

**Board of Intermediate & Secondary Education, Mirpur AJK**

**Physics Model Question Paper**

**Section-A(Marks 17) Part-II**

Time Allowed: 25Minutes

Q.1 Fill the relevant bubble for each part. Each part carries one mark.

i	The force between two charges is 28 N. If paraffin wax of relative permittivity 2.8 is introduced between charges as medium, then the force reduces to;			
	a) 25N <input type="radio"/>	b) 20N <input type="radio"/>	c) 15N <input type="radio"/>	d) 10N <input type="radio"/>
ii	A rubber ball of radius 2cm has charge of $5\mu\text{C}$ on its surface, which is uniformly distributed, the value of E at its center is;			
	a) $10\text{N C}^{-1}$ <input type="radio"/>	b) Zero <input type="radio"/>	c) $2.5\text{N C}^{-1}$ <input type="radio"/>	d) $5 \times 10^{-6}\text{N C}^{-1}$ <input type="radio"/>
iii	Kirchoff's first law is based upon the law of conservation of ;			
	a) Current <input type="radio"/>	b) Charge <input type="radio"/>	c) Voltage <input type="radio"/>	d) Energy <input type="radio"/>
iv	The maximum power delivered to a load resistor R, when the internal resistance of the source is;			
	a) $r = \infty$ <input type="radio"/>	b) $r = R$ <input type="radio"/>	c) $r = \text{Zero}$ <input type="radio"/>	d) $r = R/4$ <input type="radio"/>
v	When the angle between area and magnetic field lines is $0^\circ$ , then magnetic flux will be;			
	a) Maximum <input type="radio"/>	b) Minimum <input type="radio"/>	c) Half <input type="radio"/>	d) Quarter <input type="radio"/>
vi	The torque acting on a coil is minimum , when vector area of the coil is;			
	a) Parallel to B <input type="radio"/>	b) Perpendicular to B <input type="radio"/>	c) Antiparallel to B <input type="radio"/>	d) None of these <input type="radio"/>
vii	If a charge is at rest in magnetic field, then the force on the charge is;			
	a) Zero <input type="radio"/>	b) $q(\vec{v} \times \vec{B})$ <input type="radio"/>	c) $qvB\sin\theta$ <input type="radio"/>	d) $qvB\cos\theta$ <input type="radio"/>
viii	The power dissipation in L-C circuit is;			
	a) VI <input type="radio"/>	b) $V_0I_0$ <input type="radio"/>	c) $V_{\text{rms}}I_{\text{rms}}$ <input type="radio"/>	d) Zero <input type="radio"/>
xiv	The reactance of an inductor at 50 Hz is $10\ \Omega$ . The reactance at 100 Hz become;			
	a) $20\ \Omega$ <input type="radio"/>	b) $5\ \Omega$ <input type="radio"/>	c) $2.5\ \Omega$ <input type="radio"/>	d) $0.5\ \Omega$ <input type="radio"/>
x	A wire is stretched to double of its length, its strain is;			
	a) 2 <input type="radio"/>	b) 1 <input type="radio"/>	c) Zero <input type="radio"/>	d) 0.5 <input type="radio"/>
xi	Maximum stress which a body bears is called its;			
	a) Ultimate Tensile stress <input type="radio"/>	b) Permanent stress <input type="radio"/>	c) Elastic stress <input type="radio"/>	d) None of these <input type="radio"/>
xii	A hole in a p-type semiconductor is;			
	a) An excess electron <input type="radio"/>	b) A missing electron <input type="radio"/>	c) A missing positron <input type="radio"/>	d) An excited electron <input type="radio"/>
xiii	Inertial frames of reference have;			
	a) Zero acceleration <input type="radio"/>	b) Uniform acceleration <input type="radio"/>	c) Zero external force <input type="radio"/>	d) Both a) and b) <input type="radio"/>
xiv	According to de-Broglie equation, which on has the smallest wavelength associated with it;			
	a) Proton <input type="radio"/>	b) Neutron <input type="radio"/>	c) Electron <input type="radio"/>	d) Alpha Particle <input type="radio"/>
xv	The radius of first Bohr orbit for hydrogen is;			
	a) 0.53 m <input type="radio"/>	b) 0.53 nm <input type="radio"/>	c) 0.053 nm <input type="radio"/>	d) 0.53 mm <input type="radio"/>
xvi	The resulting nucleus in the reaction ${}^1_0n + {}^{137}_{56}\text{Ba} \rightarrow ? + \gamma$			
	a) ${}^{138}_{56}\text{Ba}$ <input type="radio"/>	b) ${}^{138}_{55}\text{Ba}$ <input type="radio"/>	c) ${}^{138}_{57}\text{La}$ <input type="radio"/>	d) ${}^{136}_{56}\text{Ba}$ <input type="radio"/>
xvii	Half life of Iodine -137 is 8 days and its weight is 20 mg, after four half lives the amount left undecayed will be;			
	a) 2.50 mg <input type="radio"/>	b) 6.25 mg <input type="radio"/>	c) 0.625 mg <input type="radio"/>	d) 0.312 mg <input type="radio"/>

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**Physics Model Question Paper** Part-II  
**Section-B(Marks 42)**

Q.2 Attempt all parts. All parts carry equal marks.

- i. Describe the relationship between potential difference and electric potential energy. Also give the difference between units volts and electron-volts.
- ii. Under what circumstances, can the potential difference of a battery exceeds its emf? Under what conditions both of these give same value.
- iii. How e/m ratio of an electron can be determined using velocity selector method?
- iv. A galvanometer have a resistance of  $100\Omega$ , and gives full scale deflection on 1 mA current. How it can be converted into an ammeter of range 0-10A.
- v. State Faraday's law of electromagnetic induction. Give its mathematical form.
- vi. Show that the relation  $\epsilon = \frac{\nabla\phi}{\nabla t}$  is dimensionally correct.

**OR**

Explain the difference between inductive reactance and capacitive reactance.

- vii. Why a choke cannot control the direct current? Explain.

**OR**

The rms value of current in an A.C circuit is 10A. What is the peak value of current?

- viii. Explain the difference among Young's, Shear and Bulk Modulus.
- ix. A semiconductor acts like insulator at 0K. Can conductivity of semiconductor be raised? If yes, then explain the process.
- x. Why the base current is weak as compared to collector current?

**OR**

An n-type semiconductor has large no. of free electrons but still it is electrically neutral. Why?

- xi. State the postulates of special theory of relativity.

**OR**

Describe the phenomenon of pair production.

- xii. Find the wavelength associated with an electron in the state  $n=4$  of hydrogen.

**OR**

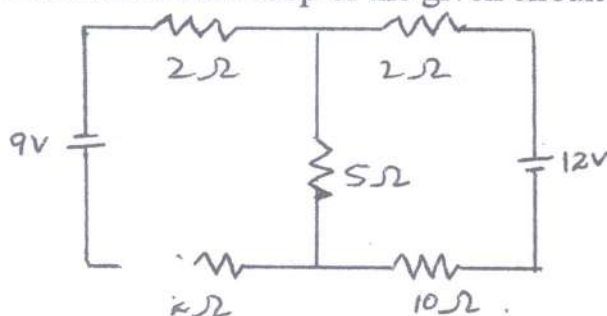
Calculate the shortest wavelength of the Balmer Series.

- xiii. With the help of equations, explain the difference between mass defect and binding energy.

- xiv. Mass of  $^{14}\text{N}$  nucleus is 13.999234u. Calculate binding energy.

**OR**

Find current in each loop of the given circuit.



**Section – C (Marks 26)**

**Note:** Attempt all questions.

**Q.3** Define Capacitance of a Capacitor and its units. Derive an expression for Capacitance of a parallel plate Capacitor. Also derive a relation for the energy stored in a Capacitor. (1+3+3=7)

**Q.4** State Ohm's law. Derive an expression for resistivity of a material and discuss the effect of temperature on resistance. (1+3+3=7)

**OR**

Does a moving charge experience a force in magnetic field? Explain.

Describe how  $e/m$  ratio for electron can be determined using magnetic field. (1+3+3=7)

**Q.5** What are transformers? Describe the working principle, construction and working of a transformer. Discuss the use and energy losses in transformers. (1+1+3+1=6)

**OR**

What is an inductor? Explain the passage of A.C through pure inductor. Also discuss the power loss in a inductor. (1+4+1=6)

**Q-6** State the postulate of special theory of relativity. Explain the consequences of this theory. (2+4=6)

**OR**

Explain the construction and working of nuclear Reactor. Also discuss type of Nuclear Reactors. (4+2=6)