Roll No. .....

3056

B. Tech. 3rd Semester (ME) Examination – February, 2022

PHYSICS – II (OPTICS & WAVES)

Paper : BSC-ME-201-G

Time : Three Hours] *[Maximum Marks : 75*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Student has to attempt ***five*** questions in all selecting ***one*** from each Unit. Question No. **1** is ***compulsory***.

1. (i) Define frequency, time period, amplitude of S. H. M.

(ii) Differentiate between longitudinal and transverse waves.

(iii) What is the difference between a narrow (point) source and broad (extended) source of light.

(iv) What is grating element.

(v) Write about Fermat's Principle.

(vi) Why is population inversion necessary for LASER Action. $2.5 \times 6 = 15$

UNIT – I

2. (a) Find an expression for velocity and acceleration of Simple Harmonic Oscillator. 10

(b) A lift is ascending at acceleration 5 m/s^2. What is the period of oscillation of a simple pendulum of length 1 meter suspended in lift. 5

3. Define quality factor of a damped oscillator. Deduce expression for it for a mechanical oscillator and an electrical oscillator. 15

UNIT – II

4. Obtain an expression for longitudinal Sound Wave in gaseous medium and explain Laplace Correction for the same. 15

5. Derive the relation $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$ for a thin lens by matrix method. Also find expression for angular magnification. 15

UNIT – III

6. Describe the formation of Newton's rings by reflected light and by transmitted light. Derive an expression for nth bright ring in reflected system. 15

7. (a) Explain the difference between resolving power and dispersive power of a grating. 9

   (b) Explain how Michelson's interferometer can be used to find the wavelength of light. 6

UNIT – IV

8. (a) Explain the terms stimulated absorption, spontaneous emission, stimulated emission, pamping in lasers & population inversion. 10

   (b) What is the ratio of the stimulated emission to spontaneous emission at a temp. of 280°C for Sodium line. 5

9. Discuss Einstein's coefficients. Derive relation between them. 15
