JHARKHAND Rai University
RANCHI

PRACTICE TEST
End Semester Examination, December 2025

Program: B.Tech (Mining /CSE)
Semester: I
Subject: Physics
Subject Code: 8BSC101 / 3 BSC101

Course Outcome:

On the completion of the Course, the students will be able to:

CO1: Apply the basic concepts of electromagnetic theory.

CO2: Explain the dual nature of matter and wave equation.

CO3: Demonstrate the types of motion and different types of forces.

CO4: Describes the different Phenomena of Wave Optics, principles of lasers, types of lasers and their application.

CO5: Design the different types of diodes.

UNIT-I

Section I (5 Marks)

1. Define Magnetic Field, Magnetization, and establish the relationship inn between B and H. (Remember-CO1)
2. State Electric flux and Gauss's Law. (Remember-CO1)
3. Explain Laplace's and Poisson's equations for electrostatic potential. (Understand-CO1)
4. Explain dielectric and types of dielectrics. Define dielectric constant. (Remember-CO1)

Section II (10 marks)

5. Coin the term magnetic field? State Biot- Savart Law. Evaluate an expression for magnetic field due to a straight wire carrying current. (Apply-CO1)
6. Explain the Faraday's Law of Electromagnetic Induction. State Lenz Law. (Understand-CO1)
7. Discuss the Displacement current. Explain Maxwell's four equations. (Understand-CO1)
8. How we can distinguish between Ferromagnetic, Paramagnetic and Diamagnetic materials explain with example. (Apply-CO1)

Section III (20 Marks)

9. Evaluate an expression for energy stored in dielectric in electrostatic field. (Evaluate-CO1)
10. Solve Laplace's equation to find the potential at a distance r from the axis of an infinitely long conducting cylinder with a surface charged density σ. (Evaluate-CO1)

UNIT II

Section I (5 marks)

11. State and explain Uncertainty Principle. (Understand-CO2)
12. Describe Dual nature of matter and explain De Broglie waves. (Apply-CO2)
13. Define Photons. What are the properties of Photons? (Undersatnd-CO2)

Section II (10 marks)

14. Derive the Schrödinger time independent wave equation. (Apply-CO2)
15. Derive the Schrödinger time dependent wave equation. (Apply-CO2)
16. Explain Davisson and Germer's experiment. (Understand-CO2)
17. Justify the existence of zero point energy on the basis of Heisenberg uncertainity principle (Evaluate-CO2)

Section III (20 marks)

18. A particle is confined to one-dimensional infinite potential well of width 0.2 x 10-9 m. It is found that when energy of the particle is 230 eV its eigen function have 5 antinodes. Find the mass of the particle. (Evaluate-CO2)

UNIT III

Section I (5 marks)

19. What is the difference between linear motion and Rotational motion (Remember-CO3)
20. Explain conservative and non-conservative force. (Understand-CO3)
21. State and prove law of conservation of Linear Momentum & Angular momentum. (Understand-CO3)

Section II (10 marks)

22. State and explain Euler's law of motion. (Understand-CO3)
23. Derive the position vector of Centre of mass of two particle system. (Apply-CO3)

Section III (20 marks)

24. Prove that, if no force acts, the linear momentum is conservative. (Apply-CO3)
25. Derive the components of velocity in a cartisian coordinate system for two dimensional case. (Evaluate-CO3)

UNIT IV

Section I (5 marks)

26. Explain Total Internal Reflection. What are the applications of the same? (Understand-CO4)
27. Discuss Brewster's Law with suitable diagram (Understand-CO4).

28. What are the properties of Laser? What are the applications of Laser? (Understand-CO4)

Section II (10 marks)

29. Define the laser and explain the principle of laser. (Understand-CO4)
30. Explain spontaneous emission, stimulated emission and population-inversion. (Understand-CO4)
31. Explain with diagram Ruby Laser. (Understand-CO4)
32. Explain the types of Lasers. Explain gas laser (He-Ne). (Understand-CO4)

Section III (20 marks)

33. Derive the equation of Simple Harmonic motion. (Apply-CO4)

UNIT V

Section I (5 marks)

34. Explain P-N junction with diagram. (Understand-CO5)
35. Explain P-N junction under forward direction and reverse direction with diagram. (Understand-CO5)
36. Explain light emitting diode and application of LEDs (Understand-CO5)

Section II (10 marks)

37. What do you mean by semiconductor? Explain the types of semiconductors (Understand-CO5)
38. Explain P-I-N Photodiode with diagram. (Understand-CO5)
39. Explain Avalanche Photodiode with diagram. (Understand-CO5)

Section III (20 marks)

40. Can you explain the optoelectronic devices? With proper sketch, discuss the working principle of LED. Also enumerate the advantages of LEDs? (Apply-CO5)

Summary Sheet

CO Wise

CO	Q. No	Mark s
CO1	1,2,3,4,5,6,7,8,9,10	100
CO2	11,12,13,14,15,16,17,18	75
CO3	19,20,21,22,23,24,25	75
CO4	26,27,28,29,30,31,32,33	75
CO 5	34,35,36,37,38,39,40	65
Total		**390**

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Unit Wise

Unit	Q. No	Mark s
Unit 1	1,2,3,4,5,6,7,8,9,10	100
Unit 2	11,12,13,14,15,16,17,18	75
Unit 3	19,20,21,22,23,24,25	75
Unit 4	26,27,28,29,30,31,32,33	75
Unit 5	34,35,36,37,38,39,40	65
Total		**390**

Blooms Taxonomy Level (BTL) Wise

BTL	Q. No	Marks
LOT	1,2,3,4,6,7,11,12,13,16,17,19,20,21,22,26,27,28,29,30,313 2,34,35 ,36,37,38,39	210
HOT	5,8,9,10,14,15,17,18,23,24,25,33,40	180
Total		**390**

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Disclaimer: - This is a Practice set. The Question in End term examination will differ from the Practice set. This Practice set is meant for practice only.