25

PHYSICS HSSC-II

SECTION – A (Marks 17)

Time allowed: 25 Minutes

Candidate Sign. _____

Invigilator Sign. _____

Answer Sheet No. _____

Signature should not cross this line

Version No.				
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ROLL NUMBER						

Deleting/overwriting is not allowed. ***Do not use lead pencil.***

Fill the relevant bubble against each question according to curriculum:

	Question	A	B	C	D	A	B	C	D
1.	If the distance between the centers of two identical bodies is doubled, the gravitational force 'F' between them will become:	F	$2F$	$\frac{F}{2}$	$\frac{F}{4}$	○	○	○	○
2.	If the gravitational field strength at the earth's surface is 'g'. What is its value at a height, $h = R_e$ from surface of earth?	$\frac{g}{2}$	$\frac{g}{4}$	$2g$	$\frac{g}{9}$	○	○	○	○
3.	Two stars have the same luminosity. If one appears dimmer, it is because:	It is farther from the observer	It has lower temperature	It has smaller size	It emits less energy	○	○	○	○
4.	In SHM, at which value of θ, the instantaneous velocity(v) is maximum (v_o)?	$\theta = \frac{3\pi}{4}$	$\theta = \frac{\pi}{2}$	$\theta = \frac{\pi}{4}$	$\theta = 0$	○	○	○	○
5.	Total energy of the mass spring system in SHM, is proportional to:	$\frac{m\omega}{x_o^2}$	$\frac{mx_o}{\omega^2}$	$m\omega^2 x_o^2$	$m\omega x_o$	○	○	○	○
6.	If the number of lines per unit length in a grating increase, the diffraction pattern (maxima) becomes:	Less sharp and closely spaced	Sharper and widely spaced	More widely spaced and less sharp	More closely spaced and sharper	○	○	○	○
7.	A.C voltage across a $0.5\mu F$ capacitor is $16\sin(2\times10^3 t)V$, peak value of voltage through the capacitor is:	2×10^3	10^3	16	2	○	○	○	○
8.	A simple pendulum has a period of 2.5s. What will be its period if its length becomes four times large?	2.5	1.25s	0.625s	5s	○	○	○	○
9.	A bridge rectifier is used to:	Increase voltage	Convert AC to DC	Store charge	Convert DC to AC	○	○	○	○
10.	In a purely resistive AC circuit, the phase difference between voltage and current is:	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	○	○	○	○
11.	In photoelectric effect, which factor increases by increasing the intensity of incident light?	Kinetic energy of electron	Stopping potential	Number of emitted electrons	Work function	○	○	○	○
12.	If a particle of mass m is moving with speed v then De-Broglie wavelength λ is given by:	$\lambda = \frac{3h}{mv}$	$\lambda = \frac{h}{mv}$	$\lambda = \frac{2h}{mv}$	$\lambda = \frac{h}{2mv}$	○	○	○	○

	Question	A	B	C	D	A	B	C	D
13.	Which of the following is an example of nuclear fusion?	Uranium decay	Atomic bomb	Energy production in the Sun	Radioactive decay	○	○	○	○
14.	If the distance from a star (luminosity L) is doubled, the radiant flux intensity becomes:	One-fourth	Half	Double	Four times	○	○	○	○
15.	The magnitude of Coriolis Force (F_c) that bends the air packet (mass= $2\times10^5 kg$) (velocity $22.2ms^{-1}$) at 25° is:	$2.74N$	$274N$	$2.74\times10^4 N$	$2.74\times10^6 N$	○	○	○	○
16.	If a star is receding from the earth it exhibits:	Red shift	Blue shift	Green shift	Yellow light	○	○	○	○
17.	Which color of visible light has the lowest frequency?	Red	Green	Blue	Violet	○	○	○	○

$F=\frac{Gm_1m_2}{r^2}$ $T=\frac{1}{f}$ $F=\frac{L}{A}$ $c=\frac{\varepsilon_o A}{d}$ $\lambda=\frac{h}{p}$ $T=2\pi\sqrt{\frac{\ell}{g}}$

$a=-\omega^2 x$ $p=mv$ $h=6.63\times10^{-34}Js^{-1}$ $R=R_e+h$ $g=9.8ms^{-2}$ $rV=kq$

$v=v_o\sin(\theta)$ $\theta=\omega t$ $\omega_{earth}=7.3\times10^{-5}rads^{-1}$ $F_c=2mv\omega_{earth}\sin\theta$ $E=hf$ $P=\frac{E}{C}$

$g=\frac{GM_e}{R^2}$ $V=\frac{W}{Q}$

ROLL NUMBER						

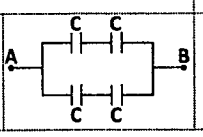
PHYSICS HSSC–II

2-6

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

SECTION – B (Marks 42)

Q. 2 Answer the following parts briefly. **(14x3=42)**

(i)	When a satellite is put into a higher orbit what will be the effect on its orbital velocity? Explain mathematically.	1+2	OR	Time period of a mass attached at the end of a spring is 0.4s. Find out the magnitude of acceleration when the displacement is 4cm.	03
(ii)	What happens to pressure when temperature and molecular speed of gas molecules increase?	03	OR	Briefly explain constructive and destructive interference of light. Give mathematical expression for both in terms of path difference.	1.5 + 1.5
(iii)	Justify qualitatively the factors which determine the frequency response and sharpness of resonance.	03	OR	Explain the function of capacitor in bridge rectifier circuit.	03
(iv)	What is self-inductance? Also write its SI unit and the factors upon which it depends.	1+2	OR	Find field strength 'g' at a height of 1500 km above surface of Earth.	03
(v)	Derive the relation between absolute temperature and average kinetic energy of gas molecules.	03	OR	How does doubling the frequency affect the capacitive reactance? Show mathematically.	03
(vi)	Briefly explain the significance of wind pattern on climate system.	1x3	OR	How are X-rays used in imaging internal body structure? Explain briefly.	03
(vii)	What is meant by pair production? Also calculate the minimum energy required in this process.	1+2	OR	Briefly explain the two types of climate inertia.	1.5 + 1.5
(viii)	What is meant by Piezoelectric effect? Enlist its two applications.	1+2	OR	What is the role of electron wavelength in achieving high resolution of electron microscope?	03
(ix)	How do control rods and moderator play an important role in the action of nuclear reactor?	1.5 + 1.5	OR	Draw labelled wave form and phasor diagram between applied voltage and current for pure inductor A.C.	2+1
(x)	Why does the equatorial region receive more energy than polar regions?	03	OR	To which idea does a red-shift exhibited by a star leads and why?	1+2
(xi)	Calculate root mean square speed of oxygen molecule at standard temperature and pressure.	03	OR	Briefly explain the terms: a. Mass Defect b. Binding Energy	1.5 + 1.5
(xii)	What factors determine the strength of gravitational field 'g' around a planet?	1.5 + 1.5	OR	What is meant by light damping and heavy damping? Show these graphically. (Displacement-time graph)	1x3
(xiii)	What is meant by grating element of a diffraction grating? Also write its formula.	2+1	OR	Distinguish graphically between half-wave and full-wave rectification.	1.5+ 1.5
(xiv)	How does increasing slit separation affect fringe spacing? Discuss with mathematical relation.	2+1	OR	Four capacitors of capacitance 'C' are connected as shown. Calculate their equivalent capacitance. 	03

SECTION – C (Marks 26)

Note: Attempt the following questions.

Q.3	Briefly describe gravitational potential and derive the expression $\varphi = -\frac{GM}{r}$ at a distance r from the centre of Earth. Make a sketch.	2+4 +1	OR	What is meant by simple harmonic motion (SHM)? Show that mass attached to a spring executes SHM. Derive the expressions for frequency 'f' and time period 'T'. Draw diagram as well.	1+3 +2+1
Q.4	Explain the working of Young's double slit experiment. Make diagram. Also derive the expression for fringe spacing.	4+1 +2	OR	What is meant by electric potential? Derive an expression for electric potential in the field due to a point charge. Make sketch.	1+5 +1
Q.5	In an RL series circuit, will the current lag or lead the applied alternating voltage? Explain the answer with phasor diagram. Also find an expression for the impedance of RL series circuit.	2+2 +2	OR	What is meant by photo electric effect? Why no emission of electrons occurs below threshold frequency? Discuss the effects of intensity of light on photoelectric current with graph.	1+2 +3
Q.6	a. What is meant by Radiant Flux Intensity? How it follows inverse square law? b. A star has a known luminosity of $9.7\times10^{27}W$. Observations of the star show that the radiant flux intensity of light received on Earth from the star is $114nWm^{-2}$. Determine the distance of the star from Earth.	3+3	OR	a. What is meant by enrichment? Why Uranium fuel needs to enriched before use? b. Find decay constant and activity of an element if its 100 out of 700 nuclei decay in 5 min.	(2+1) +3

$v_o = \sqrt{\frac{GM_e}{R}}$ $\omega = \sqrt{\frac{k}{m}}$ $X_c = \frac{1}{\omega C}$ $V_{rms} = \frac{V_o}{\sqrt{2}}$ $g = G\frac{M_e}{R^2}$ $I_{rms} = \frac{I_o}{\sqrt{2}}$ $T = \frac{2}{3k}\left\langle \frac{1}{2}mv^2 \right\rangle$ $m = \frac{M}{N_A}$

$F = kx$ $\omega = 2\pi f$ $M_e = 6\times10^{24}kg$ $a = -\omega^2 x$ $R_e = 6.4\times10^6 m$ $N_A = 6.022\times10^{23}$ $A = \lambda N$ $M_{oxygen} = 32g$

$F = \frac{L}{A}$ $T_{\frac{1}{2}} = \frac{0.693}{\lambda}$ $\lambda = \frac{1}{N}\times\frac{\Delta N}{\Delta t}$ $v_{rms} = \sqrt{\frac{3P}{\rho}}$ $v_{rms} = \sqrt{\frac{3kT}{m}}$ $v_{rms} = \sqrt{\frac{3RT}{M}}$ $f = \frac{1}{T}$ $F = \frac{L}{4\pi d^2}$

$k = 1.38\times10^{-23}JK^{-1}$ $R = 8.314Jmol^{-1}K^{-1}$ $R = R_e + h$ $\sigma = 5.67\times10^{-8}Wm^{-2}K^{-4}$