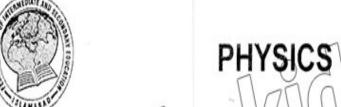


PHYSICS HSSC-



3).COM

Time allowed: 2:35 Hours

Total Marks Sections B and C: 68

NOTE: Answer any FOURTEEN parts from Section 'B' and attempts any TWO questions from Section 'C' on the separately provided answer book. Write your answers neatly and legibly.

SECTION – B (Marks 42)

Answer any FOURTEEN parts. All parts carry equal marks.

 $(14 \times 3 = 42)$

- From the Stokes' law, the drag force can be expressed as $F_D = 6\pi\eta rv$, then find the dimensions of co-(i) efficient of viscosity n?
- A and B are two mutually pendicular vectors equal in magnitude. Show their sum and difference (ii) through Head to Tail Rule with neat diagram.
- Given |A|=3.2, |B|=5.1 and $\theta=60^{\circ}$ between |A|=3.2, Find $|A \cdot B|$ and $|A \times B|$ (iii)
- Briefly explain the circumstances in which velocity \vec{v} and acceleration \vec{a} of a car are: (iv)
- (a) Parallel (b) Anti parallel The horizontal range of a projectile is 4 times of its maximum height (R = 4H). What is its angle of (v)
- projection? When a rocket re-enters the atmosphere, its nose cone becomes very hot. Where does this heat energy (vi) come from?
- Express power (P) as scalar product of force (\overline{F}) and velocity ($\overline{\nu}$). (vii)
- Derive a mathematical relation for orbital velocity and prove that $v_o \propto \frac{1}{\sqrt{r}}$ (viii)
- A circular disc of 49kg and radius 50cm is rotating at a speed of 120 rev/min. Calculate its K.E? (ix)
- Explain how swing is produced in a fast moving cricket ball? (Bernoulli effect) (x)
- What is meant by banking of roads? Also show that $v = \sqrt{gr} \tan \theta$ (xi)
- The deviation of second order diffracted image formed by an optical grating having 5000 lines | cm is 32°. (XII) Calculate the wavelength of light used.
- A body of mass m suspended from a spring with force constant k, vibrates with f. When its length is (XIII) cut into half and same body is suspended from one of the halves, the frequency is f_2 . Find out $\frac{f_1}{f_2}$?
- (xiv) Why does sound thave faster in solids than in gases?
 - What will be the wavelength of the note emitted by a closed organ pipe 32.4cm long at 0°C?
- Prove that speed of sound through Hydrogen is 4 times as compared to its speed in Oxygen. Whereas $\rho_{Hydrogen}: \rho_{Ooggen} = 1:16$
- An oil film spreading over a wet footpath shows colours. Explain how does it happen? (XVII)
- If the Young's double slit experiment is performed in water, what will happen to the interference pattern? (XVIII)
- Briefly explain the working principle of Carnot engine. (xix)
- Discuss that increase in entropy means degradation of energy. (xx)

SECTION - C (Marks 26)

Attempt any TWO questions. All questions carry equal marks. Note:

 $(2 \times 13 = 26)$

- Q. 3 Explain vector and scalar products of two vectors with neat diagrams. a.
 - Describe time of flight and range of projectile using diagram. Derive mathematical formulae b.
 - Show that $S = v_i t + \frac{1}{2}at^2$ is dimensionally correct. (04)c.
- Q. 4 State and explain Bernoulli's Equation giving all details of it with diagram. a.

(05)(04)

(05)

(04)

- Show that earth's gravitational field is a conservative field. b.
- The earth rotates on its axis once a day so that its original time $T_1 = 24$ hours. Suppose, by some process C. the earth expands so that the radius becomes double as large as at present. Determine T_2 (new time required for one revolution) after expansion using law of conservation of angular momentum, (04)
- Q. 5 Show that motion of a simple pendulum is SHM. Derive formulae for its time period; a.

(05)

b. Prove that $v_{t} = v_{0} + (0.61)t$ (04)(04)

Derive $C_p - C_v = R$ C.

 $\sin(2\theta) = 2\sin\theta\cos\theta$

 $vi^2 \sin^2 \theta$

Important formulae

 $K.E_{rot} = \frac{1}{2}I\omega^2$