



# PHYSICS HSSC-I (2019)

Revised Syllabus

Time allowed: 2:35 Hours

Total Marks Sections B, C and D: 68

NOTE: Answer any seven parts each from section B and C and any two questions from section D on the separately provided answer book. Use supplementary answer sheet i.e. Sheet-B if required. Write your answers neatly and legibly.

## SECTION – B (Marks 21)

(Chapters 1 to 5)

Q. 2 Answer any SEVEN parts. All parts carry equal marks.

(7 x 3 = 21)

- Show that the famous Einstein's equation  $E = mc^2$  is dimensionally consistent.
- What does word "micro" signify in the words "microwave oven"?
- Write down the steps for addition of vectors by rectangular components method.
- Explain how cranes are able to lift very heavy load without toppling?
- Aeroplane while horizontally drops a bomb when reaches exactly above the target, but missed it. Explain briefly.
- State how impulse is related to linear momentum.
- Show that  $W_T = \lim_{\Delta t \rightarrow 0} \sum_{i=1}^n (F_i \cos \theta_i) \Delta d_i$  for a variable force.
- Differentiate between Solar energy and Wind energy.
- Establish a relation between Linear velocity ( $v$ ) and Angular velocity ( $w$ ).
- Show that orbital velocity,  $v \propto \frac{1}{\sqrt{r}}$

## SECTION – C (Marks 21)

(Chapters 6 to 10)

Q. 3 Answer any SEVEN parts. All parts carry equal marks.

(7 x 3 = 21)

- What is meant by aerofoils? Explain briefly.
- How do pulsations in pulse show the heart beat?
- Differentiate between free and forced oscillations.
- Give two applications in which resonance plays an important role.
- Why do sound waves travel faster in solids than in gases?
- What is the difference between progressive and stationary waves?
- In a Michelson interferometer a second glass plate is also used. Why?
- What is meant by dual nature of light? Explain briefly.
- Differentiate between Reversible and Irreversible processes.
- Write the limitations of first law of thermodynamics.

## SECTION – D (Marks 26)

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

(13 x 2 = 26)

- Q. 4 a. Define projectile motion with figure. Also derive mathematical equations for maximum height attained, time of flight and range of projectile. (2+6)
- b. A ball of mass 100 g is thrown vertically upward at a speed of  $25\text{ms}^{-1}$ . If no energy is lost, determine the height it would reach. If the ball only rises to 25 m, calculate the work done against air resistance. Also calculate the force of friction. (05)
- Q. 5 a. Derive equations for kinetic and potential energies of a body of mass  $m$  executing S.H.M. (07)
- b. A car is moving at  $20\text{ms}^{-1}$  along a straight road with its  $500\text{Hz}$  horn sounding. You are standing at the road side. What frequency do you hear as car is:
- (i) Approaching you (ii) Receding from you at  $20\text{ms}^{-1}$
- (Take speed of sound =  $340\text{ms}^{-1}$ ) (06)
- Q. 6 a. Explain the diffraction of X-rays by crystal and derive an expression for Bragg's Law to find the wavelength of light used. (08)
- b. A refrigerator has a coefficient of performance 8. If the temperature in the freezer is  $-23^\circ\text{C}$ , what is the temperature at which it rejects heat? (05)