19

Version No.			
4	0	8	2

ROLL NUMBER					

PHYSICS HSSC-II

SECTION – A (Marks 17)

Time allowed: 25 Minutes

Section – A is compulsory. All parts of this section are to be answered on this page and handed over to the Centre Superintendent. Deleting/overwriting is not allowed.

Do not use lead pencil.

حصہ اول لازمی ہے۔ اس کے جوابات اسی صفحہ پر دے کر نگران مرکز کے حوالے کریں۔ کاٹ کر دوبارہ لکھنے کی اجازت نہیں ہے۔ لیڈ پنسل کا استعمال ممنوع ہے۔

Answer Sheet No. _____

ہر سوال کے سامنے دیے گئے، کریکولم کے مطابق درست دائرہ کو پر کریں۔ **Invigilator Sign.** _____

Fill the relevant bubble against each question according to curriculum: **Candidate Sign.** _____

	Question	A	B	C	D	A	B	C	D
1.	Sum of the masses of constituent nucleons as compared to the mass of the resultant nucleus is:	Negligible	Smaller	Greater	Same	○	○	○	○
2.	In the time constant of RC circuit, how much charge is stored, out of maximum charge q_o?	$0.90q_o$	$0.37q_o$	$0.51q_o$	$0.63q_o$	○	○	○	○
3.	The electric field at a distance of $20cm$ from $4\mu c$ charge is:	$9\times10^5 N/C$	$4.5\times10^5 N/C$	$3\times10^3 N/C$	$9\times10^3 N/C$	○	○	○	○
4.	For a closed circuit:	$E=V_t-Ir$	$E=V_t$	$E>V_t$	$E<V_t$	○	○	○	○
5.	Resistance of a wire is 'r' ohms. The wire is stretched to four times its length, then its resistance in ohms is:	$r/4$	$r/2$	$8r$	$4r$	○	○	○	○
6.	If a charge is at rest in a magnetic field, then the magnetic force on charge is:	Zero	qvB	$qvB\cos\theta$	$qvB\sin\theta$	○	○	○	○
7.	A $2m$ wire carrying current $5A$ is at right angle to uniform magnetic field of $0.2 web/m^2$. The force on wire will be:	$1.5N$	$2N$	$4N$	$5N$	○	○	○	○
8.	The Component in generator which consumes energy is called:	Capacitor	Commutator	Split rings	Load	○	○	○	○
9.	The circuit in which current and voltage are in phase, the power factor is:	2	Zero	1	-1	○	○	○	○
10.	An alternating voltage is given by $30\sin157t$ the frequency of alternating voltage is:	$75Hz$	$50Hz$	$25Hz$	$100Hz$	○	○	○	○
11.	Which of the following is the Young Modulus of steel?	$1.5\times10^9 N/m^2$	$2\times10^{11} N/m^2$	$3.9\times10^{-9} N/m^2$	$2\times10^9 N/m^2$	○	○	○	○
12.	A wire is stretched to four times of its length its strain is:	0.5	4	3	1	○	○	○	○
13.	A potential barrier of $0.7 volt$ exists across P-N junction made from:	Gallium	Silicon	Germinium	Indium	○	○	○	○
14.	The minimum energy required by a photon to create an electron-positron pair is:	$0.051MeV$	$0.52MeV$	$1.51MeV$	$1.02MeV$	○	○	○	○
15.	According to de-Broglie equation _____ has the smallest wavelength associated with it.	Electron	Proton	Neutron	Alpha particle	○	○	○	○
16.	If an atom exists in excited state $n=3$, the number of transitions that take place is:	25	3	5	10	○	○	○	○
17.	The duration of meta stable state is approximately:	$10^{-10}S$	$10^{-3}S$	$10^{-6}S$	$10^{-8}S$	○	○	○	○

- $E=\frac{q}{4\pi\varepsilon_o r^2}$
- $R=\frac{\rho L}{A}$
- $F=qvB\sin\theta$
- $F=BIL\sin\theta$
- $P=VI\cos\theta$
- $N=\frac{n(n-1)}{2}$
- $E_o=m_oc^2$
- $\lambda=\frac{h}{mv}$
- $V=V_o\sin\omega t$
- $\frac{\Delta L}{L}=\frac{4}{1}=4$

PHYSICS HSSC–II

Time allowed: 2:35 Hours **Total Marks Sections B and C: 68**

NOTE: Answer any fourteen parts from Section 'B' and any two questions from Section 'C'. Write your answers neatly and legibly.

SECTION – B (Marks 42)

Q. 2 Attempt any FOURTEEN parts. All parts carry equal marks. **(14 x 3 = 42)**

(i) Show that 'electric field' is 'potential gradient' $\left(E=\frac{\Delta V}{d}\right)$.

(ii) What is "electron volt"? Show its relationship with joule.

(iii) How can a rheostat be used as potential divider?

(iv) A heating coil has a resistance of 10Ω, It is designed to operate on $220V$, what electric energy in joules is supplied to heater in 20 seconds?

(v) Why low resistance in an ammeter is called shunt resistance? Why is this 'shunt' connected parallel to galvanometer?

(vi) Is it possible to accelerate a neutron in cyclotron (Magnetic field)? Justify your answer.

(vii) Briefly explain the need of laminated iron cores in transformers.

(viii) In a coil, current changes from $6A$ to $8A$ in $0.05S$. If the average E.M.F is $10V$, then find the coefficient of self-inductance.

(ix) How can radiowaves be produced? Describe that information can be transmitted by radiowaves.

(x) An inductor with an inductance of $100\mu H$, passes a current of $5mA$ when its terminal potential is $8V$ Calculate the frequency of A.C supply.

(xi) Highlight the importance of super conductors in MRI machine.

(xii) Differentiate 'elastic deformation' and 'plastic deformation'.

(xiii) Under what conditions a transistor acts as open and a closed switch?

(xiv) Briefly explain how electrons and holes flow across a P-N junction.

(xv) Should the rest mass of photon be zero? Justify your answer.

(xvi) Briefly explain the following terms:

(a) Unified Mass Scale **(b)** Mass Defect

(xvii) Differentiate between excitation potential and ionization energy?

(xviii) The inner shell transitions in heavy elements result into emission of characteristic X-Rays. How do these X-Rays differ from visible light?

(xix) Describe any two basic forces of nature.

(xx) Does fusion reaction release more energy per nucleon than fission reaction? Explain briefly.

SECTION – C (Marks 26)

Note: Attempt any TWO questions. All questions carry equal marks. **(2 x 13 = 26)**

Q. 3 a. Derive an expression for energy stored in capacitor.

b. The full-scale deflection of galvanometer is $10mA$; its resistance is 50Ω. How can it be converted into an ammeter of range $200A$?

Q. 4 a. What is meant by motional emf? Also derive an expression for motional emf.

b. An A.C circuit consists of a pure resistance of 10Ω and is connected across an A.C supply of $220V$, $100Hz$. Calculate:

(i) Current **(ii)** Power consumed **(iii)** Equation for voltage.

Q. 5 a. What is de Broglie's hypothesis? Describe an experiment to show that a particle can have wave characteristics.

b. Find the wave length associated with an electron in the state $n=3$ of the hydrogen atom.

Important formulae

- $E=\frac{\Delta V}{d}$
- $W=I^2Rt$
- $E=\frac{L\Delta I}{\Delta t}$
- $X_L=2\pi fL$
- $I=\frac{V}{X_L}$
- $\frac{1}{\lambda_n}=\frac{1}{R_H}\left(\frac{1}{p^2}-\frac{1}{n^2}\right)$
- $\lambda_{max}=\frac{\text{Constant}}{T}$
- Wein's Constant $=0.2898\times10^{-2}mk$
- $W=\frac{1}{2}QV$
- $W=\frac{1}{2}CV^2$
- $R_s=\frac{I_gR_g}{(I-I_g)}$

21

Version No.			
8	0	8	4

ROLL NUMBER					

PHYSICS HSSC-II

SECTION – A (Marks 17)

Time allowed: 25 Minutes

Section – A is compulsory. All parts of this section are to be answered on this page and handed over to the Centre Superintendent. Deleting/overwriting is not allowed.

Do not use lead pencil.

حصہ اول لازمی ہے۔ اس کے جوابات اسی صفحہ پر دے کر نا ظم مرکز کے حوالے کریں۔ کاٹ کر دوبارہ لکھنے کی اجازت نہیں ہے۔ لیڈ پنسل کا استعمال ممنوع ہے۔

Answer Sheet No. _____

ہر سوال کے سامنے دیے گئے، کریکولم کے مطابق درست دائرہ کو پر کریں۔ **Invigilator Sign.** _____

Fill the relevant bubble against each question according to curriculum: **Candidate Sign.** _____

	Question	A	B	C	D	A	B	C	D
1.	According to de-Broglie equation which one has **smallest** wavelength associated with it?	Neutron	α – Particle	Electron	Proton	○	○	○	○
2.	The energy of electron in the excited state $n=3$ in hydrogen atom is:	$-3.4eV$	$-0.85eV$	$-1.5eV$	$-13.6eV$	○	○	○	○
3.	Unit of decay constant 'λ' is:	m^{-1}	S	S^{-1}	m	○	○	○	○
4.	A $2\mu F$ capacitor of a television is subjected to $4000V$ potential difference. The energy stored in capacitor is:	$16J$	$4\times10^{-3}J$	$2\times10^{-3}J$	$8J$	○	○	○	○
5.	Electric field at a distance of $20cm$ from a $4\mu c$ charge is:	$3\times10^{3}N/C$	$9\times10^{5}N/C$	$4.5\times10^{5}N/C$	$3\times10^{5}N/C$	○	○	○	○
6.	The unit of product of resistance and capacitance is equal to unit of:	Time	Potential difference	Current	Work	○	○	○	○
7.	Kirchhoff's voltage rule is a way of stating conservation of:	Momentum	Charge	Angular momentum	Energy	○	○	○	○
8.	Two long straight wires have current flowing in them in the opposite direction, the force between the wires is:	Repulsive	Zero	Undefined	Attractive	○	○	○	○
9.	Galvanometer can be made more sensitive if $\frac{C}{BAN}$ is made:	Infinite	Zero	Smaller	Larger	○	○	○	○
10.	Which of the following quantities **DO NOT** change in a step-up transformer?	Voltage	Power	Heat	Current	○	○	○	○
11.	When the current in a coil changes from '0' to $5A$ in $0.025S$, an average E.M.F induced in a neighboring coil is $600V$, the mutual inductance for two coils is:	12.5 henry	6 henry	7.5 henry	3 henry	○	○	○	○
12.	The phase difference between the current and voltage at resonance is:	π	$-\pi$	$\pi/2$	0	○	○	○	○
13.	If the peak value of alternating current is $7\sqrt{2}A$, then the mean square value of current will be?	$25A$	$7\sqrt{2}A$	$49A$	$7A$	○	○	○	○
14.	_____ is **NOT** a ferromagnetic material.	Nickel	Cobalt	Wood	Iron	○	○	○	○
15.	If a wire is stretched to four times of its length. The strain is:	3	1	0.5	4	○	○	○	○
16.	If in a transistor both collector-base and base-emitter junctions are reversed biased then it is:	Cut-off region	Saturation region	Q-point	Active region	○	○	○	○
17.	By reducing the absolute temperature of a black body to half, the total energy radiated will change by a factor:	4	16	$\frac{1}{16}$	$\frac{1}{4}$	○	○	○	○

- $W=\frac{1}{2}CV^2$
- $\varepsilon=-\frac{\Delta}{\Delta t}(MI)$
- $\varepsilon=\frac{\Delta L}{L}$
- $\lambda=\frac{h}{mv}$
- $I_{rms}=0.7071I_m$
- $E_n=-\frac{E_o}{n^2}$
- $RC=t$
- $\sigma=5.67\times10^{-8}Wm^{-2}K^{-4}$
- $E_o=2.17\times10^{-18}J$
- $E=\sigma T^4$
- $E=\frac{q}{4\pi\varepsilon_o r^2}$

IIII

PHYSICS HSSC–II

Time allowed: 2:35 Hours **Total Marks Sections B and C: 68**

NOTE: Answer any fourteen parts from Section 'B' and any two questions from Section 'C'. Write your answers neatly and legibly.

SECTION – B (Marks 42)

Q. 2 Attempt any FOURTEEN parts. All parts carry equal marks. **(14 x 3 = 42)**

(i) Briefly explain the concept of electric dipole.

(ii) Describe the factors affecting the force on a current carrying conductor in a magnetic field.

(iii) When Wheatstone bridge is balanced, then no current flows through galvanometer. Explain briefly.

(iv) Why rise in temperature of a conductor is accompanied by rise in the resistance?

(v) How is Lenz's law a consequence of law of conservation of energy?

(vi) Briefly explain the production of back EMF in electric motor.

(vii) Two long parallel wires $8\,cm$ apart carry currents of $6A$ and $2A$ in the same direction. What is the magnitude of magnetic field mid-way between them?

(viii) How is a $10mA,\ 50\Omega$ galvanometer converted into $20V$ voltmeter?

(ix) A pure inductor is connected across a $5V, 100\,Hz$ supply, and current flowing through it is measured as $0.2\,A$ Determine the value of its inductance.

(x) Describe impedance as vector sum of resistances and reactances.

(xi) Distinguish between brittle and ductile substances.

(xii) Briefly explain any use of super conductors.

(xiii) Can a P-N Junction be also called potential barrier? Explain briefly.

(xiv) Determine the wave length of electron that has been accecrated through a potential difference of $100V$.

(xv) Describe uncertainty principle.

(xvi) Briefly explain working of transistor as switch.

(xvii) Describe the origion of different types of optical spectra.

(xviii) Write down postulates of Bohr's model of hydrogen atom.

(xix) Which of the 'Fission reaction' and 'Fusion reaction' is difficult to achieve? Give reason.

(xx) The half life of Polonium-214 is 0.1643 seconds. Determine the decay constant (λ).

SECTION – C (Marks 26)

Note: Attempt any TWO questions. All questions carry equal marks. **(2 x 13 = 26)**

Q. 3 a. State Gauss's law. Also find electric field intensity due to an infinite sheet of charge.

b. A heating coil has a resistance of 10Ω. It is designed to operate on $220V$. What energy in Joules is supplied to the heater in $5S$?

Q. 4 a. Discuss, the principle, construction and working of A.C generator. Also derive an expression for induced E.M.F and induced current.

b. A coil having resistance of 10Ω and inductance of $30\,mH$ is connected to $230V, 50Hz$ supply. Calculate

(i) Circuit current **(ii)** Phase angle **(iii)** Power consumed

Q. 5 a. What is LASER? Explain the principle and operation of LASER.

b. Helium He_2^4 has an atomic mass of $4.002603u$. Find:

(i) Mass defect **(ii)** Binding energy

(iii) Binding energy per nucleon for this nucleus.

Important formulae

- $B = \frac{u_o I}{2\pi r}$
- $R_s = \frac{I_g R_g}{(I - I_g)}$
- $L = \frac{X_L}{2\pi f}$
- $K.E = q\Delta V$
- $\lambda = \frac{h}{mv}$
- $M_{electron} = 9.1\times10^{-31}\,kg$
- $\lambda = \frac{0.693}{T_{1/2}}$
- $M_{neutron} = 1.008665u$
- $M_{proton} = 1.007825u$
- $W = I^2Rt$
- $M_{proton} = 1.67\times10^{-27}\,kg$
- $E = \Delta mc^2$
- $F = ILB\sin\theta$
- $\lambda = \frac{h}{\sqrt{2m_e q_e \Delta V}}$
- Binding energy per nucleon $= \frac{E_b}{h}$