Objective
Paper Code
8475

Intermediate Part Second
PHYSICS (Objective)   **GROUP - I**
Time: 20 Minutes   Marks: 17 FSD-1-29

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

PHYSICS (Subjective)   GROUP - I
Time: 02:40 Hours   Marks: 68 FSD–1–24

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 11×10^{-8} Ωm.   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

Objective
Paper Code
8472

Intermediate Part Second
PHYSICS (Objective) **GROUP - II**
Time: 20 Minutes   Marks: 17

Roll No. : _____

FSD-2-24

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	A particle carrying a charge of 2e falls through a potential difference of 10V. The energy acquired by it is:	2eV	5eV	10eV	20eV
2	In a capacitor energy is stored in:	Electric field	Magnetic field	Gravitational field	Nuclear field
3	The charge carriers in electrolyte are:	Free electrons	Positive and negative ions	Free electrons and ions	Electrons and holes
4	Output waveform of sweep or time base generator is:	Saw tooth wave	Sinusoidal wave	Square wave	Digital wave
5	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
6	Lenz's law is in accordance with the law of conservation of:	Charge	Mass	Momentum	Energy
7	Eddy currents are setup in a direction:	Parallel to flux	Antiparallel to flux	Perpendicular to flux	At an angle 45° to the flux
8	The unit of impedance is:	Ohm	Farad	Volt	$(Ohm)^{-1}$
9	The power factor in a series resonance circuit at resonance is:	0	1	−1	Infinity
10	The units of modulus of elasticity are the same as those of:	Stress	Strain	Power	Work done
11	In case of non-inverting operational amplifier, if $R_1 = \frac{R_2}{2}$, then:	$V_{out} = 2\ V_{in}$	$V_{in} = 2\ V_{out}$	$V_{out} = 3\ V_{in}$	$V_{in} = 3\ V_{out}$
12	$X = A \cdot \bar{B} + \bar{A} \cdot B$ is the mathematical mutation for:	NOR gate	NAND gate	XOR gate	XNOR gate
13	The slope of the maximum K.E of photoelectrons versus light frequency graph represents:	Momentum	Planck's constant	Maximum wavelength	Work function
14	The minimum energy required for pair production is:	0.51 MeV	1.51 MeV	1.02 MeV	0.051 MeV
15	The radius of second Bohr radius for hydrogen atom is:	0.053 nm	0.212 nm	0.106 nm	0.848 nm
16	The dead time for G.M counter is:	10^{-3}s	10^{-4}s	10^{-5}s	10^{-8}s
17	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

1212-XII124-15000

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

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
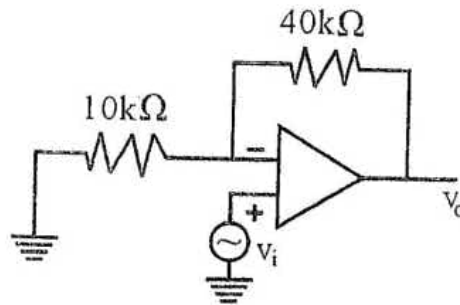
8. (a) What is photoelectric effect? Explain it on the basis of quantum theory. 05

(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

1212-XII124-15000

Objective
Paper Code
8475

Intermediate Part Second - 136
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.acf

S.#	Questions	A	B	C	D
1	If $V = 630\cos(100\pi t + 60°)V$; the frequency of rotation of generator coil is:	100Hz	314Hz	50Hz	200Hz
2	Unit of self induction is not equivalent to:	VsA^{-1}	WbA^{-1}	JA^{-2}	$Vs^{-1}A$
3	When flux through a coil remains unchanged, induced emf is:	Positive	Negative	Zero	Infinite
4	In a galvanometer, radial magnetic field ensures that iron cylinder and field lines are always:	Parallel	Perpendicular	Anti-parallel	Oblique
5	Magnetic field due to a long conductor carrying current I at distance r is proportional to:	$\frac{r}{I}$	$\frac{I}{r}$	$\frac{1}{r^2}$	$\frac{I^2}{r}$
6	Which is a unipolar medium?	Extrinsic semi-conductor	Ionized gases	Electrolyte	Metals
7	When plates of an isolated charged capacitor are moved apart, energy stored:	Increases	Decreases	Remains same	Reduces to zero
8	If a +ve point charge q is moved away from a point, the absolute potential at that point:	Increases	Remains same	Decreases	Becomes infinite
9	The ratio of decayed fraction to undecayed fraction after 3 half-lives is:	$\frac{1}{8}$	$\frac{7}{8}$	$\frac{7}{1}$	$\frac{1}{1}$
10	One twelfth of mass of $_6C^{12}$ isotope is equal to:	0.0055u	1u	1.008665u	3.016u
11	The energy of ____ electrons is specific.	Free	Orbital	Oscillating	Accelerated
12	Positron was first discovered in ____ .	Cosmic rays	Magnetosphere	Gamma ray bursts	Earth's crust
13	A black body is a perfect absorber and ____ .	Reflector	Radiator	Anti-reflector	Transmitter
14	Due to high open loop gain, a small potential difference at input ____ output voltage of operational amplifier.	Diminishes	Fluctuates	Saturates	Oscillates
15	Pulsating DC generated by rectifier can be made smooth by using:	Generator	Motor	Filter	Transistor
16	A moving hole is equivalent to a moving:	Proton	Positive ion	Positron	Electron
17	In a series RC circuit, if $R = \frac{1}{\omega c}$, the power factor is:	$\frac{\sqrt{3}}{2}$	1	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$

1209-XII112336-38000

SECTION – I

2. Write short answers to any EIGHT parts.   16
  (i)   How can you identify that which plate of a capacitor is positively charged?
  (ii) Electric lines of forces never cross. Why?
  (iii) Do electrons tend to go to region of high potential or low potential?
  (iv) If the absolute potential at a point is zero, what can you say about the electric intensity there?
  (v)   Why is B non-zero outside a solenoid?
  (vi) 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?
  (vii) Why the resistance of an ammeter should be very low?
  (viii) Can a charged particle move through a magnetic field without deflecting? Explain.
  (ix) Why are heavy nuclei unstable?
  (x)   What factors make a fusion reaction difficult to achieve?
  (xi) After 2 half-lives, what percentage of radioactive sample remains?
  (xii) Write any two uses of nuclear reactor.

3. Write short answers to any EIGHT parts.   16
  (i)   What are difficulties in testing whether the filament of a lighted bulb obeys Ohm's law?
  (ii) Is the filament resistance lower or higher in a 500W, 220V light bulb than in a 100W, 220V bulb?
  (iii) How many times per second will an incandescent lamp reach maximum brilliance when connected to 50Hz source?
  (iv) How the reception of a particular radio station is selected on your radio set?
  (v)   What is diamagnetic substance? Give example.
  (vi) What are polymeric solids? Give example.
  (vii) What is net charge on a n-type or a p-type substance?
  (viii) Why charge carriers are not present in the depletion region?
  (ix) What is thermistor? Give two examples.
  (x)   What advantage of three phase A.C supply over single phase A.C?
  (xi) What is difference between elasticity and plasticity?
  (xii) Express by diagram how current flows in n-p-n transistor?

4. Write short answers to any SIX parts.   12
  (i)   Does the induced current depend on the resistance of the circuit?
  (ii) Show that ε and $\frac{\Delta\phi}{\Delta t}$ have the same units.
  (iii) Can a D.C motor be turned into a D.C generator? What changes are required to be done?
  (iv) Can pair production take place in vacuum? Explain.
  (v)   Which has lower energy quanta? Radio waves or x-rays.
  (vi) What is the rest mass of photon? What you can say about its momentum?
  (vii) Why can red light be used in a photographic dark room when developing film, but a blue or white light cannot?
  (viii) What are advantages of lasers over ordinary light?
  (ix) What is meant by cat-scanner?

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

5. (a) Define resistivity and describe its dependence upon temperature.   05
  (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 3.0m.
    Find and justify the zero field location.   03

6. (a) State Ampere's law and derive relation for magnetic field due to current carrying solenoid.   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 the angular velocity of the coil?   03

7. (a) How can a transistor be used as an amplifier?   05
   (b) Find the value of current flowing through a capacitance 0.5µF when connected to a source of 150V   03
   at 50Hz.

8. (a) Does particle possess wave like properties? Describe experiment giving evidence of the wave nature   05
   of electron.
   (b) A 1.0m long copper wire is subjected to stretching force and its length increases by 20cm. Calculate   03
   the tensile strain and the percent elongation which the wire undergoes.

9. (a) Describe mass spectrograph and how it can be used for the detection of isotopes?   05
   (b) Find the wavelength of spectral line corresponding to the transition in hydrogen from n = 6 state to   03
   n = 3 state.

1209-XII123-38000

FBD-12-2-23

Roll No. : _____

Objective
Paper Code
8476

Intermediate Part Second - 136
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.acf

S.#	Questions	A	B	C	D
1	The reactance of an inductor at 50Hz is 10Ω its reactance at 100Hz becomes:	20Ω	5Ω	2.5Ω	3Ω
2	The winding of the electromagnetic in motor are usually called:	Magnetic coils	Field coils	Electric coils	All of these
3	Transformer is a device which step up or step down the input:	Current	Voltage	Energy	Power
4	The unit of $\vec{E}$ is NC^{-1} and that of $\vec{B}$ is $NA^{-1}m^{-1}$ then the unit of $\frac{E}{B}$ is:	ms^{-2}	$m^{-1}s^{-1}$	ms	ms^{-1}
5	The value of high resistance which can be used to convert galvanometer in voltmeter:	$R_h = \frac{I_g}{V} - R_g$	$R_h = R_g - \frac{V}{I_g}$	$R_h = \frac{V}{I_g} - R_g$	None
6	Energy consumed by 60 watts bulb in 2 minutes is equal to:	720 Joule	7.2 kilo Joule	120 Joule	7600 Joule
7	Unit of relative permittivity is:	No unit	NC^2m^{-2}	Nm^2C^{-2}	$N^{-1}C^{-2}m^{-2}$
8	Force experienced per unit positive test charge at a point in an electric field is:	Electric potential	Electric potential energy	Electric field strength	Electric field
9	The dead time for Geiger-Muller counter is:	10^{-4} s	10 s	10^{-2} s	10^{-3} s
10	Cobalt-60 is the source for:	α-rays	γ-rays	β-rays	Neutron
11	Helium-Neon laser discharge tube contains Helium:	10%	15%	25%	85%
12	Using relativistic effects, the location of an air craft after an hour flight can be predicted about:	20m	760m	50m	780m
13	Mathematical form of Stephen-Boltzmann law is:	$E = \sigma T^2$	$E = \sigma T^3$	$E = \sigma T^4$	$E = \sigma T^6$
14	In photo voltaic cell current is directly proportional to:	Wavelength of light	Energy	Frequency of light	Intensity of light
15	A diode can be used as:	Amplifier	Rectifier	Oscillator	Transistor
16	When silicon crystal doped with a pentavalent impurity, the doped semi-conductor is:	n-type	p-type	Both A & B	None of these
17	Ohm is not a unit for:	Reactance	Resistance	Inductance	Impedance

1210-XII112336-15000

1210-XII123
FBD-12-2-23
Intermediate Part Second
PHYSICS (Subjective) **GROUP - II**
Time: 02:40 Hours   Marks: 68
Roll No. _____

SECTION – I

2. Write short answers to any EIGHT parts.   16

(i) 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?

(ii) 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 with in surface?

(iii) Define Gauss's law for n-point charges.

(iv) What is effect of relative permittivity of different dielectrics on electric force?

(v) How can you use a magnetic field to separate isotopes of chemical element?

(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) How radial magnetic field is produced in a galvanometer?

(viii) Find the radius of orbit of an electron moving at a rate of 2×10^7 ms^{-1} in a uniform magnetic field of 1.20×10^{-3} T.

(ix) What information is revealed by the length and shape of the tracks of an incident particle in Wilson cloud chamber?

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

(xi) What is meant by nuclear fission reaction? Give its uses.

(xii) What are types of nuclear reactors?

3. Write short answers to any EIGHT parts.   16

(i) What are sources of current?

(ii) State Kirchhoff's rules.

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

(iv) What is meant by phase lag and phase lead?

(v) 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.

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

(vii) Write any two properties of semi-conductors.

(viii) Differentiate between retentivity and coercivity.

(ix) Write a brief note on superconductors.

(x) What are applications of photodiode?

(xi) What is meant by closed loop gain and open loop gain of an operational amplifier?

(xii) Why a photodiode is operated in reverse biased state?

4. Write short answers to any SIX parts.   12

(i) What is step up and step down transformer?

(ii) Why is the transformer used to transmit the A.C current over long distance?

(iii) A square loop of wire is moving through a uniform magnetic field. The normal to the loop is oriented parallel to the magnetic field. Is a emf induced in loop? Give a reason for your answer.

(iv) Will higher frequency light eject more electrons from a metal surface than low frequency light?

(v) If an electron and a proton have the same de-Broglie wavelength, which particle has greater speed?

(vi) What is dual wave-particle nature?

(vii) What is Compton shift? At what angle, Compton shift will be maximum?

(viii) What is meant by quantized radii of hydrogen atom?

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

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

5. (a) State Gauss's law and apply it to find electric field intensity due to an infinite sheet of charge by pointing out the importance of Gaussian surface.   05

(b) How many electrons pass through an electric bulb in one minute if the 300mA current is passing through it?   03

6. (a) Determine e/m ratio of electron in terms of B and V (accelerating voltage).   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) How capacitor behave in A.C circuit? Write expression for capacitive reactance.   05
   (b) Calculate the gain of non-inverting amplifier shown in figure given below: 03
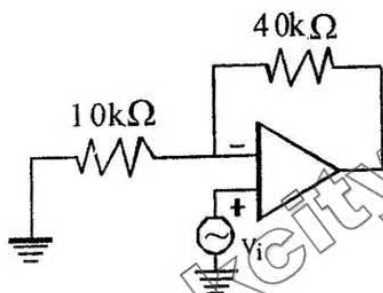
8. (a) Explain energy band theory of solids. How does it help to distinguish between conductor, insulator   05
   and semi-conductor.
   (b) What is the energy of photon in a beam of infrared radiation of wavelength 1240nm?   03

9. (a) What is radioactivity and explain nuclear transmutation?   05
   (b) What are the energies in eV of quanta of wavelength $\lambda = 400nm$, 500nm and 700nm?   03

1210-XII123-15000

Objective
Paper Code
8477

Intermediate Part Second - 103
PHYSICS (Objective) GROUP - I
Time: 20 Minutes   Marks: 17

Roll No. : _____

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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.coa

FBD-G1-22

S.#	Questions	A	B	C	D
1	If an iron core coil of reactance 628Ω is placed in series with 450Ω resistance in AC circuit. The phase difference will be:	51.5°	60°	30°	45°
2	Energy band theory based on:	Wave mechanical model	Bohr atomic model	Pauli exclusion principle	Electronic configuration of electrons
3	In transistor with common emitter configuration, output voltage is at phase difference of:	90°	100°	120°	180°
4	An electronic computer is vast arrangement of electronic switches which are made from:	Resistors	Inductors	Capacitors	Transistors
5	$\dfrac{h}{m_0 c}$ has the unit of:	Time	Distance	Velocity	Acceleration
6	An electron moving with speed of $1 \times 10^6 ms^{-1}$ has wavelength:	$7 \times 10^{-10} m$	$7 \times 10^{-9} m$	$7 \times 10^{10} m$	$7 \times 10^{-8} m$
7	Velocity of electron of hydrogen in different orbits is:	Same	Quantized	Increase in higher orbits	Independent of orbit number
8	It is believed that quark cannot exist in:	Free state	Bound state	Quark antiquark combination	Three quark combination
9	Ultra violet radiation cause:	Healthy growth	Saver crop damage	Fast hair grow	Formation of ozone
10	Joule per Coulomb is equal to:	Second	Newton	Watt	Volt
11	Gravitational force cannot be:	Mass dependent	Distance dependent	Shielded	Stronger than electric force
12	In carbon resistance, colour bands are red, red, red and silver. The numerical value of resistance will be:	2200Ω±10%	220Ω±5%	22000Ω±20%	22Ω±10%
13	The torque on a current carrying rectangular coil placed outside the magnetic field will be:	Maximum	NIAB	Zero	IA cos θ
14	Sensitivity of moving coil galvanometer can be increased by:	Decreasing area of coil	Decreasing number of turns	Using thick suspension wire	Increasing magnetic field
15	When motor is just started, the current passing through the coil will be:	Large	Small	Zero	Average
16	The windings of electromagnet in DC motor are called:	Solenoids	Field coils	Inductors	Loops
17	When 10V is applied to an AC circuit with current of 10mA then impedance will be:	100Ω	10Ω	1000Ω	0.1Ω

PHYSICS   (Subjective)   GROUP - I

Time: 02:40 Hours   Marks: 68   FBD-G1-22

SECTION – I

2. Write short answers to any EIGHT parts.

(i)   If a point charge 'q' of mass 'm' is released in a non-uniform electric field with electric field lines pointing in the same direction, will it make a rectilinear motion?

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

(iii)   What is the potential gradient? Write its unit.

(iv)   What is EEG and ERG?

(v)   How can you use a current loop 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)   Why parallel current attract and opposite current repel?

(viii)   Distinguish between sensitive and dead-beat galvanometer.

(ix)   How can radioactivity help in the treatment of Cancer?

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

(xi)   If $^{235}_{92}U$ decays twice by α-emission, what is the resulting isotope?

(xii)   Write two advantages of solid-state detector?

3. Write short answers to any EIGHT parts.

(i)   Write the heating effect of the current.

(ii)   Why does the resistance of a conductor rise with temperature?

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

(iv)   What is a choke?

(v)   How does doubling the frequency affect the reactance of a capacitor?

(vi)   A sinusoidal current has rms value of 10A. What is the maximum or peak value?

(vii)   Distinguish between hard magnetic material and soft magnetic material.

(viii)   Define the terms yield point and ultimate tensile stress.

(ix)   How the hysteresis loss is used in the construction of a transformer?

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

(xi)   Write the truth table and Boolean expression of NAND gate.

(xii)   What is the biasing requirement of the junctions of a transistor for its normal operation?

4. Write short answers to any SIX parts.

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

(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)   State Lenz's law. Does it agree with the law of conservation of energy?

(iv)   Define mutual inductance and also define its unit.

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

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

(vii)   If the speed of light were infinite what would be the equations of special theory of relativity reduced?

(viii)   Calculate the longest wavelength of radiation for Paschen series.

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

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

5. (a) What is Wheatstone Bridge? How it can be used to find the unknown resistance?   0

(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.   0

6. (a) State and explain Faraday's Law of electromagnetic induction.   0

(b) A power line 10m high caries a current 200A. Find the magnetic field of wire at the ground.   0

(Continued   P/2)

. (a) Derive an expression for the resonance frequency in R.L.C series circuit. Also give properties of series resonance circuit. 05

(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 $\dfrac{I_C}{I_E}$; if the value of current gain β is 100. 03

. (a) Explain energy band theory of solids. How does it help to distinguish between conductors, insulators and semi-conductors? 05

(b) What is the de-Broglie wavelength of an electron whose Kinetic energy is 120eV ? 03

. (a) Write three postulate of Bohr's atomic model. Derive an expression for radii of quantized orbit of hydrogen atom? 05

(b) Find the energy associated with the following reaction:

$$^{14}_{7}N + {}^{4}_{2}He \rightarrow {}^{17}_{8}O + {}^{1}_{1}H .$$

What does negative sign indicate? 03

309-XII122-45000

Roll No. : _____

Objective
Paper Code
8474

Intermediate Part Second - 103
PHYSICS (Objective) GROUP - II
Time: 20 Minutes   Marks: 17

☆
☆ FBD-G2-22

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.coa

S.#	Questions	A	B	C	D
1	The energy released by fusion of two deuterons into a helium nucleus is about:	24 MeV	200 MeV	1.02 MeV	7.2 MeV
2	One Joule of energy absorbed in a body per kg is equal to:	1 rad	1 rem	Sievert	Gray
3	Paschan series is obtained when all the transitions of electron terminate on:	2nd orbit	3rd orbit	4th orbit	5th orbit
4	Platinum wire becomes yellow at room temperature of:	900°C	1300°C	1600°C	500°C,
5	If object moves with the speed of light, its mass become:	Zero	Small	Same	Infinity
6	The thickness of a base in a transistor is of the order of:	10^{-3} m	10^{-4} m	10^{-6} m	10^{2} m
7	$X = \overline{A \cdot B}$ is the mathematical notation for:	NAND gate	NOR gate	OR gate	AND gate
8	The critical temperature for mercury is:	7.2K	4.2K	1.18K	3.7K
9	Resistance of choke is:	Zero	Very small	Large	Infinite
10	In three phase, voltage across any two lines is:	220V	230V	400V	430V
11	In DC generator, split rings acts as:	Capacitor	Commutator	Inductor	Resistor
12	Energy stored in the inductor is:	$\frac{1}{2}L^2 I$	$\frac{1}{2}LI$	$\frac{1}{2}LI^2$	$\frac{1}{2}L^2 I^2$
13	A galvanometer becomes more sensitive when the factor $\frac{C}{BAN}$ will be:	Large	Small	Constant	Zero
14	Force on a moving charge in a uniform magnetic field will be maximum, when the angle between $\vec{V}$ and $\vec{B}$ is:	0°	30°	60°	90°
15	Kirchhoff's first rule is based on conservation of:	Energy	Voltage	Charge	Mass
16	Coulomb per volt is called:	Farad	Ampere	Joule	Ohm
17	If the distance between two point charges is halved. the electric force becomes:	Half	Double	¼ times	4 times

PHYSICS   (Subjective)   GROUP - II

Time: 02:40 Hours   Marks: 68   FBD-G2-22

SECTION – I

2. Write short answers to any EIGHT parts.   16

(i) Is E necessarily zero inside a charged rubber balloon if balloon is spherical? Assume that charge is distributed uniformly over the surface.

(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) Derive relation for potential gradient $E = -\dfrac{\Delta V}{\Delta r}$

(iv) Write similarities and differences between electrostatic and gravitational forces.

(v) Define CRO and write the names of its parts.

(vi) Define tesla and write its formula.

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

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

(ix) What do you understand by "back ground radiation"? State two sources of this radiation.

(x) What do you mean by the term critical mass?

(xi) Define absorbed dose and gray.

(xii) Write the names of basic forces of nature.

3. Write short answers to any EIGHT parts.   16

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

(ii) Why does the resistance of conductor rise with temperature?

(iii) State Kirchhoff's second rule and write its mathematical formula.

(iv) Write any two properties of parallel resonance circuit.

(v) How does doubling the frequency affect the reactance (a) an inductor   (b) a capacitor?

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

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

(viii) What is meant by strain energy?

(ix) Distinguish between crystalline solids and amorphous solids.

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

(xi) Why charge carriers are not present in the depletion region?

(xii) Write the names of three parts of a transistor.

4. Write short answers to any SIX parts.   12

(i) Does the induced emf in a circuit depend on the resistance of the circuit? Does the induced current depend on the resistance of the circuit?

(ii) Four unmarked wires emerge from a transformer. What steps would you take to determine the turns ratio?

(iii) What factors can change the mutual inductance of two coils?

(iv) If the length of solenoid is doubled keeping all other factors same, what will be change in energy density of current carrying solenoid?

(v) Why do not we observe a Compton's effect with visible light?

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

(vii) Explain NAVSTAR navigation system.

(viii) Can the electron in the ground state of hydrogen absorb a photon of energy 13.6eV and greater than 13.6eV?

(ix) Explain bremsstrahlung in x-rays spectrum.

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

5. (a) State Gauss's law and apply it to find out the electric intensity due to infinite sheet of charge.   05

(b) A rectangular bar of iron is 2cm by 2cm in cross-section and 40cm long. Calculate its resistance.   03

(Resistivity = $11 \times 10^{-8} \Omega m$)

6. (a) State Ampere's law and apply it to find the magnetic field due to a current carrying solenoid.   05

(b) When current through a coil changes from 100mA to 200mA in 0.005s, an induced emf of 40mV is produced in the coil. What is the self-inductance of the coil?   03

(a) What is transistor? Describe its construction and operation. Also show that how current flows in n-p-n transistor? 05

(b) Find the value of current flowing through a capacitance $0.5\mu F$, when connected to a source of 150V at 50Hz. 03

(a) What are intrinsic and extrinsic semi-conductors? How the p-type and n-type materials are formed? 05

(b) X-rays of wavelength 22pm are scattered from a carbon target. The scattered radiation being viewed at $85°$ to the incident beam. What is Compton shift? 03

(a) Describe atomic spectrum of hydrogen. Show that energy of electron in hydrogen atom is quantized. 05

(b) Calculate the energy (in MeV) released in the following fusion reaction:

$$_1^2H + _1^2H \rightarrow _2^4He + _0^1n .$$ 03

310-XII122-19000

Objective
Paper Code
8471

Intermediate Part Second **FBD-41-21** Roll No. : _____

PHYSICS (Objective) GROUP - I
Time: 20 Minutes   Marks: 17

You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill the
Q.No.1 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	Electrical field intensity between two oppositely charged parallel plates is:	$\frac{2\sigma}{\varepsilon_0}$	$\frac{\sigma}{\varepsilon_0}$	$\frac{\sigma}{2\varepsilon_0}$	$\frac{\varepsilon_0}{\sigma}$
2	When a dielectric material is inserted between the plates of a capacitor, the potential difference between the plates:	Does not change	Increases	Decreases	Increases then decreases
3	Kirchhoff's first rule is based on law of conservation of:	Mass	Momentum	Energy	Charge
4	Magnetic field strength is measured in terms of:	Wbm^{-2}	Wb	NmA^{-1}	Js
5	In CRO the output waveform of time base generator is:	A ripple	Square wave	Sinusoidal	Saw tooth
6	Mutual inductance of two coils does not depend on:	Number of turns of the coils	Area of cross-section of coils	Density of material of coils	Nature of the core material
7	If the magnetic field intensity is doubled then magnetic energy density becomes:	Four times	Double	Half	Eight times
8	Direct current cannot flow through:	Resistor	Capacitor	Inductor	Ammeter
9	In RLC series circuit, the condition for resonance is:	$X_C > X_L$	$X_C = X_L$	$X_C < X_L$	$X_L = Z$
10	Dimensions of strain are same as that of:	Stress	Pressure	Young's modulus	Relative permittivity
11	Forward resistance of the p-n junction is:	Very large	Of the order of $k\Omega$	A few Ohms	In mega Ohms
12	In a transistor greater concentration of impurity is added in:	Emitter	Collector	Both emitter and collector	Base
13	Value of Plank's constant is:	6.34×10^{-43} Js	6.43×10^{-34} Js	6.64×10^{-19} Js	6.63×10^{-34} Js
14	A gamma radiation has an energy of the order of:	1 MeV	1 keV	100 eV	1 eV
15	Rydberg constant is given in units of:	kg^{-1}	m^{-1}	s^{-1}	Js
16	In a nuclear transmutation, radium changes into radon, the emitted particle is:	A neutron	A proton	An alpha particle	A beta particle
17	The average number of neutrons produced per fission of uranium-235 atom is:	2.5	3	2	4

SECTION – I

2. **Write short answers to any EIGHT parts.**   16
   (i) Do electrons tend to go to region of high potential or of low potential?
   (ii) Define electron volt. Show that $1 \, eV = 1.60 \times 10^{-19} J$
   (iii) Is E necessarily zero inside a charged rubber balloon if balloon is spherical? Assume that charge is distributed uniformly over the surface.
   (iv) What are differences between electric force and gravitational forces?
   (v) How can you use a magnetic field to separate isotopes of chemical element?
   (vi) Why does a picture on a TV screen become distorted when a magnet is brought near the screen?
   (vii) Define the terms magnetic flux and magnetic flux density.
   (viii) Determine the magnitude of force on a charged particle in an electric and magnetic field.
   (ix) Define induced current and induced emf.
   (x) Show that ε and $\frac{\Delta \phi}{\Delta t}$ have same units.
   (xi) How the induced current can be increased?
   (xii) 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?

3. **Write short answers to any EIGHT parts.**   16
   (i) Describe a circuit which will give a continuously varying potential.
   (ii) Explain why the terminal potential difference of a battery decrease when the current drawn from it is increased?
   (iii) What is meant by tolerance? Give example.
   (iv) How does doubling the frequency affect the reactance of an inductor and a capacitor?
   (v) In a R-L circuit, will the current lag or lead the voltage? Illustrate your answer by a vector diagram.
   (vi) Write four properties of parallel resonance circuit.
   (vii) What is meant by hysteresis loss?
   (viii) Define stress and strain. What are their SI units?
   (ix) What are ductile and brittle substances? Give an example of each.
   (x) What is the net charge on a n-type or a p-type substance?
   (xi) How does the motion of an electron in a n-type substance differ from the motion of holes in a p-type substance?
   (xii) What is operational amplifier?

4. **Write short answers to any SIX parts.**   12
   (i) Which has lower energy quanta? Radiowave or X-ray?
   (ii) Why do not we observe Compton effect with visible light?
   (iii) Define work function and give its unit.
   (iv) What are the advantages of laser light over ordinary light?
   (v) Define ionization potential and excitation potential.
   (vi) If a nucleus has half-life of 1 year, does it mean that it will be completely decayed after 2 years? Explain it.
   (vii) What do you mean by term critical mass?
   (viii) Define half-life. Give its expression.
   (ix) Define Hadrons and Leptons.

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

5. (a) Explain electric potential at a point due to a point charge. Derive its relation.   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 $11 \times 10^{-8} \Omega m$ 03

6. (a) Determine $\frac{e}{m}$ of an electron. Derive its relation.   05
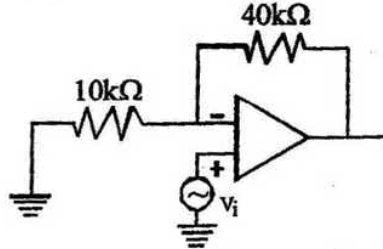   (b) Two coils are placed side by side. An emf of 0.8V is observed in one coil when current is changing at the rate of $200 \, As^{-1}$ in the other coil. What is the mutual induction of the coils?   03

7. (a) Describe the behaviour of an inductor in an A.C. circuit and write expression for reactance of an inductor. 05
   (b) Calculate the gain of non-inverting amplifier shown in figure: 03

8. (a) Describe the formation of energy bands in solids. Explain the difference of electrical behaviour of conductors, insulators and semi-conductors in terms of energy band theory. 05

   (b) A sheet of lead 5.0mm thick reduces the intensity of a beam of γ-rays by a factor of 0.4. Find half value thickness of lead sheet which will reduce the intensity to half of its initial value. 03

9. (a) What is meant by inner shell transition and characteristics X-rays. How X-rays are produced? Write any two properties and uses of X-rays. 05
   (b) An electron is accelerated through a potential difference of 50V. Calculate its de-Broglie wavelength. 03

335-XII121-37000

Objective
Paper Code
8472

FSD

Intermediate Part Second FBD-42-21

Roll No. : _____

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	A particle of mass m and charge q is released from rest in a uniform electric field E. The K.E. attained by the particle after moving a distance 'd' is:	$\dfrac{Ed}{q}$	qE^2d	qEd	$\dfrac{qE}{d^2}$
2	The energy stored in the capacitor is:	K.E.	P.E.	Electrical K.E.	Electrical P.E.
3	On increasing the length of wire specific resistance of the wire:	Increases	Decreases	Remains unchanged	First increase then decrease
4	An electron is moving in a circle of radius 'r' in a uniform magnetic field, suddenly the field is reduced to B/2, the radius of circle now becomes:	$\dfrac{r}{2}$	$\dfrac{r}{4}$	2 r	4 r
5	Force on current carrying conductor per unit length is given by:	ILB sin θ	ILB	IB	IB sin θ
6	The current flowing through a coil due to induced emf in it depends upon:	Shape of the coil	Resistance of the coil	Area of the coil	Magnetic flux
7	The induced emf primarily produced at the cost of:	Internal energy	Chemical energy	Electrical energy	Mechanical energy
8	At low frequency the current through a capacitor of A.C. circuit will be:	Large	Small	Zero	Infinite
9	The inductance and capacitance behave a function of:	Voltage	Frequency	Time	Current
10	Impurity atoms are doped in semi-conductor to increase:	Free electrons	Holes	Conductivity	Resistivity
11	The specially designed semi-conductor diode used as indicator lamp in electronic circuit are:	The switch	Solar cells	Photodiodes	Light emitting diode
12	Which diode is used for detection of light?	Light emitting diode	Photo diode	Photo voltaic cell	All these
13	Rest mass of photon is:	Zero	Infinity	$\dfrac{hf}{e}$	$\dfrac{hc}{\lambda}$
14	Threshold wavelength for metal having work function ϕ_o is λ_o. What is threshold wavelength for metal having work function $2\phi_o$ is?	$\dfrac{\lambda}{2}$	4λ	2λ	$\dfrac{\lambda}{4}$
15	Production of X-rays can be regarded as inverse of:	Compton effect	Photoelectric effect	Annihilation of matter	Pair production
16	The energy released per unit mass is greater in:	Fission reaction	Fusion reaction	Chemical reaction	Nuclear reaction
17	Energy needed to create an electron-hole pair in a solid state detector is:	2 - 3 eV	3 - 4 eV	4 - 5 eV	5 - 6 eV

336-XII121-17000

PHYSICS (Subjective) GROUP - II
Time: 02:40 Hours   Marks: 68 FBD-62-21

SECTION – I

2. **Write short answers to any EIGHT parts.**   16
   (i) How can you identify that which plate of a capacitor is positively charged?
   (ii) Do electrons tend to go to region of high potential or of low potential?
   (iii) State Gauss's law and write its mathematical expression.
   (iv) Give a comparison between electric and gravitational forces.
   (v) Describe the change in magnetic field inside a solenoid carrying a steady current I, if the number of turns is doubled but the length remains the same.
   (vi) 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?
   (vii) Define magnetic flux density and write its unit.
   (viii) What is Lorentz force? Write its mathematical expression.
   (ix) How would you position a flat loop of wire in a changing magnetic field so that there is no emf induced in the loop?
   (x) Does the induced emf always act to decrease the magnetic flux through a circuit?
   (xi) Write the factors upon which mutual inductance depends.
   (xii) State Faraday's law of electromagnetic induction and write its mathematical expression.

3. **Write short answers to any EIGHT parts.**   16
   (i) Why does the resistance of a conductor rise with temperature?
   (ii) Explain why the terminal potential difference of a battery decreases when the current drawn from it is increased?
   (iii) Differentiate between resistance and resistivity. Also give their units.
   (iv) A sinusoidal current has 'rms' value of 10A. What is the maximum or peak value?
   (v) In R-L circuit, will the current lag or lead the voltage? Illustrate your answer by a vector diagram.
   (vi) At what frequency will an inductor of inductance 1.0H have reactance of 500Ω.
   (vii) What is meant by hysteresis loss? How it is used in the construction of a transformer?
   (viii) Define modulus of elasticity. Show that unit of modulus of elasticity and stress are same.
   (ix) Differentiate between curie temperature and critical temperature.
   (x) Why charge carriers are not present in the depletion region?
   (xi) Why a photo diode is operated in reverse biased region?
   (xii) A transistor has I_C = 10mA and I_B = 40mA. Calculate the current gain.

4. **Write short answers to any SIX parts.**   12
   (i) As a solid is heated and begin to glow, why does it first appear red?
   (ii) Can pair production take place in vacuum? Explain.
   (iii) What is the energy of photon in a beam of infra-red radiation of wavelength 1240nm?
   (iv) Is energy conserved, when an atom emits a photon of light?
   (v) What is meant by CAT-Scanner?
   (vi) Why are heavy nuclei unstable?
   (vii) Describe a brief account of interaction of various types of radiations with matter.
   (viii) What factors make a fusion reaction difficult to achieve?
   (ix) What is self-quenching in working of GM-Counter?

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

5. (a) Define capacitance. Also derive a relation for capacitance of a parallel plate capacitor for air and dielectric as a medium.   05
   (b) 0.75A current flows through an iron wire with a battery of 1.5V is connected across its ends. The length of the wire is 5.0m and its cross-sectional area is $2.5 \times 10^{-7} m^2$. Compute the resistivity of iron.   03

6. (a) Derive the relation of e/m of an electron.   05
   (b) Two coils are placed side by side. An emf of 0.8V is observed in one coil when the current is changing at the rate of $200 As^{-1}$ in the other coil. What is the mutual inductance of the coils?   03

7. (a) What is an operational amplifier? Derive a relation for gain of operational amplifier as inverting amplifier.   05
   (b) Find the capacitance required to construct a resonance circuit of frequency 1000kHz with an inductor of 5mH.   03

8. (a) Define and explain fusion reaction in detail.   05
   (b) A 1.0m long copper wire is subjected to stretching force and its length increases by 20cm. Calculate the tensile strain and the percent elongation which the wire undergoes.   03

9. (a) What is de-Broglie hypothesis? How Davisson and Germer verify it? Explain.   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

Objective
Paper Code
8471

Roll No. : _____

Intermediate Part Second   (New Scheme)
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	The force on an electron in a field of $1\times10^8 NC^{-1}$ will be:	$1.6\times10^{-8}N$	$1.6\times10^{-11}N$	$1.6\times10^{-19}N$	$1.6\times10^{-27}N$
2	Electric flux is maximum, when angle between $\vec{E}$ and surface area is:	$0°$	$90°$	$180°$	$45°$
3	Heat generated by a 50 watt bulb in one hour is:	36000 J	48000 J	18000 J	180000 J
4	The relation $B=\dfrac{\mu_0 I}{2\pi r}$ is called:	Ampere's law	Faraday's law	Lenz's law	Gauss's law
5	The magnetic force on an electron, travelling at $10^6 ms^{-1}$ parallel to the magnetic field of strength 1T is:	$10^{-12}N$	$10^3 N$	0	$16\times10^{-12}N$
6	One of the applications of mutual induction is:	Choke	Rectifier	Rheostat	Step up transfer
7	Henry can be written as:	VsA^{-1}	^{-1}A	$Vs^{-1}A$	$V^{-1}sA$
8	In RLC series resonance circuit, at resonance frequency, impedance Z is:	$\sqrt{R^2+X_L^2}$	R	$\sqrt{R^2+X_C^2}$	X_L
9	Choke consumes extremely small:	Current	Charge	Power	Potential
10	A single domain in paramagnetic substance contains nearly:	10^8-10^{10} atoms	$10^{15}-10^{20}$ atoms	$10^{12}-10^{20}$ atoms	$10^{12}-10^{16}$ atoms
11	$X=\overline{A\cdot B}$ is the mathematical notation for:	NAND gate	OR gate	NOR gate	AND gate
12	In a comparator circuit, when intensity of light decreases, then resistance of LDR:	R_L increases	R_L decreases	V_R decreases	V_- increases
13	If an electron is accelerated through a potential difference of 10 V, then energy gained by electron is:	$1.6\times10^{-20}J$	1.6 eV	10 eV	$1.6\times10^{-19}eV$
14	If velocity of a body becomes equal to "C", then its mass becomes:	0 kg	$m=m_0$	$m\to\infty$	$m=\dfrac{m_0}{2}$
15	An electron can reside in the meta stable state for about:	$10^3 s$	$10^{-8}s$	$10^8 s$	$10^{-3}s$
16	Half life of iodine-131 is 8 days and it weighs 20mg. After 4 half lives, the amount left behind will be:	2.5mg	1.25mg	0.625mg	0.312mg
17	Which group belongs to Hadrons?	Protons and neutrons	Mesons and neutrinos	Photons and electrons	Positrons and electrons

PHYSICS   (Subjective)   GROUP - 1   FBD-12-G₁-19

Time: 02:40 Hours   Marks: 68

SECTION – I

Write short answers to any EIGHT parts.   16

(i) Define potential gradient and show that $E = -\dfrac{\Delta V}{\Delta r}$

(ii) Write two differences between electrical and gravitational forces.

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

(iv) Suppose that you follow an electric field line due to positive point charge. Do electric field and the potential increase or decrease?

(v) What do you know about sensitivity of galvanometer?

(vi) What are the uses of CRO ?

(vii) How can you use a magnetic field to separate isotopes of chemical element?

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

(ix) What are the factors upon which the mutual inductance depends?

(x) What is the back motor effect in generators?

(xi) Four unmarked wires emerge from a transformer. What steps would you take to determine the turns ratio?

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

Write short answers to any EIGHT parts.   16

(i) State the Kirchhoff's first and second rule.

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

(iii) What is meant by the tolerance in a resistor? Write the value of tolerance of silver and gold.

(iv) What is a choke?

(v) What is meant by AM and FM ?

(vi) A circuit contains an iron cored inductor, a switch and a DC source arranged in series. The switch is closed and after an interval reopened. Explain why a spark jumps across the switch contacts?

(vii) Define diamagnetic and ferromagnetic substances. Give their examples.

(viii) Distinguish between crystalline and amorphous solids.

(ix) What is the mechanism of electrical conduction by holes and electrons in a pure semiconductor element?

(x) Why ordinary silicon diodes do not emit light?

(xi) Why charge carriers are not present in the depletion regions?

(xii) What is solar cell? Give its uses.

Write short answers to any SIX parts.   12

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

(ii) When does light behave as a wave? When does it behave like a particle?

(iii) Calculate the value of Compton wave length of electron.

(iv) Explain why laser action could not occur without population inversion between atomic levels?

(v) How K_α and K_β X-rays are emitted?

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

(vii) What do you understand by background radiations? State two sources.

(viii) Differentiate between Hadrons and Leptons.

(ix) Write any two uses of radiography.

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

5. (a) What is capacitor? Derive a relation for the capacitance of parallel plate capacitor. Show that capacitance varies in the presence of dielectric between the plates of capacitor.   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 coefficient of resistance of iron is $5.2\times10^{-3}K^{-1}$?   03

6. (a) Explain the phenomena of mutual induction, mutual inductance and define its units.   05

(b) Alpha particles ranging in speed from 1000ms⁻¹ to 2000ms⁻¹ enter into a velocity selector where the electric intensity is 300Vm⁻¹ and the magnetic induction 0.20T. Which particle will move undeviated through the field?   03

7. (a) What is transistor? How it is used as an amplifier? Derive its voltage gain equation.   05

(b) At what frequency will an inductor of 1.0H have a reactance of 500Ω ?   03

8. (a) Describe de-Broglie's hypothesis and explain Davisson and Germer experiment to confirm this hypothesis.   02,03

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

9. (a) What is radioactivity? Discuss emission of alpha (α), beta (β) and gamma (γ) radiations from radioactive nuclei.   05

(b) Compute the shortest wavelength radiation in the Balmer series. What value of "n" must be used?   03

Objective
Paper Code
8474

Intermediate Part Second (New Scheme)
PHYSICS (Objective) GROUP - II
Time: 20 Minutes   Marks: 17

Roll No. : _____

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.

Q.No.1

S.#	Questions	A	B	C	D
1	The peak to peak value is:	V_0	$-V_0$	$\sqrt{2}\,V_0$	$2V_0$
2	SI unit of modulus of elasticity is:	Coulomb	Volt	Pascal Nm^{-2}	Ampere
3	In transistor the central region is known as:	Base	Emitter	Collector	Inductor
4	The open loop gain of op-amplifier is of the order of:	10^3	10^5	10^6	10^4
5	Amount of energy released due to complete conversion of 1 kg mass into energy is:	9×10^{16} J	9×10^{9} J	9×10^{20} J	3×10^{8} J
6	The unit of Planck's constant is:	Joule	Joule-s	Watt	Candela
7	If transition of electron in hydrogen atom ends at third orbit then radiation emitted lies in:	Balmer	Lyman	Paschen	Bracket
8	The bombardment of nitrogen with α-particle will produce:	Neutron	Proton	Electron	Positron
9	The quantity called the absorbed dose "D" is:	E/m	E/C	m/C	C/E
10	Which one is photoconductor?	Copper	Selenium	Mercury	Aluminium
11	A charge of 4 Coulomb is in the field of intensity 4 N/C. The force on the charge is:	8 N	16 N	4 N	1 N
12	mhom^{-1} is the SI unit of:	Conductance	Conductivity	Resistance	Resistivity
13	The magnetic induction has the same unit as of:	Flux	Flux density	Electric intensity	Magnetization
14	The Lorentz force on charged particle is:	$F = E_c + F_b$	$F = E_c - F_b$	$F = \dfrac{E_c}{F_b}$	$F = E_c \times F_b$
15	Lenz's law is in accordance with the law of conservation of:	Momentum	Angular momentum	Charge	Energy
16	Working principle of transformer is:	Mutual induction	Self induction	Faraday's law	Lenz's law
17	When the motor is running at maximum speed, the back emf will be:	Maximum	Minimum	No back emf	Varies

PHYSICS (Subjective)   **GROUP - II**   FBD-R-G₂-19

Time: 02:40 Hours   Marks: 68

SECTION – I

2. Write short answers to any EIGHT parts.   16

(i) Electric lines of force never cross. Why?

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

(iii) What is meant by potential gradient?

(iv) Define capacitance and its unit Farad.

(v) How can you use a magnetic field to separate isotopes of chemical element?

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

(vii) What is sweep or time base generator?

(viii) Distinguish between magnetic flux and magnetic flux density.

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

(x) Show that "ε" and $\frac{\Delta\phi}{\Delta t}$ have the same units.

(xi) Define Henry.

(xii) How the efficiency of transformer can be improved?

3. Write short answers to any EIGHT parts.   16

(i) What are thermistors? How are they made?

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

(iii) Why does the resistance of a conductor rise with temperature?

(iv) What do you understand about the terms (a) phase lag (b) phase lead ?

(v) A sinusoidal current has rms value of 10A. What is the maximum or peak value?

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

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

(viii) How would you obtain n-type and p-type material from pure silicon? Illustrate it by schematic diagram.

(ix) Differentiate between para and ferromagnetic substances.

(x) What is normal operation of a transistor? Show it with diagram.

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

(xii) What is the net charge on a n-type or a p-type substance?

4. Write short answers to any SIX parts.   12

(i) Show that any material object cannot be accelerated to the speed of light 'c' in free space.

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

(iii) If an electron and a proton have the same de-Broglie wavelength, which particle has greater speed?

(iv) Differentiate between spontaneous and stimulated emissions?

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

(vi) What is natural radioactivity? Name types of radiations emitted from radioactive elements.

(vii) What are leptons? Write its examples.

(viii) Why does a Geiger Muller tube for detecting γ-rays not need a window at all?

(ix) Find the mass defect of tritium, if the atomic mass of tritium is 3.016049 u.

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

5. (a) What is Wheatstone Bridge? Give its principle, circuit diagram and working. How it can be used to determine an 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 volts (eV).   03

6. (a) State Ampere's law and apply it to find the magnetic field due to current carrying solenoid.   05

(b) A coil of 10 turns and 35cm² area is in a perpendicular magnetic field of 0.5T. The coil is pulled out of the field in 1.0 sec. Find the induced emf in the coil as it is pulled out of the field.   03

7. (a) Define rectification and describe the working of a full wave rectifier.   05

(b) A 10mH, 20Ω coil is connected across 240V and 180/π Hz source. How much power does it dissipate?   03

8. (a) What is meant by strain energy? Derive the relation for strain energy from force extension graph.   05

(b) The life time of an electron in an excited state is about 10⁻⁸s. What is its uncertainty in energy during this time?   03

9. (a) Derive the relations for quantized radii and energies for hydrogen atom.   05

(b) Find the mass defect and binding energy of the deuteron nucleus. The experimental mass of deuteron is 3.3435×10⁻²⁷ kg.   03

Objective
Paper Code

8471

Intermediate Part Second (New Scheme)
PHYSICS (Objective)
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	The capacitance of capacitor depends upon:	Thickness of plates	Charges on the plates	Voltage applied	Geometry of the capacitor
2	A billion electrons are added to pith ball. Its charge is:	$-1.6 \times 10^{-10}C$	$-1.6 \times 10^{-12}C$	$-1.6 \times 10^{-14}C$	$-1.6 \times 10^{-7}C$
3	The current through a resistance of 100Ω when connected across a source of 220V is:	22000A	22A	2.2A	0.45A
4	A current carrying conductor is placed in uniform magnetic field parallel to it. The magnetic force experienced by the conductor is:	F = ILB	F = ILB sinθ	F = ILB cosθ	F is zero
5	Cathode ray oscilloscope works by deflecting a beam of:	Electrons	Protons	Neutrons	Positrons
6	The only difference between the construction of DC and AC generator is:	Carbon brushes	coil	Commutator	Magnetic field
7	If the coil is wound on iron core, the flux through it:	Decreases	Becomes zero	Increases	Remains constant
8	During each cycle, alternating voltage reaches to peak value:	Once	Twice	Thrice	Four times
9	The device which allows only the continuous flow of AC through it is:	Capacitor	Inductor	Battery	Thermistor
10	A vacant or partially filled band is called:	Fermi band	Valence band	Forbidden band	Conduction band
11	A device which is used for the conversion of AC into DC is called:	Oscillator	Detector	Amplifier	Rectifier
12	Which one is not fundamental logic gate?	OR gate	AND gate	NOT gate	NAND gate
13	The unit of Plank's constant is:	Joule	Joule-S	Watt	Candela
14	Which one is low energy photon?	Visible light	Infrared light	Ultra violet light	X-rays
15	Radiation produced from TV picture tube is:	Gamma rays	X-rays	Infrared light	Ultra violet light
16	The bombardment of nitrogen with α-particle will produce:	Neutron	Proton	Electron	Positron
17	The quantity called the absorbed dose "D" is:	E/m	E/C	m/C	C/E

PHYSICS   (Subjective)

FBD-12-18

Time: 02:40 Hours   Marks: 68

SECTION – I

2. **Write short answers to any EIGHT parts.**   16
   (i)   Do electrons tend to go to region of high potential or of low potential?
   (ii)   Electric lines of force never cross. Why?
   (iii)   Define capacitance and electric polarization.
   (iv)   Show $1eV = 1.6 \times 10^{-19} J$
   (v)   A plane conducted 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?
   (vi)   Why the voltmeter should have a very high resistance?
   (vii)   What is digital multimeter?
   (viii) Define ammeter and voltmeter.
   (ix)   When the primary circuit of a transformer is connected to a.c. mains the current in it (a) is very small if the secondary circuit is open but (b) increases when the secondary circuit is closed. Explain these factors.
   (x)   Show that ε and $\dfrac{\Delta\phi}{\Delta t}$ have the same units.
   (xi)   Define induced current and induced emf.
   (xii)   Define self-induction and mutual induction.

3. **Write short answers to any EIGHT parts.**   16
   (i)   Write the names of sources of current.
   (ii)   Is the filament resistance lower or higher in a 500W, 220V light bulb than in a 100W, 220V bulb?
   (iii)   A voltmeter cannot read the exact emf of a cell. Why?
   (iv)   What do you mean by phase lag and phase lead?
   (v)   Show that potential difference across LC is zero at resonating frequency in series LRC series circuit.
   (vi)   Name the device that will (a) permit the flow of direct current but oppose the flow of alternating current (b) permit the flow of alternating current but not direct current.
   (vii)   Show that units of modulus of elasticity and stress are the same.
   (viii) Define ductile and brittle substances. Give example of each.
   (ix)   What are superconductors? Where are they used?
   (x)   What do LED and LASER stand for?
   (xi)   Why ordinary silicon diodes do not emit light?
   (xii)   The anode of a diode is 0.2 positive with respect to its cathode. Is it forward biased?

4. **Write short answers to any SIX parts.**   12
   (i)   Can pair production take place in vacuum? Explain.
   (ii)   We do not notice the de-Broglie wavelength for a pitched cricket ball. Explain why?
   (iii)   Write the relations of length contraction and time dilation in case of special theory of relativity.
   (iv)   What are advantages of LASER over ordinary light?
   (v)   Can electron reside inside the nucleus? Explain.
   (vi)   How can radioactivity help in treatment of Cancer?
   (vii)   Why heavy nuclei are unstable? Explain.
   (viii) Define half-life and discuss its dependence.
   (ix)   Write names of hydrogen isotopes with their formulas (symbols).

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

5. (a) What is potentiometer? How it can be used as (i) potential divider (ii) measuring of unknown emf of a cell?   1,2,2
   (b) Determine the electric field at the position $\vec{r} = (4i + 3j)$ m. Caused by a point charge $q = 5.0 \times 10^{-6}$ C placed at the origin.   03

6. (a) What is solenoid? Draw the pattern of magnetic field produced by the current carrying solenoid and derive the relation to calculate the value of its magnetic field inside it by using Ampere's law.   1,1,3
   (b) When current through a coil changes from 100mA to 200mA in 0.005s an induced emf of 40mV is produced in the coil. (i) What is the self-inductance of the coil? (ii) Increase in the energy stored in the coil.   03

7. (a) How operational amplifier can be used as inverting and non-inverting amplifier? Derive their gain. 2,2,1
   (b) Find the value of the current and inductive reactance when AC voltage of 220V at 50Hz is passed through an inductor of 10H.   03

8. (a) What is de-Broglie's hypothesis about wave nature of particle? How it was confirmed by Davisson and Germer?   02,03
   (b) A 1.25cm diameter cylinder is subjected to a load of 2500kg. Calculate the stress on the bar in megapascals.   03

9. (a) What is a nuclear reactor? Describe its four important parts.   01,04
   (b) Compute the shortest wavelength radiation in the Balmer series? What value of n must be used? 03

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