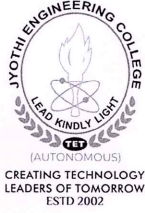


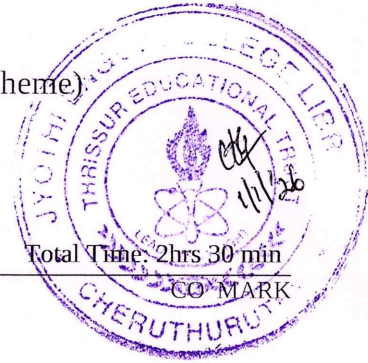
Reg No.: \_\_\_\_\_

Name : \_\_\_\_\_



Jyothi Engineering College(Autonomous)

B. Tech Degree S1 (R) Examination, December 2025 (2025 Scheme)

25PHT103- PHYSICS FOR PHYSICAL SCIENCE  
AND LIFE SCIENCE

Total Mark: 60

Total Time: 2hrs 30 min

**PART A**

(Answer All Questions. Each question carries 3 marks)

1. Why metastable state is necessary for laser emission? CO1 (3)
2. Why should refractive index of cladding be of lower value in comparison with refractive index of core in an optic fibre? CO1 (3)
3. How path difference and phase difference are related in wave motion? CO2 (3)
4. Write down the expression for the radius of nth dark ring in Newton's ring. Explain with reason what happens to the radius when air is replaced by a liquid of refractive index  $\mu$ . CO2 (3)
5. Explain with a numerical example that wave nature of matter is not apparent in our daily observations of large particles. CO3 (3)
6. What is the physical significance of wave function? CO3 (3)
7. Explain the principle behind ultrasound scanning. CO4 (3)
8. What is Non-Destructive Testing (NDT)? Write any one of the advantages of NDT. CO4 (3)

**PART B**

(Answer any one full question from each module, each question carries 9 marks)

**Module - 1**

9. Explain the working of a semiconductor laser. Mention any two of its applications with the property of the laser used. CO1 (9)

OR

10. Explain the construction and working of a ruby laser with schematic and energy level diagrams. CO1 (9)

**Module - 2**

11. a) Describe how interference fringes are produced in an air wedge. CO2 (5)
- b) Light of wavelength  $5893\text{\AA}$  is reflected at nearly normal incidence from a soap film of refractive index 1.42. What is the least thickness of the film that will appear as dark? CO2 (4)

OR

12. a) Discuss diffraction due to grating and derive the grating equation for normal incidence. CO2 (5)
- b) What is the highest order of spectrum which may be seen with a light of wavelength 650 nm by means of a grating having 5000 lines per cm? CO2 (4)

**Module - 3**

13. a) Starting from a plane wave equation, derive Schrodinger's time dependent wave equation. CO3 (5)
- b) Find the lowest energy of an electron moving in a one dimensional infinitely high potential well of width  $1\text{\AA}$ . ( $h = 6.625 \times 10^{-34} \text{Js}$ ) CO3 (4)

OR

14. a) State and explain uncertainty principle. Use this principle to show the non-existence of electrons inside the nucleus. CO3 (5)
- b) An electron is confined to a potential well of width 10nm. Calculate the minimum uncertainty in its velocity. Mass of electron is  $9.1 \times 10^{-31} \text{kg}$ . CO3 (4)

Module - 4

15. a) Define reverberation and reverberation time. What is the significance of reverberation time? Compare reverberation and echo. CO4 (5)
- b) A hall has a volume  $2000\text{m}^3$  and its total absorption is 92.9 Sabine. What will be the effect on reverberation time if the hall is full of audience and thereby increasing the absorption by another 85 Sabine? CO4 (4)

OR

16. a) What do you understand by SONAR? Describe the working principle of SONAR and mention two practical uses of this technology. CO4 (5)
- b) A string of length 1.2 m and mass 0.012 kg is stretched with a tension of 48 N. Calculate the velocity and the fundamental frequency of vibration of transverse wave in the string. CO4 (4)

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