

**I B. Tech I Semester Supplementary Examinations, August/September - 2022****ENGINEERING PHYSICS**

(Com. to CE, ME, Agri E)

Time: 3 hours

Max. Marks: 75

**Answer any five Questions one Question from Each Unit****All Questions Carry Equal Marks****UNIT I**

1. a) Derive an expression for frequency of a simple harmonic oscillator and show that (10M)  
is independent of the amplitude of motion.
- b) Explain why Newton's first and second laws are valid in the inertial frame of (5M)  
reference.

Or

2. a) What are forced oscillations? Obtain an expression for amplitude of forced (10M)  
oscillator and deduce the condition for resonance.
- b) The quality factor of a sonometer wire is 2000. On plucking, it makes 240 (5M)  
vibrations per second. Calculate the time in which amplitude decreases to half the  
initial value.

**UNIT II**

3. a) Explain how the reverberation time of a hall is affected by (10M)  
(i) its size, (ii) nature of its wall surfaces and (iii) audience.  
Derive expression for growth and decay of sound energy inside a hall.
- b) Define 'Absorption Coefficient' of a material and describe a method for its (5M)  
determination.

Or

4. a) State Inverse Piezoelectric effect. Draw the Piezoelectric ultrasonic generator (10M)  
circuit and explain its working.
- b) What are the advantages and disadvantages of ultrasonic testing? (5M)

**UNIT III**

5. a) Describe with necessary theory, how rigidity modulus of a wire is determined. (10M)
  - b) Describe the experimental procedure to find the Young's modulus of a cantilever. (5M)
- Or
6. a) Describe with relevant theory the determination of Young's modulus of the (10M)  
material of a bar by uniform bending.
  - b) Write short note on a) Young's modulus and b) Shear modulus (5M)

**UNIT IV**

7. a) What are the characteristics of laser? Describe the construction and working of Ruby laser with neat diagram. (10M)  
b) Mention some important applications of Laser. (5M)

Or

8. a) Explain the principle of operation and use of a piezoelectric strain gauge with a plot of electrical characteristics of a quartz crystal. (10M)  
b) Explain the principle of operation and use of a magnetostrictive sensor. (5M)

**UNIT V**

9. a) Elucidate the atomic origin of permanent magnetism in magnetic materials. (10M)  
b) What is ferromagnetism? Explain the properties of ferromagnetic materials. (5M)

Or

- 10 a) What do you understand by dielectric constant? Define dielectric susceptibility. Derive the relation between dielectric constant and dielectric susceptibility. (6M)  
b) Explain electronic polarisability and show that electronic polarisability for a mono atomic gas increases as the size of the atom becomes larger. (9M)