


Multan Board-2024

Paper Code		2024 (1 st -A)			
Number: 4477		INTERMEDIATE PART-II (12 th Class)		Roll No: _____	
PHYSICS PAPER-II GROUP-I					
TIME ALLOWED: 20 Minutes		OBJECTIVE		MAXIMUM MARKS: 17	
Q.No.1		You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question.			
S.#	QUESTIONS	A	B	C	D
1	Two opposite point charges, separated by a distance 2d, the electric potential at mid-way between them is:	1 volt	2 volts	3 volts	Zero volt
2	A current carrying conductor experience maximum force in a uniform magnetic field, when it is placed:	Perpendicular to field	Parallel to field	At an angle $\theta = 60^\circ$ to field	At an angle of 180° to field
3	Which substance of the given has greatest resistivity?	Silver	Germanium	Carbon	Gold
4	When the coil at rest is placed in a uniform magnetic field, then induced current would be:	Maximum	Minimum	Some time maximum some time minimum	Zero
5	In D.C motor the split rings act as:	Commutator	Capacitor	Resistor	Inductor
6	In three phase A.C generator, when the voltage across the first pair of slip rings is zero, then it has the phase of:	0°	90°	120°	180°
7	The amplitude modulation transmission frequencies range is:	88 MHz to 108 MHz	540 kHz to 1600 kHz	540 MHz to 1600 MHz	88 kHz to 108 MHz
8	A temperature above 77k, any superconductor referred as:	High temperature super conductor	Low temperature super conductor	Low temperature semi conductor	High temperature conductor
9	The symbol of NOT gate is:	Rectangle	Bubble only	Triangle and Bubble	Square
10	SI unit of voltage gain of NPN transistor is:	Volt	Coulomb	Farad	No unit
11	The materialization of energy take place in the process of:	Photo electric effect	Compton effect	Pair production	Annihilation of matter
12	Which one of the physical quantity is independent of relativistic speed?	Mass	Length	Time	Charge
13	Which one of the radiations has the most energetic photon?	T.V waves	γ - rays	X - rays	Microwaves
14	Electromagnetic radiation having wavelength longer than the red light is known as:	Infrared radiation	Ultraviolet radiation	Microwaves	Gamma rays
15	The half life of radioactive element depends upon the:	Temperature	Atmospheric pressure	Number of nucleons	Number of electrons
16	The unit of radiation one Becquerel is equal to:	One disintegration per second	3.7×10^{10} disintegration per second	Two disintegration per second	3.7 disintegration per minute
17	Due to polarization of dielectric, the electrical energy stored between the plates of capacitor when battery is connected:	Increases	Decreases	Remains same	May increase or decreases

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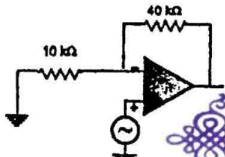
INTERMEDIATE PART-II (12 th Class)		2024 (1 st -A)	Roll No: _____
PHYSICS PAPER-II GROUP-I			
TIME ALLOWED: 2.40 Hours		SUBJECTIVE	MAXIMUM MARKS: 68
NOTE: Write same question number and its parts number on answer book, as given in the question paper.			
SECTION-I			
2. Attempt any eight parts.			8 × 2 = 16
(i)	What is a Test Charge? Write its any two characteristics.		
(ii)	Show that an ohm times farad is equivalent to second.		
(iii)	Is E necessarily zero inside a charged rubber balloon if balloon is spherical? Assume that charge is distributed uniformly over the surface.		
(iv)	Is it true that Gauss's law states that the total number of lines of forces crossing any closed surface in the outward direction is proportional to the net positive charge enclosed within surface?		
(v)	Find the radius of an orbit of an electron moving at a rate of $2.0 \times 10^7 \text{ ms}^{-1}$ in a uniform magnetic field of $1.20 \times 10^{-3} \text{ T}$.		
(vi)	Differentiate between Ammeter and Ohmmeter.		
(vii)	A plane conducting loop is located in a uniform magnetic field that is directed along the x -axis. For what orientation of the loop is the flux a maximum? For what orientation is the flux a minimum?		
(viii)	Is it possible to orient a current loop in a uniform magnetic field such that the loop will not tend to rotate? Explain.		
(ix)	Define Mass Defect and write its formula.		
(x)	Write down disadvantages of α and β -particles.		
(xi)	If someone accidentally swallows an α -source and a β -source, which would be the more dangerous to him? Explain why?		
(xii)	Discuss the advantages and disadvantages of nuclear power compared to the use of fossil fuel generated power.		
3. Attempt any eight parts.			8 × 2 = 16
(i)	Describe a circuit which will give a continuously varying potential.		
(ii)	Why does the resistance of a conductor rise with temperature?		
(iii)	Derive the mathematical expression for the maximum power output.		
(iv)	How does doubling the frequency affect the reactance of a capacitor?		
(v)	At what frequency will an inductor of 1.0H have a reactance of 500Ω ?		
(vi)	Briefly explain the Phase Lag and Phase Lead with wave diagram.		
(vii)	Draw a stress-strain curve for a ductile material, and then define the terms: Elastic limit and Yield point.		
(viii)	Mention four applications of superconductors.		
(ix)	Differentiate between Bulk Modulus and Shear Modulus.		
(x)	What is the net charge on a n-type or a p-type substance?		
(xi)	The inputs of a gate are 1 and 0. Identify the gate if its output is (a) 0, (b) 1		
(xii)	How can we use OP-AMP as a comparator?		
4. Attempt any six parts.			6 × 2 = 12
(i)	Show that ϵ and $\frac{\Delta\phi}{\Delta t}$ have the same units.		
(ii)	Does an induced emf always act to decrease the magnetic flux through a circuit?		
(iii)	How can we minimize the energy losses in a practical transformer?		
(iv)	What are the measurements on which two observers in relative motion will always agree upon?		
(v)	We do not notice the de-Broglie wavelength for a pitched cricket ball. Explain why?		
(vi)	What is reason for fundamental uncertainty associated with sub-atomic measurements?		
(vii)	How did Bohr stated his complementarity principle for complete description of matter and radiation?		
(viii)	Is energy conserved when an atom emits a photon of light?		
(ix)	How do we differentiate orbital and free electrons on the basis of their energy?		
SECTION-II			
NOTE: Attempt any three questions.			3 × 8 = 24
5.(a)	Derive a relation for electric potential at a point due to point charge.	05	
(b)	The potential difference between the terminals of a battery in open circuit is 2.2 V. When it is connected across a resistance of 5.0Ω , the potential falls to 1.8V. Calculate current and internal resistance of the battery.	03	
6.(a)	What is Galvanometer? Describe the conversion of Galvanometer into ammeter.	05	
(b)	An emf of 0.45V is induced across the ends of a metal bar due to its motion in a magnetic field of 0.22T . How much field is required to produce 1.5V emf?	03	
7.(a)	Describe the effect of inductance in an A.C Circuit.	05	
(b)	The current flowing into the base of a transistor is $100\mu\text{A}$. Find its collector current I_C , its emitter current I_E , and the ratio I_C/I_E , if the value of current gain β is 100.	03	
8.(a)	What is meant by strain energy? Derive the relation for strain energy from force-extension graph.	05	
(b)	Yellow light of 577 nm wavelength is incident on a cesium surface. The stopping voltage is found to be 0.25V. Find (a) the maximum K.E of photoelectrons (b) the work function of cesium	03	
9.(a)	What is Nuclear Reactor? Explain different parts of a power reactor.	05	
(b)	Calculate the longest wavelength of radiation for the Paschen series.	03	

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Paper Code Number: 4478		2024 (1 st -A) INTERMEDIATE PART-II (12 th Class)		Roll No:	
PHYSICS PAPER-II GROUP-II					
TIME ALLOWED: 20 Minutes		OBJECTIVE		MAXIMUM MARKS: 17	
Q.No.1	You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question.				
S.#	QUESTIONS	A	B	C	D
1	Half life of uranium-239 is:	24.5 min	25.5 min	23.5 min ●	26.5 min
2	The building blocks of protons and neutrons are called:	Positron	Quarks ●	Electron	Neutron
3	If the medium between the charges is not free space, then electrostatic force will:	Increase	Decrease ●	Remains constant	Infinite
4	Negative sign in equation $E = -\frac{\Delta V}{\Delta r}$ shows:	Decreasing potential ●	Increasing potential	Increasing strength	Magnitude
5	Reciprocal of resistivity is called:	Inductance	Conductance ●	Conductivity	Resistance
6	A charged particle enters in a strong magnetic field its K.E:	Increases	Infinite	Decreases	Remains same ●
7	When a charged particle is projected perpendicular to a uniform magnetic field, its path is:	Helix	Circular ●	Spiral	Ellipse
8	If the angular frequency of A.C generator is doubled, the time period will be:	Doubled	Four times	Half ●	One fourth
9	Split ring are used in:	D.C motor ●	Transformer	A.C generator	A.C motor
10	Root mean square value of voltage is:	$\sqrt{2}V_o$	$\frac{V_o}{2}$	$\frac{V_o}{\sqrt{2}} \bullet$	$2V_o$
11	The phase of A.C at positive peak from origin is:	$\frac{\pi}{4}$	$\frac{\pi}{2} \bullet$	$\frac{3\pi}{2}$	π
12	Which is pentavalent impurity?	Gallium	Boron	Indium	Antimony ●
13	Which component of the transistor has lowest concentration of impurity?	Base ●	Emitter	Collector	Resistor
14	Bolean expression for AND gate is:	$X = A + B$	$X = \overline{A \cdot B}$	$X = A \cdot B \bullet$	$X = \overline{A + B}$
15	Compton shift for wavelength is minimum for scattering angle $\theta =$	90°	0°	$45^\circ \bullet$	270°
16	At higher energies more then 1.02 MeV the dominant process is:	Compton effect	Photoelectric effect	Fission process	Pair production ●
17	Electron normally can reside in excited state for about:	$10^{-8} s$	$10^{-3} s \bullet$	$10^{-6} s$	$10^8 s$

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INTERMEDIATE PART-II (12 th Class)		2024 (1 st -A)	Roll No:
PHYSICS PAPER-II GROUP-II			
TIME ALLOWED: 2.40 Hours		SUBJECTIVE	MAXIMUM MARKS: 68
NOTE: Write same question number and its parts number on answer book, as given in the question paper.			
SECTION-I			
2. Attempt any eight parts.			8 × 2 = 16
(i)	Describe the force or forces on a positive point charge when placed between parallel plates. (a) with similar and equal charges (b) with opposite and equal charges		
(ii)	Do electrons tend to go to region of high potential or of low potential?		
(iii)	Two opposite point charges, each of magnitude q are separated by a distance $2d$. What is the electric potential at a point P mid way between them?		
(iv)	Sketch the graphs for charging and discharging of a capacitor.		
(v)	How can a current loop be used to determine the presence of a magnetic field in a given region of space?		
(vi)	How can you use a magnetic field to separate isotopes of chemical element?		
(vii)	How can a galvanometer be converted into an ammeter? Also write down the formula to adjust the shunt resistance.		
(viii)	Define CRO and write down its principle.		
(ix)	If a nucleus has half-life of 1 year, does this mean that it will be completely decayed after 2 years? Explain.		
(x)	What do you understand by "background radiation"? State two sources of this radiation.		
(xi)	Explain the effects of low level radiation and high level radiation.		
(xii)	Explain the p-p reaction in the sun with the help of equations.		
3. Attempt any eight parts.			8 × 2 = 16
(i)	Give two differences between Electromotive force and Potential difference.		
(ii)	What is Open circuit and Closed circuit?		
(iii)	Calculate the terminal potential difference across an external resistance when a current 0.5A flowing in a circuit. The emf is 2V and source of emf has internal resistance 1Ω .		
(iv)	Name the device that will (a) permit flow of direct current but oppose the flow of alternating current (b) permit flow of alternating current but not the direct current		
(v)	How the reception of a particular radio station is selected on your radio set?		
(vi)	Find the capacitance required to construct a resonance circuit of frequency 1000kHz with an inductor of 5mH.		
(vii)	Define Proportional limit and Ultimate tensile strength.		
(viii)	How n-type semi conductor is formed by the process of doping?		
(ix)	What is the difference between Ferromagnetic and Paramagnetic substances?		
(x)	What is Electronics? Write down only names of electronic devices (at least two).		
(xi)	Why +ve terminal of a battery is connected with p-type and -ve terminal with n-type region.		
(xii)	Explain briefly Light emitting diode.		
4. Attempt any six parts.			6 × 2 = 12
(i)	What is to be done in order to enhance the magnetic flux in transformer?		
(ii)	In a certain region, the earth's magnetic field points vertically down. When a plane flies due north, which wingtip is positively charged?		
(iii)	Four unmarked wires emerge from a transformer. What steps would you take to determine the turns ratio?		
(iv)	State Stefan-Boltzmann law and write its mathematical relation.		
(v)	The classical theory cannot explain the threshold frequency of light. Why? Explain.		
(vi)	If an electron and a proton have the same de Broglie wavelength, which particle has greater speed?		
(vii)	What advantages an electron microscope has over an optical microscope?		
(viii)	How line spectra can be used for the identification of elements? Explain.		
(ix)	Explain why laser action cannot occur without population inversion between atomic levels?		
SECTION-II			
NOTE: Attempt any three questions.			3 × 8 = 24
5.(a)	Define Xerography. Draw the schematic diagram of a photocopier and explain its working.	05	
(b)	How many electrons pass through an electric bulb in one minute if the 300 mA current is passing through it?	03	
6.(a)	State Ampere's law. Apply it to find magnetic field inside the solenoid.	05	
(b)	A D.C motor operates at 240V and has a resistance of 0.5Ω . When the motor is running at normal speed, the armature current is 15A. Find the back emf in the armature.	03	
7.(a)	Describe the A.C through R.C series circuit.	05	
(b)	Calculate the gain of non-inverting amplifier as shown in given figure:	03	
			
8.(a)	What is Compton effect? Derive relation for Compton shift? Also discuss it for $\theta=0^\circ$ and $\theta=90^\circ$	05	
(b)	The length of a steel wire is 1.0 m and its cross-sectional area is $0.03 \times 10^{-4} m^2$. Find the work done in stretching the wire when a force of 100N is applied on it. Where $Y = 3.0 \times 10^{11} Nm^{-2}$.	03	
9.(a)	What is Nuclear Reactor? Describe function of its main parts.	05	
(b)	The wavelength of $K X$ - ray from copper is $1.377 \times 10^{-10} m$. What is the energy difference between the two levels from which this transition results?	03	

Paper Code
Number: 4473

2023 (1st-A)
INTERMEDIATE PART-II (12th Class)

Roll No:

PHYSICS PAPER-II GROUP-I

Multan Board-2023

TIME ALLOWED: 20 Minutes	OBJECTIVE	MAXIMUM MARKS: 17
Q.No.1 You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question.		
S.#	QUESTIONS	
1	Root mean square value of an alternating voltage is:	<div style="display: flex; justify-content: space-between; width: 100%;"> <div>A $\frac{V_o^2}{\sqrt{2}}$</div> <div>B $\frac{V_o}{\sqrt{2}}$</div> <div>C $\frac{V_o^2}{2}$</div> <div>D $\frac{V_o}{2}$</div> </div>
2	Power dissipated in a pure inductor is:	<div style="display: flex; justify-content: space-between; width: 100%;"> <div>A Zero</div> <div>B Infinite</div> <div>C Small</div> <div>D Maximum</div> </div>
3	The value of potential barrier for silicon at room temperature is:	<div style="display: flex; justify-content: space-between; width: 100%;"> <div>A 0.3V</div> <div>B 0.5V</div> <div>C 0.7V</div> <div>D 0.9V</div> </div>
4	The ratio of impurity addition in an intrinsic semiconductor is:	<div style="display: flex; justify-content: space-between; width: 100%;"> <div>A 1 to 10³</div> <div>B 1 to 10⁴</div> <div>C 1 to 10⁵</div> <div>D 1 to 10⁶</div> </div>
5	SI unit of current gain of transistor is:	<div style="display: flex; justify-content: space-between; width: 100%;"> <div>A Coulomb</div> <div>B Ampere</div> <div>C No unit</div> <div>D Farad</div> </div>
6	When platinum wire is heated, it appears cherry red at temperature:	<div style="display: flex; justify-content: space-between; width: 100%;"> <div>A 500°C</div> <div>B 900°C</div> <div>C 1100°C</div> <div>D 1300°C</div> </div>
7	A photocell is base on:	<div style="display: flex; justify-content: space-between; width: 100%;"> <div>A Photoelectric effect</div> <div>B Polarization</div> <div>C Time dilation</div> <div>D Compton effect</div> </div>
8	Normally an electron can reside in excited state for about:	<div style="display: flex; justify-content: space-between; width: 100%;"> <div>A 10⁻¹⁰ s</div> <div>B 10⁻⁴ s</div> <div>C 10⁻⁸ s</div> <div>D 10⁻⁸ s</div> </div>
9	Dead time of the counter is:	<div style="display: flex; justify-content: space-between; width: 100%;"> <div>A ~10⁻⁷ s</div> <div>B ~10⁻⁶ s</div> <div>C ~10⁻⁴ s</div> <div>D ~10⁻⁵ s</div> </div>
10	The building blocks of protons and neutrons are called:	<div style="display: flex; justify-content: space-between; width: 100%;"> <div>A Quarks</div> <div>B Electrons</div> <div>C Protons</div> <div>D Ions</div> </div>
11	The unit of an electric field is:	<div style="display: flex; justify-content: space-between; width: 100%;"> <div>A Henry</div> <div>B Faraday</div> <div>C Watt</div> <div>D Oersted</div> </div>
12	Electric field intensity due to an infinite sheet of charge is:	<div style="display: flex; justify-content: space-between; width: 100%;"> <div>A $E = \frac{2\sigma}{\epsilon_o}$</div> <div>B $E = 2\sigma\epsilon_o$</div> <div>C $E = \frac{\sigma}{2\epsilon_o}$</div> <div>D $E = \frac{\sigma}{\epsilon_o}$</div> </div>
13	The value of drift velocity of electrons is of the order of:	<div style="display: flex; justify-content: space-between; width: 100%;"> <div>A 10³ ms⁻¹</div> <div>B 10² ms⁻¹</div> <div>C 10⁻³ ms⁻¹</div> <div>D 10⁻² ms⁻¹</div> </div>
14	Formula for shunt resistance R_s is:	<div style="display: flex; justify-content: space-between; width: 100%;"> <div>A $R_s = \frac{I_g}{I - I_g} R_g$</div> <div>B $R_s = \frac{V_g}{I - I_g} R_g$</div> <div>C $R_s = \frac{I - I_g}{I_g} R_g$</div> <div>D $R_s = \frac{I - I_g}{I_g R_g}$</div> </div>
15	Voltmeter is connected in the circuit in:	<div style="display: flex; justify-content: space-between; width: 100%;"> <div>A Perpendicular</div> <div>B Parallel</div> <div>C Series</div> <div>D Anti parallel</div> </div>
16	The principle of an A.C. generator is base on:	<div style="display: flex; justify-content: space-between; width: 100%;"> <div>A Mutual Induction</div> <div>B Lenz's law</div> <div>C Self induction</div> <div>D Faraday's law of electromagnetic induction</div> </div>
17	When the motor is just started, back emf always:	<div style="display: flex; justify-content: space-between; width: 100%;"> <div>A Becomes zero</div> <div>B Decreases</div> <div>C Remains same</div> <div>D Increases</div> </div>

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PHYSICS PAPER-II GROUP-I	Multan Board-2023	
TIME ALLOWED: 2.40 Hours	SUBJECTIVE	MAXIMUM MARKS: 68
NOTE: Write same question number and its parts number on answer book, as given in the question paper.		

SECTION-I

2. Attempt any eight parts.		8 × 2 = 16
(i) State Gauss's law.	(ii) What is the function of ECG?	
(iii) Do electrons tend to go to region of high potential or of low potential?		
(iv) Draw q – t curve for charging process and from this curve define capacitive time constant.		
(v) Define tesla and write relation between tesla and Gauss.		
(vi) Why a voltmeter is always connected in parallel in circuit?		
(vii) If the length of the solenoid is doubled by keeping number of turns constant for steady current then what should be the new value of the magnetic field?		
(viii) If a charged particle moves in a straight line through some region of space, can you say that magnetic field in that region is zero?		
(ix) Name the six quarks.	(x) What is the function of dosimeter?	
(xi) What are isotopes? What do they have in common and what their differences?		
(xii) Discuss the advantages and disadvantages of fission power from the point of safety, pollution and resources.		
3. Attempt any eight parts.		8 × 2 = 16
(i) Do bends in a wire affect its electrical resistance? Explain.		
(ii) Describe a circuit which will give a continuously varying potential.		
(iii) What is a series resistance circuit? How would equivalent resistance be calculated in such circuit?		
(iv) A sinusoidal current has rms value of 10A. What is maximum or peak value?		
(v) How the reception of a particular radio station is selected on your radio set?		
(vi) What is power factor of a pure (a) resistive circuit (b) inductive circuit?		
(vii) What is meant by strain energy? How can it be determined from force-extension graph?		
(viii) How would you justify that Young's modulus of fluids is zero?		
(ix) How existing view of magnetism forbids presence of an isolated magnetic pole?		
(x) Why ordinary silicon diodes do not emit light?		
(xi) Draw circuit diagram of half wave rectifier and its output waveform for sinusoidal input.		
(xii) Define open loop voltage gain of an operational amplifier. What is its value for a typical operational amplifier?		
4. Attempt any six parts.		6 × 2 = 12
(i) Is it possible to change both the area and the magnetic field passing through the loop and still not have an induced emf in the loop?		
(ii) Can a step-up transformer increase the power level?		
(iii) Why self induced emf is also called as back emf?		
(iv) A beam of red light and a beam of blue light have exactly the same energy. Which beam contains the greater number of photons?		
(v) Why don't we observe a Compton effect with visible light?		
(vi) Describe the dual nature of energy and matter.		
(vii) Which has the lower energy quanta? Radiowaves or X-rays?		
(viii) Why Neon is mixed with Helium in Ne – He laser?		
(ix) What do we mean when we say that the atom is excited?		

SECTION-II

NOTE: Attempt any three questions.		3 × 8 = 24
5.(a) Derive the relation for capacitance of parallel plate capacitor and hence define dielectric constant.		5
(b) A platinum wire has resistance of 10Ω at 0°C and 20Ω at 273°C. Find the value of temperature co-efficient of resistance of platinum.		3
6.(a) Derive an expression of force on a moving charge in a magnetic field.		5
(b) A Square coil side 16cm has 200 turns and rotates in a uniform magnetic field of magnitude 0.05T. If the peak emf is 12V. What is angular velocity of coil?		3
7.(a) What is rectification? Draw diagram and explain working of full wave rectifier.		5
(b) Find the value of the current and inductive reactance when A.C. voltage of 220V at 50Hz is passed through an inductor of 10H.		3
8.(a) What is photoelectric effect? How its different results were successfully explained by Einstein?		5
(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.		3
9.(a) What is mass defect and binding energy? Draw the graph between binding energy per nucleus and nucleus number. Also explain this curve.		5
(b) Electrons in an X-ray tube are accelerated through a potential difference 3000V. If these electrons are slow down in a target, what will be the minimum wavelength of X-rays produced?		3

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PHYSICS PAPER-II GROUP-II		
TIME ALLOWED: 2.40 Hours	SUBJECTIVE	MAXIMUM MARKS: 68
NOTE: Write same question number and its parts number on answer book, as given in the question paper.		

SECTION-I

2. Attempt any eight parts.		8 × 2 = 16
(i)	Suppose that you follow an electric field line due to a positive point charge. Do electric field increase or decrease?	
(ii)	If a point charge q of mass m is released in a non-uniform field with field lines pointing in the same direction, will it make a rectilinear motion?	
(iii)	Show that ohms times farad is equivalent to second.	
(iv)	What is a test charge? Write its any two characteristics.	
(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)	Define Lorentz force. Write role of each component of this force.	
(viii)	A proton enters this page from left to right while magnetic field is out of the page. Prove that it will be deflected towards bottom of page.	
(ix)	What factors make fusion reaction difficult to achieve?	
(x)	What is a radioactive tracer? Describe one application in medicine.	
(xi)	What are leptons? Name at least two leptons.	(xii) Define nuclear activity. Write its SI unit.
3. Attempt any eight parts.		8 × 2 = 16
(i)	Is the filament resistance lower or higher in a 500W, 220V light bulb than in a 100W, 220V bulb?	
(ii)	How the bridge circuit is used to determine an unknown resistance?	
(iii)	Why heat is produced in a conductor due to flow of electric current?	
(iv)	Describe amplitude modulation with diagram.	
(v)	Describe the condition which will make the reactance of capacitor small.	
(vi)	Describe two advantages of a 3phase A.C. supply.	
(vii)	Differentiate between crystalline and amorphous solids.	
(viii)	Draw stress-strain curves for ductile and brittle materials.	
(ix)	How can the conductivity of a semi-conductor be raised?	
(x)	The anode of a diode is 0.2 volts positive with respect to its cathode. Is it forward biased?	
(xi)	What is the biasing requirement of the junctions of a transistor for its normal operations?	
(xii)	What is importance of use of a semi-conductor in electronic circuits? Explain.	
4. Attempt any six parts.		6 × 2 = 12
(i)	How can the spectrum of hydrogen contain so many lines, when hydrogen contain one electron?	
(ii)	Will bright light eject more electrons from a metal surface than dimmer light of same colour?	
(iii)	Why don't we observe Compton effect with visible light?	
(iv)	Can an electric motor be used to drive an electric generator with the output from generator being used to operate the motor?	
(v)	In a certain region the earth's magnetic field point vertically downward. When a plane flies due north, which wingtip is positively charged?	
(vi)	What is the importance of minus sign in the expression? $\epsilon = -\frac{N\Delta\phi}{\Delta t}$	
(vii)	What is threshold frequency in photoelectric effect?	
(viii)	What do you mean by annihilation of matter?	(ix) Write down two postulates of Bohr's theory.

SECTION-II

NOTE: Attempt any three questions.		3 × 8 = 24
5.(a)	What is Wheatstone bridge? Explain and prove the principle of Wheatstone bridge.	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)	What is transformer? Derive its equation and discuss power losses in the transformer.	5
(b)	The resistance of a galvanometer is 50 ohm and reads full scale deflection with a current of 2.0 mA. Show by a diagram how to convert this galvanometer into voltmeter reading 200V full scale.	3
7.(a)	What is an operational amplifier? Describe the use of operational amplifier as non-inverting O.P. amplifier and find its gain.	5
(b)	A $10mH$, 20Ω coil is connected across 240V and $180/\pi$ Hz source. How much power does it dissipate?	3
8.(a)	Derive an expression for strain energy in deformed material.	5
(b)	What is the de Broglie wavelength of an electron whose kinetic energy is 120 eV.	3
9.(a)	Write postulates of Bohr's Model. Prove that radii and energy of electron is quantized in hydrogen atom.	5
(b)	Find the mass defect and binding energy for tritium. If the atomic mass of tritium is 3.016049 U, Mass of neutron = 1.008665U, Mass of proton = 1.007276 U, Mass of electron = 0.00055 U	3

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 bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. No credit will be awarded in case BUBBLES are not filled. Do not solve question on this sheet of OBJECTIVE PAPER.

Q.No.1



- (1) $\frac{\text{sec}}{\text{ohm}}$ is equal to:
 (A) Coulomb (B) Farad (C) Joule (D) Ampere
- (2) S.I unit of electric flux is:
 (A) NC^{-1} (B) Nm^2C^{-1} (C) NmC^{-1} (D) NmC^2
- (3) A thermistor is a heat sensitive:
 (A) Resistor (B) Capacitor (C) Inductor (D) Diode
- (4) S.I unit of magnetic flux density is:
 (A) Wb m (B) Wb m^{-1} (C) Wb m^{-2} (D) Wb m^{-3}
- (5) If 300 turns of wire are wound on 30cm length, then number of turns per unit length is:
 (A) 10 (B) 20 (C) 100 (D) 1000
- (6) The principle of A.C generator is:
 (A) Mutual induction (B) Self induction (C) Electromagnetic induction (D) All of these
- (7) Energy density in inductor is given by:
 (A) $\frac{1}{2} \frac{B}{\mu_0}$ (B) $\frac{1}{2} \frac{B}{\mu_0^2}$ (C) $\frac{1}{2} \frac{B^2}{\mu_0}$ (D) $\frac{1}{2} \frac{B^2}{\mu_0}$
- (8) The device which allows only the flow of D.C is:
 (A) Capacitor (B) Resistor (C) Inductor (D) Generator
- (9) In R.L.C series circuit resonance occurs when:
 (A) $X_C > X_L$ (B) $X_L > X_C$ (C) $X_L \gg X_C$ (D) $X_L = X_C$
- (10) The Curie temperature for iron is:
 (A) 923 K (B) 1023 K (C) 823 K (D) 723 K
- (11) For non-inverting amplifier, if $R_1 = \infty \text{ ohm}$, $R_2 = 0 \text{ ohm}$ then gain of amplifier is:
 (A) 2 (B) 0 (C) 1 (D) Infinite
- (12) The current gain " β " of a transistor is given by:
 (A) $\frac{I_C}{I_B}$ (B) $\frac{I_E}{I_C}$ (C) $\frac{I_B}{I_C}$ (D) $\frac{I_E}{I_B}$
- (13) The rest mass of X - ray photon is:
 (A) $1.6 \times 10^{-19} \text{ kg}$ (B) $9.1 \times 10^{-31} \text{ kg}$ (C) $1.67 \times 10^{-27} \text{ kg}$ (D) Zero
- (14) When platinum wire is heated, it becomes white at temperature:
 (A) 900°C (B) 1100°C (C) 1300°C (D) 1600°C
- (15) The value of Rydberg constant is:
 (A) $1.0974 \times 10^7 \text{ m}^{-1}$ (B) $1.0974 \times 10^{-7} \text{ m}^{-1}$ (C) $1.0974 \times 10^{11} \text{ m}^{-1}$ (D) $1.0974 \times 10^{-11} \text{ m}^{-1}$
- (16) When γ - rays are emitted, the nuclear mass of an element:
 (A) Increases by 2 units (B) Increases by 1 unit (C) Decreases by 4 units (D) Does not change
- (17) The particles equal in mass or greater than proton are:
 (A) Baryons (B) Hadrons (C) Fermions (D) Mesons

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

SECTION-I

2. Attempt any eight parts.



8 × 2 = 16

- (i) Electric lines of force never cross. Explain why?
- (ii) 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?
- (iii) Prove that $1 \frac{\text{volt}}{\text{meter}} = 1 \frac{\text{Newton}}{\text{Coulomb}}$
- (iv) A particle carrying a charge of $2e$ falls through a potential difference of $3.0V$. Find energy acquired by it.
- (v) How can you use a magnetic field to separate isotopes of chemical element?
- (vi) If a charged particle moves in a straight line through some region of space, can you say that magnetic field in the region is zero?
- (vii) Draw Saw tooth voltage waveform and explain it.
- (viii) Define magnetic flux and one Tesla.
- (ix) Does the induced emf in a circuit depend on the resistance of the circuit?
- (x) How would you position a flat loop of wire in a changing magnetic field, so that there is no emf induced in the loop?
- (xi) A metal rod of length $25cm$ is moving at speed of $0.5m/s$ in a direction perpendicular to a $0.25T$ magnetic field. Find the emf produced in the rod.
- (xii) Define motional emf and write its mathematical expression.

3. Attempt any eight parts.

8 × 2 = 16

- (i) Do bends in a wire affect its electrical resistance? Explain.
- (ii) Why does the resistance of a conductor rise with temperature?
- (iii) State Kirchhoff's Second Rule and write its equation.
- (iv) In a R-L circuit will the current lag or lead the voltage? Illustrate your answer by a vector diagram.
- (v) How does doubling the frequency affect the reactance of (a) an inductor (b) a capacitor
- (vi) Write four properties of parallel resonance circuit.
- (vii) Distinguish between ductile and brittle substances.
- (viii) Define modulus of elasticity. Show that the units of modulus of elasticity and stress are the same.
- (ix) Write a brief note on superconductor.
- (x) What is rectification, write its two types.
- (xi) Why is the base current in a transistor very small?
- (xii) Why ordinary silicon diodes do not emit light?

4. Attempt any six parts.

6 × 2 = 12

- (i) Discuss the variation of photoelectric current with the intensity of light falling on plate of photocell.
- (ii) Which photon, red, green or blue carries the most (a) energy and (b) momentum.
- (iii) What advantages an electron microscope has over an optical microscope?

- (iv) What are characteristic X – rays? How are they originated from the atoms?
- (v) Can the electron in the ground state of hydrogen absorb a photon of energy 13.6 eV and greater than 13.6 eV ?
- (vi) Why is the mass of a nucleus less than the total mass of constituent particles? Where is this mass lost?
- (vii) What is the difference between hadrons and leptons?
- (viii) A particle which is more ionizing is less penetrating. Why?
- (ix) What do you understand by “back ground radiation”? State two sources of this radiation.



SECTION-II

NOTE: Attempt any three questions.

3 × 8 = 24

- 5.(a) Derive an expression for the energy stored in the capacitor. 5
- (b) The potential difference between the terminals of a battery in open circuit is 2.2 V . When it is connected across a resistance of 5.0Ω . The potential falls to 1.8 V . Calculate the current and the internal resistance of the battery. 3
- 6.(a) Define self induction. Prove that in case of inductor, the energy density is directly proportional to the square of magnetic field. 5
- (b) A power line 10 m high carries a current 200 A . Find the magnetic field of the wire at the ground. 3
- 7.(a) Describe A.C through R–C series circuit. 5
- (b) In a circuit, the transistor has a current 10 mA at collector and base current $40\mu\text{ A}$. What is the current gain of the transistor? 3
- 8.(a) What are intrinsic and extrinsic semiconductors? How the P – type and N – type materials are formed? 5
- (b) Calculate the energy (in MeV) released in the following fusion reaction: 3

$${}^2_1\text{H} + {}^3_1\text{H} \longrightarrow {}^4_2\text{He} + {}^1_0\text{n}$$
- 9.(a) What is photoelectric effect? Write two results of this effect which cannot be explained by classical electromagnetic theory. Explain them on the basis of quantum theory. 5
- (b) A tungsten target is struck by electron that have been accelerated from rest through 40 kV potential difference. Find the shortest wavelength of the bremsstrahlung radiation emitted. 3

PHYSICS PAPER-II GROUP-II

TIME ALLOWED: 20 Minutes

MAXIMUM MARKS: 17

OBJECTIVE

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. No credit will be awarded in case BUBBLES are not filled. Do not solve question on this sheet of OBJECTIVE PAPER.

Q.No.1



- (1) The SI unit of Impedance is:
 (A) Henry (B) Hertz (C) Ohm (D) Volt
- (2) Which one of the following is the example of crystalline solid?
 (A) Plastic (B) Glass (C) Rubber (D) Zirconia
- (3) Which component of the transistor has greater concentration of impurity?
 (A) Base (B) Emitter (C) Collector (D) Resistor
- (4) In full wave rectification, the numbers of diodes required is:
 (A) 4 (B) 3 (C) 1 (D) 5
- (5) Plank's constant ' h ' has the same unit as that of:
 (A) Angular momentum (B) Linear velocity (C) Torque (D) Power
- (6) The factor $\frac{h}{m_0 c}$ has the dimension of:
 (A) Mass (B) Time (C) Length (D) Power
- (7) The radius of 10th orbit of hydrogen atom in nm is:
 (A) 0.53 (B) 51.3 (C) 5.3 (D) 53
- (8) The binding energy per nucleon is maximum for:
 (A) Iron (B) Helium (C) Radium (D) Copper
- (9) Which of the following is highly penetrating?
 (A) α - particles (B) γ - rays (C) X - rays (D) β - particles
- (10) The force on electron in an electric field of magnitude 10^4 NC^{-1} is:
 (A) $1.9 \times 10^{-15} \text{ N}$ (B) $1.6 \times 10^{-15} \text{ N}$ (C) $1.6 \times 10^{-8} \text{ N}$ (D) $1.8 \times 10^{-15} \text{ N}$
- (11) The total electric flux through any closed surface depends upon:
 (A) Charge (B) Medium (C) Geometry of closed surface (D) Both A and B
- (12) Heat generated by a 50 watt bulb in one hour is:
 (A) 36000 J (B) 48000 J (C) 1800 J (D) 180000 J
- (13) One Tesla(T) is equal to:
 (A) 1 NA^{-1} (B) 1 Nm^{-1} (C) $1 \text{ NA}^{-1} \text{ m}$ (D) $1 \text{ NA}^{-1} \text{ m}^{-1}$
- (14) A 5 meter wire carrying a current of 2A is at right angle to uniform magnetic field of 0.5 Tesla. The force on the wire is:
 (A) 5N (B) 4N (C) 2N (D) 1.5N
- (15) Lenz's law is in accordance with the law of conservation of:
 (A) Mass (B) Momentum (C) Energy (D) Charge
- (16) The emf induced in 1mH inductor in which current changes from 5A to 3A in 1ms is:
 (A) $2 \times 10^{-6} \text{ V}$ (B) 2V (C) $6 \times 10^{-6} \text{ V}$ (D) 8V
- (17) Current leads the applied voltage in pure _____ circuit.
 (A) Resistive (B) Capacitive (C) Inductive (D) Reactive

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

SECTION-I



2. Attempt any eight parts.

8 × 2 = 16

- (i) How can you identify that which plate of capacitor is positively charged?
- (ii) Is \vec{E} necessarily zero inside a charged rubber balloon if balloon is spherical?
Assume that charge is distributed uniformly over the surface.
- (iii) Define surface charge density. Also give its S.I unit.
- (iv) Describe the change in the magnetic field inside a solenoid carrying a steady current I ,
if (a) length of solenoid is doubled but number of turns remains same and
(b) the number of turns is doubled but length remains the same.
- (v) What are dissimilarities between electric and gravitational forces?
- (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) Write down the main parts of C.R.O.
- (viii) Define magnetic induction, also define its unit.
- (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) 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?
- (xi) Name the factors upon which self inductance depends?
- (xii) Write down two methods for producing the induced emf in a loop.

3. Attempt any eight parts.

8 × 2 = 16

- (i) Do bends in a wire affect its electrical resistance? Explain.
- (ii) Why does the resistance of a conductor rise with increase of temperature?
- (iii) Write two uses of potentiometer.
- (iv) A sinusoidal current has rms value of 10 A. What is maximum or peak value?
- (v) In a R-L circuit, will the current lag or lead the voltage? Illustrate your answer by a vector diagram.
- (vi) What is the advantage of three phase A.C supply over single phase A.C?
- (vii) Distinguish between crystalline, amorphous and polymeric solids.
- (viii) What are superconductors? Write its two applications.
- (ix) Why does doping not change the basic structure of the solid? Explain.
- (x) Why does light emitting diodes emit visible light?
- (xi) What is the net charge on a n -type or a p -type substance?
- (xii) Why ordinary silicon diodes do not emit light?

4. Attempt any six parts.

6 × 2 = 12

- (i) Will bright light eject more electrons from a metal surface than dimmer light of the same colour?
- (ii) Will higher frequency light eject greater number of electrons than low frequency light?
- (iii) Write the name of any four applications of photocell.

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- (iv) Write any two uses of Laser in medicine and industry.
- (v) What do we mean when we say that the atom is excited?
- (vi) What is fission chain reaction?
- (vii) For what purpose, bromine is mixed with principal gas in Geiger tube?
- (viii) What information is revealed by the length and shape of the tracks of an incident particle in Wilson cloud chamber?
- (ix) What factors make a fusion reaction difficult to achieve?



SECTION-II

NOTE: Attempt any three questions.

3 × 8 = 24

- 5.(a) Compare the properties of electric and gravitational force. 5
- (b) A platinum wire has resistance of 10Ω at $0^\circ C$ and 20Ω at $273^\circ C$. Find the value of temperature co-efficient of resistance of platinum. 3
- 6.(a) Define mutual induction. Also derive an expression for induced *emf* in the secondary coil. 5
- (b) A coil of $0.1m \times 0.1m$ and of 200 turns carrying a current of $1.0mA$ is placed in a uniform magnetic field of $0.1T$. Calculate the maximum torque that acts on the coil. 3
- 7.(a) What is operational amplifier. Derive the relation for the gain of non-inverting amplifier. 5
- (b) Find the value of current flowing through a capacitance $0.5\mu F$. When connected to a source of $150V$ at $50Hz$ 3
- 8.(a) What is fusion reaction? Discuss in detail. What is the major source of heat and light in the Sun? 5
- (b) What stress would cause a wire to increase in length by 0.01% if the Young's modulus of the wire is $12 \times 10^{10} Pa$? What force would produce this stress if the diameter of the wire is $0.56 mm$? 3
- 9.(a) What is photoelectric effect? Explain it on the basis of quantum theory. 5
- (b) Find the speed of the electron in the first Bohr's orbit. 3

PHYSICS PAPER-II (NEW SCHEME) GROUP-I

TIME ALLOWED: 20 Minutes

OBJECTIVE

MAXIMUM MARKS: 17

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. Attempt as many questions as given in objective type question paper and leave others blank. No credit will be awarded in case BUBBLES are not filled. Do not solve questions on this sheet of OBJECTIVE PAPER.

Q.No.1

- (1) The study of electric charges at rest under the action of electric forces is known as:
(A) Electromagnetism (B) Electrostatics (C) Magnetic Induction (D) Electric field
- (2) A particle carrying a charge of $2e$ falls through a potential difference of $3V$.
The energy acquired by it is:
(A) $9.6 \times 10^{-18} J$ (B) $9.6 \times 10^{-19} J$ (C) $1.6 \times 10^{-19} J$ (D) $9.6 \times 10^{-17} J$
- (3) Kirchhoff's 2nd rule is a manifestation of law of conservation of:
(A) Energy (B) Charge (C) Mass (D) Momentum
- (4) Formula for magnetic field due to solenoid is given by:
(A) $\mu_0 I$ (B) $\mu_0 nI$ (C) $\mu_0 SI$ (D) $\mu_0 n\ell$
- (5) The value of permeability of free space ' μ_0 ' is:
(A) $4\pi \times 10^{-7} Wb A^{-1} m^{-1}$
(B) $4\pi \times 10^7 Wb A^{-1} m^{-1}$ (C) $4\pi \times 10^{-7} Wb Am^{-1}$ (D) $4\pi \times 10^7 Wb Am^{-1}$
- (6) 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 Law of Electromagnetic Induction
- (7) Electric current produces magnetic field was discovered by:
(A) Faraday (B) Maxwell (C) Oersted (D) Lenz
- (8) The impedance of R - L series circuit is:
(A) $Z = \sqrt{R^2 + X_L^2}$ (B) $Z = \sqrt{R^2 + X_C^2}$ (C) $Z = \sqrt{R + X_L}$ (D) $Z = R$
- (9) The capacitance required to construct a resonance circuit of frequency $1000kHz$ with an inductor of $5mH$ is:
(A) $5.09 pF$ (B) $5.09 \mu F$ (C) $5.09 mF$ (D) $50.9 pF$
- (10) Substances which undergo plastic deformation until they break are called: (A) Brittle Substances
(B) Non-magnetic Substances (C) Magnetic Substances (D) Ductile Substances
- (11) The size of base of transistor is of the order of:
(A) $10^{-6} m$ (B) $10^{-5} m$ (C) $10^{-4} m$ (D) $10^{-3} m$
- (12) A two inputs NAND gate with inputs A and B has an output ' O ' if:
(A) A is O (B) B is O (C) Both A and B are O (D) Both A and B are 1
- (13) Compton wavelength is:
(A) $\frac{h}{m_0 c^2}$ (B) $\frac{hc}{m_0}$ (C) $\frac{h}{m_0 c}$ (D) $\frac{hc}{m_0 \lambda}$
- (14) The energy required for pair production is:
(A) $0.51 MeV$ (B) $1.02 MeV$ (C) $2.04 MeV$ (D) $3.06 MeV$
- (15) The relation for Balmer Series is written as:
(A) $\frac{1}{\lambda} = R_H \left(\frac{1}{2^2} - \frac{1}{n^2} \right)$ (B) $\frac{1}{\lambda} = R_H \left(\frac{1}{3^2} - \frac{1}{n^2} \right)$ (C) $\frac{1}{\lambda} = R_H \left(\frac{1}{4^2} - \frac{1}{n^2} \right)$ (D) $\frac{1}{\lambda} = R_H \left(\frac{1}{5^2} - \frac{1}{n^2} \right)$
- (16) 1 rem is equal to:
(A) $0.1 Sv$ (B) $0.01 Sv$ (C) $10 Sv$ (D) $100 Sv$
- (17) Subatomic particles are divided into:
(A) Six groups (B) Five groups (C) Four groups (D) Three groups

INTERMEDIATE PART-II (12th CLASS)

PHYSICS PAPER-II (NEW SCHEME) GROUP-I

TIME ALLOWED: 2.40 Hours

SUBJECTIVE

MAXIMUM MARKS: 68

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

SECTION-I

8 × 2 = 16

2. Attempt any eight parts.

- (i) Suppose that you follow an electric field line due to a positive point charge. Do electric field and the potential increase or decrease?
- (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 within surface?
- (iii) What are the factors upon which the electric flux depend?
- (iv) Differentiate between electrical potential difference and electric potential at a point.
- (v) How can a current loop be used to determine the presence of a magnetic field in a given region of space?
- (vi) Why does the picture on a TV screen become distorted when a magnet is brought near the screen?
- (vii) What is galvanometer? On which principle it works?
- (viii) What is Magnetic Flux Density? Also write its unit.
- (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) A suspended magnet is Oscillating freely in a horizontal plane. The Oscillations are strongly damped when a metal plate is placed under the magnet. Explain why does this occur?
- (xi) What is Transformer? What is its working principle?
- (xii) What is back emf effect in motors?

3. Attempt any eight parts.

8 × 2 = 16

- (i) Why does the resistance of a conductor rise with temperature?
- (ii) Is the filament resistance lower or higher in a 500W, 220V light bulb than in a 100W, 220V bulb?
- (iii) State Kirchhoff's first rule and write its mathematical formula.
- (iv) How many times per second will an incandescent lamp reach maximum brilliance when connected to a 50 Hz source?
- (v) How does doubling the frequency affect the reactance of (a) an inductor (b) a capacitor
- (vi) Define impedance and write the impedance expression for R – L series circuits.
- (vii) Differentiate between Ductile and Brittle substances.
- (viii) How would you obtain n-type and p-type material from pure Silicon?
- (ix) Define Modulus of elasticity. Show that the units of Modulus elasticity and stress are the same.
- (x) Write two characteristics of Op-amplifier.
- (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 the effect forward and reverse biasing of a diode on the width of depletion region?

4. Attempt any six parts.

6 × 2 = 12

- (i) A particle of mass 5.0 mg moves with speed of 8.0 ms^{-1} . Calculate de Broglie wavelength.
- (ii) Why don't we observe a Compton effect with visible light?
- (iii) Which has the lower energy quanta? Radiowaves or X-rays.
- (iv) Define Spectroscopy.
- (v) What are the advantages of Laser over ordinary light?

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- (vi) Write the names of four basic forces of nature.
- (vii) What information is revealed by the length and shape of the tracks of an incident particle in Wilson Cloud Chamber?
- (viii) What do you understand by "background radiation"? Give two sources of this radiation.
- (ix) If a nucleus has a half-life of 1(one) year, does this mean that it will be completely decayed after 2 years?



SECTION-II

NOTE: - Attempt any three questions.

3 × 8 = 24

- 5.(a) Define Electric Potential. Derive the relation of 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 coefficient of resistance of platinum. 3
- 6.(a) Define Solenoid. Derive an expression for the energy stored per unit volume inside the solenoid. 5
- (b) A power line 10.0m high carries a current 200A. Find the magnetic field of the wire at the ground. 3
- 7.(a) What are Electromagnetic Waves? Discuss principle of generation, transmission and reception of electromagnetic waves. 5
- (b) The current flowing into the base of a transistor is $100\mu\text{A}$. 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) What is meant by Strain Energy? How can it be determined from the force-extension graph? 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 0.51MeV . 3
- 9.(a) What are building blocks of matter? Explain. 5
- (b) What is the energy in eV of quanta of wavelength of $\lambda = 500\text{nm}$. 3

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PHYSICS PAPER-II (NEW SCHEME) GROUP-II

TIME ALLOWED: 20 Minutes

OBJECTIVE

MAXIMUM MARKS: 17

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. Attempt as many questions as given in objective type question paper and leave others blank. No credit will be awarded in case BUBBLES are not filled. Do not solve questions on this sheet of OBJECTIVE PAPER.

Q.No.1

- (1) The electric potential at mid point in an electric dipole is:

(A) 0.5 V	(B) 0 V	(C) 1 V	(D) 1.5 V
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- (2) Negative of potential gradient is equal to:

(A) Magnetic intensity	(B) Electric flux	(C) Electric intensity	(D) Magnetic flux
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- (3) Drift velocity of electrons is of the order of:

(A) 10^3 kms^{-1}	(B) 10^{-3} ms^{-1}	(C) 10^3 ms^{-1}	(D) 10^5 ms^{-1}
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- (4) The SI unit of magnetic induction is:

(A) Weber	(B) Gauss	(C) Tesla	(D) N/A
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- (5) A cross (x) represents the direction of magnetic field:

(A) Out of page	(B) Tangent to page	(C) Parallel to page	(D) In to the page
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- (6) The only difference between the construction of A.C and D.C generator is:

(A) Carbon Brushes	(B) Commutator	(C) Coil	(D) Magnetic field
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- (7) In three phase A.C supply, the coils are inclined at an angle of:

(A) 0°	(B) 90°	(C) 130°	(D) 120°
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- (8) The SI unit of \sqrt{LC} is:

(A) Second	(B) Ampere	(C) Hertz	(D) Farad
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- (9) In extrinsic semiconductors, doping is of the order of:

(A) 1 atom to 10^4	(B) 1 atom to 10^8	(C) 1 atom to 10^6	(D) 1 atom to 10^3
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- (10) The operation of complementation is performed by:

(A) AND Gate	(B) OR Gate	(C) XOR Gate	(D) NOT Gate
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- (11) In op-amp, the input resistance is of the order of:

(A) Several Mega Ohms	(B) Several Kilo Ohms	(C) Few Ohms	(D) Hundred Ohms
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- (12) The factor $\frac{h}{m_0 c}$ has the dimensions of:

(A) Time	(B) Mass	(C) Length	(D) Energy
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- (13) The value of Stefan's constant " σ " is given by:

(A) $5.67 \times 10^{-8} \text{ W m}^{-2} \text{ K}^{-2}$	(B) $5.67 \times 10^{-8} \text{ W m}^{-2} \text{ K}^{-1}$	(C) $5.67 \times 10^8 \text{ W m}^2 \text{ K}^2$	(D) $5.67 \times 10^{-8} \text{ W}^2 \text{ m}^2 \text{ K}^{-2}$
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- (14) The typical nuclei have diameter less than:

(A) 10^{-14} m	(B) 10^{-12} m	(C) 10^{-10} m	(D) 10^{-8} m
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- (15) The particles which do not experience strong nuclear force are called:

(A) Hadrons	(B) Baryons	(C) Leptons	(D) Mesons
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- (16) Iodine - 131 is used for the treatment of:

(A) Thyroid glands	(B) Bones	(C) Lungs	(D) Eyes
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- (17) The term $\frac{\Delta \phi}{\Delta t}$ has the same units as:

(A) Time	(B) Current	(C) Electromotive force	(D) Magnetic flux
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INTERMEDIATE PART-II (12th CLASS)**PHYSICS: PAPER-II (NEW SCHEME) GROUP-II****TIME ALLOWED: 2.40 Hours****SUBJECTIVE****MAXIMUM MARKS: 68**

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

SECTION-I**8 × 2 = 16****2. Attempt any eight parts.**

- (i) Write the names of main parts of xerography and draw its diagram.
- (ii) Define electric flux and write its formula. Also give its SI unit.
- (iii) Suppose that you follow an electric field line due to a positive point charge. Do electric field and the potential increase or decrease?
- (iv) Is \vec{E} necessarily zero inside a charged rubber balloon if balloon is spherical? Assume that charge is distributed uniformly over the surface.
- (v) A solenoid 15 cm long has 300 turns of wire. A current of 5.0 A flows through it. What is the magnitude of magnetic field inside the solenoid?
- (vi) Differentiate between sensitive and dead beat galvanometer. Also define sensitivity of galvanometer.
- (vii) Suppose that a charge q is moving in a uniform magnetic field with a velocity V . Why is there no work done by the magnetic force that acts on the charge?
- (viii) A loop of wire is suspended between the poles of a magnet with its plane parallel to the pole faces. What happens if a direct current is put through the coil? What happens if an alternating current is used instead?
- (ix) Write any two methods in which the current is induced in a coil.
- (x) Why the motor is overloaded? Give the reason.
- (xi) When an electric motor, such as an electric drill, is being used, does it also act as a generator? If so what is the consequence of this?
- (xii) Can a D.C. motor be turned into a D.C generator? What changes are required to be done?

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

- (i) Describe a circuit which will give a continuously varying potential.
- (ii) What are the difficulties in testing whether the filament of a lighted bulb obey's Ohm's law?
- (iii) Write four sources of Current.
- (iv) What is meant by A.M and F.M.?
- (v) How many times per second will an incandescent lamp reach maximum brilliance when connected to a 50 Hz source?
- (vi) What do you mean by root mean square value of voltage and write its formula?
- (vii) Distinguish between soft and hard magnetic materials with examples.
- (viii) Which is more elastic, steel or rubber? Why?
- (ix) Differentiate between ductile and brittle substances.
- (x) What is the net charge on a n-type or a p-type substance?
- (xi) What is the effect of forward and reverse biasing of a diode on the width of the depletion region?
- (xii) What is Potential Barrier? What is the value of potential barrier of Silicon and Germanium?

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

- (i) A beam of red light and a beam of blue light have exactly the same energy. Which beam contains the greater number of photons?
- (ii) We do not notice the de Broglie wavelength for a pitched cricket ball? Explain why?
- (iii) What are the measurements on which two observers in relative motion will always agree upon?

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- (iv) Can X – rays be reflected, refracted, diffracted and polarized just like any other waves? Explain.
- (v) Explain why laser action can not occur without population inversion between atomic levels?
- (vi) What do you understand by “background radiation”? State two sources of this radiation.
- (vii) How can radioactivity help in the treatment of cancer?
- (viii) If someone accidentally swallows an α – source and a β – source which would be the more dangerous to him? Why?
- (ix) Define absorbed dose(D) and write its SI unit.

SECTION-II



NOTE: - Attempt any three questions.

3 × 8 = 24

- 5.(a) What is Potentiometer? How it is used as potential divider and to measure an emf of a cell?

1 + 2 + 2

- (b) A capacitor has a capacitance of $2.5 \times 10^{-8} F$. In the charging process, electrons are removed from one plate and placed on the other one. When the potential difference between the plates is $450 V$, how many electrons have been transferred?

$(e = 1.6 \times 10^{-19} C)$

3

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

5

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

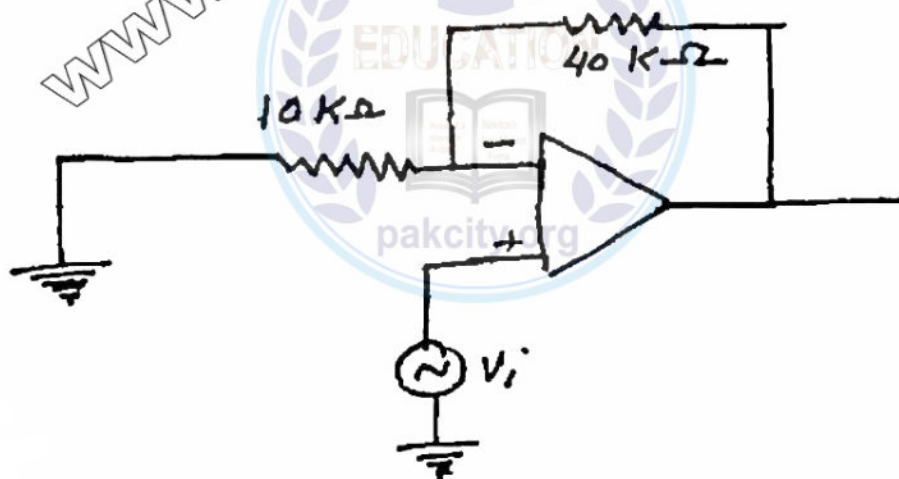
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- 7.(a) Explain the RLC parallel resonance circuit. Determine the value of resonant frequency and write down its properties.

1 + 2 + 2

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

3



- 8.(a) What is energy band theory? How behaviours of electrical conductors, insulators and semi-conductors can be explained on the basis of energy band theory.

5

- (b) A bar 1.0 m in length and located along x –axis moves with a speed of $0.75 c$ with respect to a stationary observer. What is the length of bar as measured by the stationary observer.

3

- 9.(a) State Bohr's model of Hydrogen atom. Derive relation for quantized radii.

5

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

3

PHYSICS PAPER-II (NEW SCHEME) GROUP-I

TIME ALLOWED: 20 Minutes

OBJECTIVE

MAXIMUM MARKS: 17

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. Attempt as many questions as given in objective type question paper and leave others blank. No credit will be awarded if case BUBBLES are not filled. Do not solve questions on this sheet of OBJECTIVE PAPER.

Q.No.1

(1) The phase at the positive peak is:-

- (A) Zero (B) π (C) 2π (D) $\frac{\pi}{2}$

(2) In three phase A.C. supply, if first coil has phase 0° , then the other two coils will have phases:-

- (A) 0° and 120° (B) 120° and 240° (C) 240° and 360° (D) 0° and 360°

(3) In ferromagnetic substances, domain contains atoms nearly equal to:-

- (A) 10^8 to 10^{12} (B) 10^{10} to 10^{14} (C) 10^{12} to 10^{16} (D) 10^{14} to 10^{18}

(4) _____ is the building block of every complex electronic circuit.

- (A) Semiconductor diode (B) Resistor (C) Capacitor (D) Amplifier

(5) Photodiode is used for the detection of:-

- (A) Light (B) Thermal radiation (C) Radio waves (D) Sound waves

(6) The rest mass of Photon is:-

- (A) Infinite (B) Small (C) Zero (D) $1.67 \times 10^{-27} \text{ kg}$

(7) Application of wave nature of particle is:-

- (A) Photodiode (B) Simple microscope
(C) Compound microscope (D) Electron microscope

(8) X-rays are similar in nature to:-

- (A) γ -rays (B) β -rays (C) α -rays (D) Cathode rays

(9) Hydrogen bomb is an example of:-

- (A) Nuclear fission (B) Nuclear fusion (C) Chain reaction (D) Chemical reaction

(10) Various types of cancer are treated by:-

- (A) Carbon - 14 (B) Nickel - 63 (C) Cobalt - 60 (D) Strontium - 90

(11) In photocopier, the drum is coated with a layer of:-

- (A) Copper (B) Silver (C) Selenium (D) Gold

(12) If time constant in RC series circuit is small, then capacitor is charged:-

- (A) Slowly (B) Rapidly (C) At constant rate (D) Intermittently

(13) The current flowing through each resistor of equal resistance in parallel combination is:-

- (A) Same (B) Different (C) Zero (D) Infinite

(14) Two parallel wires carrying currents in the same direction:-

- (A) Have no effect (B) Repel each other (C) Have no field around them (D) Attract each other

(15) Cathode ray oscilloscope works by deflecting beam of _____.

- (A) Protons (B) Electrons (C) Neutrons (D) Positrons

(16) The mutual inductance of the coils depends upon:-

- (A) Density of coil (B) Material of coil (C) Geometry of coil (D) Stiffness of coil

(17) A 50 mH coil carries a current of 2.0 A. Then energy stored in its magnetic field is:-

- (A) 0.1 J (B) 10 J (C) 100 J (D) 1000 J

INTERMEDIATE PART-II (12th CLASS)**PHYSICS PAPER-II (NEW SCHEME) GROUP-I**

TIME ALLOWED: 2.40 Hours

SUBJECTIVE

MAXIMUM MARKS: 68

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

SECTION-I

2. Attempt any eight parts.

8 × 2 = 16

- (i) Do electrons tend to go to region of high potential or of low potential? Explain.
- (ii) The potential is constant throughout a given region of space. Is the electrical field zero or non-zero in this region? Explain.
- (iii) Define charging and discharging of a capacitor.
- (iv) How sharks locate their prey? Explain briefly.
- (v) Can a charged particle move through a magnetic field without experiencing any magnetic force? If so then how?
- (vi) Why the resistance of an ammeter should be very low?
- (vii) How can you use a magnetic field to separate isotopes of chemical element? Explain.
- (viii) How might a loop of wire carrying a current be used as a compass? How could such a compass distinguish between north and south pole?
- (ix) Does the induced emf always act to decrease the magnetic flux through a circuit? Explain.
- (x) Can a transformer be used with D.C? Explain.
- (xi) Show that \mathcal{E} and $\frac{\Delta\phi}{\Delta t}$ have the same units.
- (xii) Can an emf be produced in a D.C. motor? Would it be possible to use motor as a generator or source? Explain.

3. Attempt any eight parts.

8 × 2 = 16

- (i) What is the resistance of a Carbon resistor if its first band is red, second band is green, third band is orange and fourth band is gold?
- (ii) Write name of any two effects of current.
- (iii) Do bends in a wire affect its electrical resistance? Explain.
- (iv) What is Impedance? Write its SI unit.
- (v) At what frequency, will an inductor of inductance 1.0 H have a reactance of 500Ω ?
- (vi) How many times per second, will an incandescent lamp reach maximum brilliance when connected to a 50 Hz source?
- (vii) Define Elasticity and Plasticity.
- (viii) Distinguish between Crystalline and Amorphous solids and give an example for each.
- (ix) What is meant by Diamagnetic Substances? Give an example.
- (x) Write the truth table of NAND gate.
- (xi) Define open loop gain of an operational amplifier.
- (xii) Why ordinary Silicon diodes do not emit light? Explain.

4. Attempt any six parts.

6 × 2 = 12

- (i) Define work function and threshold frequency.
- (ii) Why don't we observe a Compton effect with visible light?
- (iii) When does light behave as a wave? When does it behave as a particle?
- (iv) Write down two properties and two uses of x-rays.
- (v) What do we mean, when we say that the atom is excited?

- (vi) Differentiate between mass-defect and binding energy.
- (vii) Show that $1 a.m.u = 931 MeV$
- (viii) What factors make a fusion reaction difficult to achieve?
- (ix) How can radio activity help in the treatment of cancer?



SECTION-II

NOTE: - Attempt any three questions.

$3 \times 8 = 24$

5.(a) What is Rheostat? How can it be used as a variable resistor as well as potential divider? 1 + 4

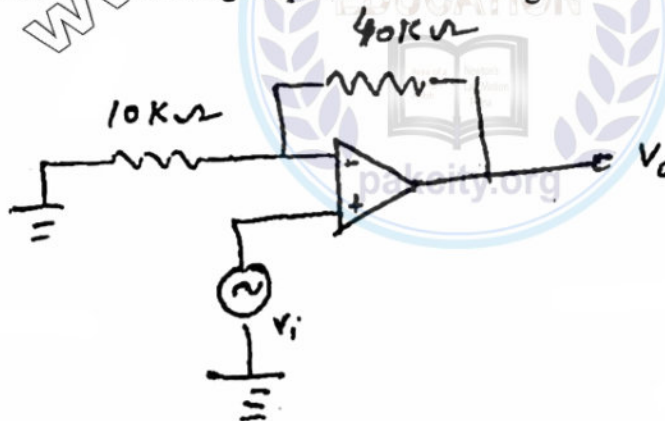
(b) Find the electric field strength required to hold suspended a particle of mass $1.0 \times 10^{-6} kg$ and charge $1.0 \mu C$ between two plates 10.0 cm apart. 3

6.(a) Define Electromagnetic Induction. Derive the expression for motional e.m.f. 1 + 4

(b) What shunt resistance must be connected across a galvanometer of 50.0Ω resistance which gives full scale deflection with $2.0 mA$ current, so as to convert it into an ammeter of range $10.0 A$? 3

7.(a) Describe an R – L – C series circuit. Draw its impedance diagram and derive expression for its resonance frequency. Also write down its two properties. 1 + 1 + 2 + 1

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



8.(a) What is assumption of de-Broglie wavelength? How is it verified experimentally by Davisson and Germer experiment? 2 + 3

(b) A 1.25 cm diameter cylinder is subjected to a load of 2500 kg. Calculate the stress on the bar in mega pascals. 3

9.(a) What are isotopes and how isotopes are separated by mass spectrograph? Explain. 1 + 4

(b) Calculate the longest wavelength of radiation for the Paschen series. 3

PHYSICS PAPER-II (NEW SCHEME) GROUP-II**TIME ALLOWED: 20 Minutes****OBJECTIVE****MAXIMUM MARKS: 17**

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. Attempt as many questions as given in objective type question paper and leave others blank. No credit will be awarded in case BUBBLES are not filled. Do not solve questions on this sheet of OBJECTIVE PAPER.

Q.No.1

- (1) The value of ϵ_r for air is:-
 (A) 1.6 (B) 1.06 (C) 1.006 (D) 1.0006
- (2) In case of photocopier, a special dry, black powder called toner is given a:-
 (A) Positive charge (B) Negative charge (C) Neutral (D) First positive then negative
- (3) The potential difference between the head and tail of an electric eel can be up to:-
 (A) 500 V (B) 600 V (C) 700 V (D) 800 V
- (4) The current flowing towards the reader can be represented by a symbol:-
 (A) Dot (B) Dash (C) Cross (D) Line
- (5) The vector sum of the electric force and magnetic force is known as:-
 (A) Maximum force (B) Lorentz force (C) Deflecting force (D) Newton's force
- (6) The expression for energy density of solenoid is given as:-
 (A) $\frac{B^2}{\mu_0}$ (B) $2 \frac{B^2}{\mu_0}$ (C) $\frac{1}{2} \frac{B^2}{\mu_0}$ (D) $B^2 \mu_0$
- (7) A simple device that prevents the direction of current from changing is called:-
 (A) Commutator (B) Rotor (C) Armature (D) Detector
- (8) The unit of impedance is:-
 (A) Volt (B) Ohm (C) Farad (D) Watt
- (9) At resonance, the behaviour of R - L - C series circuit is:-
 (A) Resistive (B) Capacitive (C) Inductive (D) Modulative
- (10) Glass is also known as:-
 (A) Solid (B) Liquid (C) Solid liquid (D) Gas
- (11) The open loop gain of Op - Amp is of the order of:-
 (A) 10^2 (B) 10^3 (C) 10^4 (D) 10^5
- (12) The common emitter current amplification factor β is given by:-
 (A) $\frac{I_C}{I_E}$ (B) $\frac{I_C}{I_B}$ (C) $\frac{I_E}{I_B}$ (D) $\frac{I_B}{I_E}$
- (13) The speed of earth around its orbit is:-
 (A) 10 km/s (B) 20 km/s (C) 25 km/s (D) 30 km/s
- (14) The unit of Plank's constant "h" is:-
 (A) J C (B) J/C (C) J S (D) J/S
- (15) In Helium - Neon Laser, the discharge tube is filled with:-
 (A) 85 % of He (B) 80 % of He (C) 90 % of He (D) 95 % of He
- (16) The half-life of radon gas is:-
 (A) 3.8 hours (B) 3.8 minutes (C) 3.8 days (D) 3.8 years
- (17) The background radiation to which we are exposed, on the average is:-
 (A) 1 mSv per year (B) 2 mSv per year (C) 3 mSv per year (D) 4 mSv per year

INTERMEDIATE PART-II (12th CLASS)

PHYSICS PAPER-II (NEW SCHEME)

GROUP-II

TIME ALLOWED: 2.40 Hours

SUBJECTIVE

MAXIMUM MARKS: 68

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

SECTION-I

2. Attempt any eight parts.

8 × 2 = 16

- (i) How can you identify that which plate of a capacitor is negatively charged?
- (ii) Electric lines of force never cross. Why?
- (iii) Prove that $1eV = 1.6 \times 10^{-19} J$
- (iv) Explain briefly the role of deflection plates in inkjet printers.
- (v) Why does the picture on a T.V screen become distorted when a magnet is brought near it?
- (vi) How can you use a magnetic field to separate isotopes of chemical element?
- (vii) Explain briefly the working of electron gun in CRO.
- (viii) Differentiate between magnetic flux and flux density.
- (ix) Does the induced emf always act to decrease the magnetic flux through a circuit? Explain.
- (x) 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? Explain.
- (xi) A glass rod of length 'L' is moving perpendicular to the applied magnetic field B with velocity V. Explain briefly about the induced emf in it.
- (xii) Define self inductance. Name any two factors upon which it depends.

3. Attempt any eight parts.

8 × 2 = 16

- (i) Is the filament resistance lower or higher in a 500 W, 220 V light bulb than in a 100W, 220 V bulb?
- (ii) What is Wheatstone bridge? How can it be used to determine an unknown resistance?
- (iii) What is Thermistor? Write its two uses.
- (iv) What is the principle of Metal Detector? Write two uses of metal detector.
- (v) How can you establish the formula for power in A.C circuits? Explain the role of power factor in it.
- (vi) How does doubling of frequency affect the reactance of (a) An inductor (b) A capacitor?
- (vii) Define Polymerization Reaction. Write two examples of Polymeric solids.
- (viii) Define Brittle and Ductile Substances. Give two examples in each case.
- (ix) Why is it impossible to have an isolated north or south pole of magnet? Explain.
- (x) What is the role of potential barrier in a diode? How is it formed in a diode?
- (xi) Describe by a circuit diagram, how current flows in a n - p - n transistor?
- (xii) How is the XOR gate so called? Draw its symbol.

4. Attempt any six parts.

6 × 2 = 12

- (i) Differentiate between Photoelectric Effect and Compton Effect.
- (ii) What are the measurements on which two observers in relative motion will always agree upon? Explain
- (iii) Will bright light eject more electrons from a metal surface than dimmer light of the same colour?
- (iv) Write any two Postulates of Bohr's model of the Hydrogen atom
- (v) What do we mean when we say that the atom is in a stationary state?

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- (vi) A particle which produces more ionization is less penetrating. Explain.
- (vii) Why are heavy Nuclei Unstable? Explain.
- (viii) What is meant by Absorbed Dose? Write its unit.
- (ix) Define Hadrons and Leptons.



SECTION-II

NOTE: - Attempt any three questions.

3 × 8 = 24

- 5.(a) Define Resistivity. How does it depend upon temperature? Also define temperature coefficient of resistance.

1 + 3 + 1 = 5

- (b) Determine the electric field at the position $\vec{r} = (4\hat{i} + 3\hat{j}) \text{ m}$ caused by a point charge $q = 5.0 \times 10^{-6} \text{ C}$ placed at origin.

3

- 6.(a) Derive the relation for energy stored in an inductor.

5

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

3

- 7.(a) What is Transistor? Describe the use of transistor as an amplifier. Also calculate its voltage gain.

1+2+2

- (b) What is the resonant frequency of a circuit which includes a coil of inductance 2.5 H and a capacitance of $40 \mu\text{F}$?

3

- 8.(a) Define Positron. How Davison and Germer experiment confirms the wave nature of particles?

1+4

- (b) A 1.25 cm diameter cylinder is subjected to a load of 2500 Kg. Calculate the stress on the bar in mega pascals.

3

- 9.(a) Define Spontaneous and Stimulated emissions. Explain the Laser action in detail.

1+1+3

- (b) A 75 kg person receives a whole body radiation dose of 24 m – rad, delivered by α – particles for which RBE factor is 12. Calculate (a) The absorbed energy in Joules and

(b) The equivalent dose in rem.

3