

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

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



**Jyothi Engineering College(Autonomous)**  
 B. Tech Degree S1 (S) Examination, June 2026 (2025 Scheme)  
**25PHT102 - PHYSICS FOR ELECTRICAL SCIENCE**

**Total Mark: 60****PART A****(Answer All Questions. Each question carries 3 marks)**

1. Why is the reverse current in a diode almost constant with an increase in reverse bias voltage? CO1 (3)
2. Explain the factors affecting the density of holes in the valence band. CO1 (3)
3. Explain negative resistance of the tunnel diode with the help of V-I characteristics. CO2 (3)
4. Calculate the band gap energy of the semiconductor material used in an LED which emits light of wavelength **654 nm**. CO2 (3)
5. Explain the mechanism of space charge polarization in dielectrics. CO3 (3)
6. Prove that super conductors are perfect diamagnets. CO3 (3)
7. Explain any three important properties of lasers. CO4 (3)
8. Explain stimulated emission process with the help of an energy level diagram. CO4 (3)

**PART B****(Answer any one full question from each module, each question carries 9 marks)****Module - 1**

9. a) What is the Fermi level, and with a clear diagram, explain its position in extrinsic semiconductors for both n-type and p-type materials. CO1 (5)
- b) In a rectifier circuit operating at  $27^{\circ}\text{C}$ , the forward biased current is 6.63 A for a forward voltage of 0.22 V. Calculate the reverse saturation current. CO1 (4)

**OR**

10. a) Obtain an expression for intrinsic carrier concentration. CO1 (5)
- b) With the help of a neat diagram, explain the V-I characteristics of a p n junction diode. CO1 (4)

**Module - 2**

11. a) Explain the construction and working of a junction photodiode with a neat diagram. CO2 (5)
- b) In a centre tap full wave rectifier each diode has an internal resistance of **10  $\Omega$** . The transformer rms secondary voltage from centre tap to each end of secondary is **50 V** and load resistance is **980  $\Omega$** . Find mean load current and rms value of load current. CO2 (4)

**OR**

12. a) Explain the working of solar cells and draw the V-I characteristics of a solar cell. CO2 (5)
- b) Differentiate between a PN junction diode and a Zener diode. CO2 (4)

**Module - 3**

13. a) Explain the characteristics of Type I and Type II superconductors with appropriate diagrams and examples. CO3 (5)
- b) What is critical magnetic field? How is it related to temperature of superconductor? CO3 (4)

**OR**

14. a) Explain the mechanism of ionic polarization in ionic crystals with a neat diagram. Derive an expression for the induced dipole moment. CO3 (5)
- b) If the electric field strength inside two parallel plates of a capacitor is  $10^4 \text{ V/m}$  due to a dielectric medium of dielectric constant 3, find the polarization vector.  $\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2/\text{Nm}^2$  CO3 (4)

**Module - 4**

15. a) What are the basic components of a laser system? How are these requirements satisfied in the case of Ruby laser? CO4 (5)
- b) Briefly explain any four applications of laser. CO4 (4)

**OR**

16. a) What do you mean by acceptance angle of an optical fibre? Obtain the expression for the acceptance angle of an optic fibre. CO4 (5)
- b) Calculate the numerical aperture and acceptance angle of optical fibre of refractive indices for core and cladding as 1.62 and 1.52, respectively. CO4 (4)

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