due to current carrying solenoid using Ampere's Law. 05
(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 2A?What is the induced emf when the current changes at 20 AS^{-1}? 03

7. (a) An alternating current is passing through R-L-C series circuit.How this circuit works as resonance circuit.Discuss frequency,current graph of this circuit. 08



(b) In Circuit given, there is negligible potential drop between B and E.If β is 100.Calculate
(i) Base current (ii) Collector current.

8. (a) Define strain energy and derive a relation for strain energy in a deformed materials. 05
(b) A sheet of lead 5mm 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 to half of its initial value. 03

9. (a) Apply uncertainty principle to an atom in order to find that an electron can never be found inside of a nucleus and it can exist in the atom but outside the nucleus. 05
(b) A particle of mass 5.0 mg moves with speed of 8.0 ms^{-1}. Calculate its deBroglie wavelength. 03

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Inter. (Part-II) A-2019

Roll No. 762490 (in words) (to be filled in by the candidate)

(For all sessions)

Paper Code	8	4	7	7

RWP-12-19

Physics (Objective Type)

Time: 20 Minutes

Marks: 17

NOTE: Write answers to the questions on objective answer sheet provided. Four possible answers A,B,C & 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. In R,L,C series circuit, at higher frequencies:
   (A) $X_L = X_C$ (B) $X_L > X_C$ (C) $X_L < X_C$ (D) $X_L = 0$
2. Which one belongs to trivalent group?
   (A) Aluminium (B) Antimoney (C) Phosphorous (D) Arsenic
3. Colour of light emitted by LED depands upon
   (A) its forward biasing (B) its reverse biasing (C) type of material (D) forward current
4. At low temperature, a body emits radiations of:
   (A) shorter wavelength (B) longer wavelength
   (C) high frequency (D) high frequency& shorter wavelength
5. The shortest wavelength in Lyman series is equal to:
   (A) R_H (B) $\frac{R_H}{2}$ (C) $\frac{1}{R_H}$ (D) $\frac{2}{3}R_H$
6. In the reaction, $X + {}^{16}_{8}O \rightarrow {}^{14}_{7}N + {}^{1}_{1}H$, X is:
   (A) ${}^{3}_{1}H$ (B) ${}^{2}_{1}H$ (C) ${}^{9}_{4}C$ (D) ${}^{9}_{5}C$
7. If the charges are doubled and the distance between them is also doubled, then Coulomb's force will be:
   (A) double (B) halved (C) remains same (D) four times
8. A rubber ball of radius 2cm has a charge of $5\mu C$ on its surface, which is uniformly distributed, the value of $\vec{E}$ at its centre is:
   (A) $10NC^{-1}$ (B) Zero (C) $2.5\ NC^{-1}$ (D) $5\times10^{-6}NC^{-1}$
9. Which one of the following relation is correct?
   (A) joule=volt x ampere (B) joule=coulomb / volt (C) joule=volt / ampere (D) joule=coulomb x volt
10. In carbon resistors, which colour band indicates the tolerance of $\pm10\%$?
    (A) White (B) Silver (C) Gold (D) Violet
11. For an open circuit, terminal potential difference Vt is:
    (A) Vt=2emf (B) Vt=emf (C) Vt>emf (D) Vt<emf
12. An electron travelling at 10^6m/s enters parallel in a magnetic field of 1 tesla, the magnetic force acting on it is:
    (A) Zero (B) 10^{-12}N (C) 10^{-3}N (D) 1.6×10^{-13}N
13. When a charged particle is projected opposite to the direction of magnetic field, it experiences a force equal to:
    (A) $quB\cos\theta$ (B) $quB\sin\theta$ (C) quB (D) zero
14. In order to increase the range of voltmeter R_H is:
    (A) increased (B) decreased (C) unchanged (D) increased by 4 times
15. Which device permits the flow of D.C?
    (A) Capacitor (B) Photocell (C) Inductor (D) transformer
16. For an ideal step up transformer:
    (A) $N_P > N_S$ (B) $V_S I_S > V_P I_P$ (C) $V_S < V_P$ (D) $I_S < I_P$
17. When a metal detector comes close to a metal then its frequecy
    (A) becomes double (B) remains same (C) becomes half (D) increases

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

(For all sessions)

RWP-12-19

Physics (Essay Type)

Time: 2:40 Hours

Section - I

Marks: 68

2- Write short answers of any eight parts from the following. 2 x 8 =16

i. Show that Σ and $\frac{\Delta\phi}{\Delta t}$ have the same units.

ii. What is the effect of current passing through a long straight wire?

iii. Electric lines of force never cross Why?

iv. What is motional emf? State the factors it depends upon.

v. What is the back emf effect in motors?

vi. Why the resistance of ammeter should be very low?

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

viii. Write down the factors upon which the force on current carrying conductor placed in uniform magnetic field depands

ix. What is Coulomb's law and effect of dielectric on Coulomb's force?

x. State Gauss's law and its mathematical expression.

xi. Is $\vec{E}$ necessarily zero inside a charged rubber balloon if balloon is spherical? Assume that charge is distributed uniformly over the surface.

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

3- Write short answers of any eight parts from the following. 2 x 8 =16

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

ii. How heating effect produced when current flow through the conductor?

iii. What is Thermister? Give its two applications.

iv. What is Choke? Why is it used in A C circuit?

v. At what frequency will an inductor of 1.0H have a reactance of 500Ω?

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

vii. What are ductile and brittle substances? Give an example of each.

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

viii. What is meant by Dia and Feromagnetic substances? Give an example for each.

xi Write four applications of photo diode

xii Draw the symbol and truth table of NOR gate.

x. Why a photo diode is operated in reverse biased state?

4- Write short answers of any six parts from the following. 2 x 6 =12

i. What advantages an electron microscope has over an optical microscope?

ii. Why do we not observe compton effect with visible light?

iii. Define positron and Heisenberg uncertainty principle.

iv. What do we mean when we say that atom is excited?

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

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

vii. What factors make a fusion reaction difficult to achieve?

viii. What do you mean by the terms critical mass?

ix. Define Hadrons and Leptons

Section - II

NOTE: Answer any three questions from the following. 8x3=24

5. (a) Define a capacitor and capacitance. Derive an expression for capacitance of a parallel plate capacitor when a dielectric material is inserted between the plates. 05

   (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 $5.2\times10^{-3}K^{-1}$? 03

6. (a) What do you mean by the galvanometer? Write down the principle, construction and working of galvanometer 05

   (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 anguiar velocity of the coil? 03

7. (a) What is RC series circuit? Calculate the impedance and phase angle for RC series circuit. 05

   (b) The current flowing into the base of transistor is 100 μA. Find its collector current I_C and emitter current I_e if the value of current gain β is 100 03

8. (a) What is meant by photo electric effect? Explain it with refrence to (i) Intensity of light (ii) Frequency of light: Also write and discuss its Important results. 05

   (b) What stress would cause a wire into increase in length of 0.01%. If Young's modulus of the wire is 12×10^{10}Pa? What force would produce this stress If the diameter of the wire is 0.56mm? 03

9. (a) Describe the principle, construction and working of Wilson's cloud chamber. How it provide information about charged particle? 05

   (b) Calculate the longest wavelength of radiation for the Paschen Series 03

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Roll No._____ to be filled in by the candidate.

Paper Code	4	4	7	5

Sessions: 2015-2017 & 2016-2018

Physics (Objective Type)

Rwp-12-18

Time: 20 Minutes **Marks: 17**

NOTE: Write answers to the questions on objective answer sheet provided. Four possible answers A,B,C & 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. Maximum compton shift is observed at:
(A) 0° (B) 90° (C) 180° (D) 45°

2. Bremsstrahlung radiations are example of:
(A) Atomic spectra (B) Molecular spectra (C) Continuous spectra (D) Discrete spectra

3. What is different in isotopes?
(A) number of protons (B) number of neutrons (C) number of electrons (D) Charge number

4. Circulation of blood is studied by radio isotope:
(A) carbon-14 (B) carbon-12 (C) cobalt-60 (D) sodium-24

5. if electric lines of force are equally spaced the electric field is:
(A) uniform (B) non-uniform (C) weak (D) strong

6. Drum of Photocopier is made of:
(A) Copper (B) Toner (C) Selenium (D) Aluminium

7. Magnetic effect of current is used in:
(A) Toaster (B) Electric motor (C) Electric iron (D) D.C battery

8. Two current carrying parallel conductors are lying in same direction, they.
(A) form magnetic dipole (B) attract each other (C) repel each other (D) have no effect

9. If current flowing through a solenoid becomes four times, then magnetic field inside it becomes:
(A) two times (B) three times (C) four times (D) half

10. In A.C,inductor behaves as:
(A) Capacitor (B) Resistor (C) Commutators (D) Transistor

11. In A.C generator when plane of coil is perpendicular to the magnetic field, then output of generator is:
(A) NWAB (B) $2\pi f$ (C) maximum (D) zero

12. In metal detectors, we use:
(A) RL circuit (B) RC circuit (C) LC circuit (D) any of these

13. In frequency modulation, which factor is changed?
(A) Amplitude of carrier waves (B) Frequency of carrier wave
(C) Amplitude of signal (D) Frequency of signal

14. A material which is insulator at OK and conduct at room temperature is:
(A) Silver (B) Lead (C) Germanium (D) Polythene

15. Doping is made compartively larger in:
(A) emitter (B) base (C) collector (D) P-type semi-conductors

16. In put resistance of op-amplifier is of the order of:
(A) Few ohms (B) Mega ohms (C) Milli ohms (D) Micro ohms

17. Light of 4.5ev is incident on a cesium surface and stoping potential is 0.25V, maximum K.E of emitted electrons is:
(A) 4.5 ev (B) 4.25 ev (C) 4.75 ev (D) 0.25 ev

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

Sessions: 2015-2017 & 2016-2018

Physics (Essay Type)

Pwp-12-18

Time: 2:40 Hours **Marks: 68**

Section - I

2- Write short answers of any eight parts from the following. **2 x 8 =16**

i. What is capaciter? Define the capacitance.
ii. Write in detail about electron Volt.
iii. How can you identify that which plate of a capacitor is positively charged?
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 rectlinear motion?
v. Define magnetic flux and mention the factors upon which it depends.
vi. Write down the uses of C.R.O.
vii. Why the voltmeter should have a very high resistance?
viii. Is it possible to orient a current loop in uniform magnetic field such that the loop will not tend to rotate?
ix. State Faraday's law of electromagnetic induction and write its mathematical expression.
x. What is D.C motor? Write down the parts of D.C motor.
xi. Can a D.C motor be turned into D.C generator? What changes are required to be done?
xii. Does the induced emf always act to decrease the magetic flux through a circuit?

3- Write short answers of any eight parts from the following. **2 x 8 =16**

i. Define ohm's law. Also define ohmic and non-ohmic devices.
ii. What is wheat stone bridge? Sketch its circuit diagram.
iii. Why does the resistance of a conductor rise with temperature?
iv. Write two properties of parallel resonance circuit.
v. How does doubling the frequency affect the reactance of: (a) an inductor. (b). a capacitor.
vi. A sinusoidal current has rms value of 10 A. What is the maximum or peak value?
vii. Define retantivity and coercivity.
viii. Distinguish between crystalline and amorphous solids.
ix. Distinguish between instrinsic and extrinsic semi-conductor.
x. What is photodiode? Write down its any two applications.
xi Why charge carrier are not present in the depletion region?
xii What is the effect of forward and reverse biasing of a diode on the width of depletion region?

4- Write short answers of any six parts from the following. **2 x 6 =12**

i. Define pair production and annihilation of matter.
ii. Which has the lower energy quanta? Radio wave or X-rays.
iii. Is it possible to create a single electron from energy? Explain.
iv. Is energy conserved when an electron emits a photon of light.
v. Define normal population and population inversion.
vi. How can radioactivity help in the treatment of cancer?
vii. A particle which produces more ionisation is less penetrating. Why?
viii. Why are heavy nuclei unstable?
ix. What are the basic forces in nature?

Section - II

NOTE: **Answer any three questions from the following.** **8x3=24**

5. (a) State Gauss's Law.Derive a relation for electric intensity at a point near an infinite sheet of charge. **05**
   (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 $11x10^{-8}\Omega m$ **03**
6. (a) What is mutual induction? Derive a relation for induced emf in secondary coil. What is unit of mutual inductance? Define it. **05**
   (b) A 20cm wire carrying a current of 10.0A is placed in a uniform magnetic field of 0.30T. If wire makes an angle of 40^o with the direction of magnetic field, find the magnitude of the force acting on the wire. **03**
7. (a) What is transistor? Describe the use of transistor as an amplifier and calculate its voltage gain. **05**
   (b) What is the resonant frequency of a circuit which includes a coil of inductance 2.5H and a capacitance of $40\mu F$? **03**
8. (a) What is meant by doping? Give the names of doped materials. How would you obtain n-type and p-type material from pure silicon? Illustrate it by Schematic diagram. **05**
   (b) A 90 KeV x-ray photon is fired at a carbon target and compton scattering occurs. Find the wavelength of incident photon and scattered photon for scattering angle of 60^o. **03**
9. (a) Write down the postulates of Bohr atom model for hydrogen atom. Also derive the formula for nth orbit radius of Bohr atom model and prove that the Bohr radii are quantized. **05**
   (b) A sheet of lead 5.0mm thick reduces the intensity of beam of $\gamma-rays$ by a factor 0.4. Find half value thickness of lead sheet which will reduce the intensity to half of its initial value. **03**