

**Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carry equal marks.
5. Figures to the right indicate full marks.
6. Use of log table or electronic calculator is allowed.

1. Attempt any eight of the following.

8

- \_\_\_\_\_ beam is used in holography.
  - Direct
  - Diffused
  - LASER
  - IR
- The packets of energy in the monochromatic light are called as \_\_\_\_\_.
  - Bunch
  - Bundle
  - Quanta
  - None of the above
- The velocity of ocean wave is nothing but-----
  - Group velocity
  - Wave velocity
  - Particle velocity
  - None of the above.
- The diameter of Bohr's first orbit of H-atom is -----
  - 0.1nm
  - 1  $\mu$ m
  - 1 mm
  - 1 cm
- \_\_\_\_\_ Gas is most responsible for green house effect
  - H<sub>2</sub>
  - N<sub>2</sub>
  - CO<sub>2</sub>
  - NO<sub>x</sub>
- 'Sun at Zenith' means the position of the sun is -----
  - Overhead
  - Inclined towards East
  - Inclined towards West
  - sun is absent.

- vii) Select the correct option.
- Group velocity = wave velocity
  - Group velocity = particle velocity
  - Group velocity > wave velocity
  - Group velocity < particle velocity
- viii) Principal quantum number gives total number of -----
- Elliptical orbits
  - circular orbits
  - Both circular & Elliptical orbits
  - None of the above.
- ix) Frank & Hertz experiment explains-----
- |                          |                                   |
|--------------------------|-----------------------------------|
| a) Uncertainty principle | b) wave particle duality          |
| c) Photoelectric effect  | d) Discrete atomic energy levels. |
- x) IR light in solar spectrum is -----
- |                             |                       |
|-----------------------------|-----------------------|
| a) Visible                  | b) Invisible          |
| c) Both visible & invisible | d) None of the above. |

2. Attempt any four of the following.

8

- Define wave velocity and group velocity.
- State any two applications of uncertainty principle
- Describe the correspondence principle, in short.
- State the applications of holography.
- State Bohr's postulates.
- Enlist the conventional and non conventional sources of energy.

3. Attempt any two of the following.

8

- Write a short note on energy crisis.
- Describe spontaneous & stimulated emission.
- Find the group velocity if phase velocity of ripples on water surface having surface tension 'S' & density ' $\rho$ ' is given by.

$$W = \sqrt{\frac{2\pi S}{\rho \lambda}}$$

4. a) Attempt **any two** of the following. 6
- i) Describe Sommerfield's correction to Bohr's Theory.
  - ii) Explain population Inversion.
  - iii) Write a note on liquid flat plate collector.
- b) State the uses of LASER. 2
5. a) What are the different types of solar cells? Explain any one of them. State merits & demerits of photovoltaic solar energy conversion. 6

OR

Describe He-Ne LASER in detail.

- d) State the Limitations of Bohr's model. 2

\*\*\*\*\*