

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular/Supplementary Winter Examination – 2025

Course: F.Y. B.Tech.

Branch: All Branch

Semester: I

Subject Code & Name: BTBS102P & Engineering Physics

Max Marks: 60

Date: 17/01/2026

Duration: 3 Hr.

Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and include objective-type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 6.
4. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
5. Use of non-programmable scientific calculators is allowed.
6. Assume suitable data wherever necessary and mention it clearly.

	(Level/CO)	Marks
Q. 1 Select an appropriate option for each of the following. (Compulsory)		12
1 In forced vibration amplitude will be.... a. constant b. decreases c. Increases d. none	Understand (CO1)	1
2 In the Piezoelectric Method the frequency produced is.... a. 50KHz b. 2KHz- 20KHz c. 30 Hz d. 50 MHz	Remember (CO1)	1
3 From the following which is an optical active compound? a. sugar b. water c. ceramic d. none	Understand (CO2)	1
4 In Ruby laser active material is... a. Cr ³⁺ ion b. aluminium c. Helium d. Neon	Understand (CO2)	1
5 The de-Broglie wavelength associated with material particle is given by a. $\lambda = \frac{12.26}{\sqrt{V}}$ b. $4 = \frac{1.226}{\sqrt{V}}$ c. $= \frac{122.6}{V}$ d. $= \frac{12.26}{V}$	Remember (CO3)	1
6 The mathematical equation of Heisenberg's uncertainty principle is a. $\Delta x, \Delta p \geq \frac{h}{4\pi}$ b. $\Delta x, \Delta p \geq 0$ c. $\Delta x, \Delta p \geq h$ d. $x, p \geq \frac{h}{4\pi}$	Remember (CO3)	1
7 The co-ordination number of BCC structure is a. 4 b. 6 c. 8 d. 12	Remember (CO4)	1
8 Differential form of Maxwell's equation of Gauss's Law for magnetostatics is.. a. $\nabla \cdot B = 1$ b. $\nabla \cdot B = 0$ c. $\nabla \times B \equiv \infty$ d. $\Delta \cdot B = 1$	Remember (CO4)	1
9 Atomic Packing Fraction of FCC is a. 0.74 b. 0.68 c. 0.52 d. 0.85	Understand (CO4)	1
10 The pure semiconductor is called as _____ Semiconductors. a. Extrinsic b. Intrinsic c. p-type d. n-type	Remember (CO5)	1
11 At critical temperature, Resistivity of superconductor becomes... a. zero b. not zero c. infinity d. none	Understand (CO5)	1
	Analyse (CO5)	1

12	For Ge semiconductor energy band gap is		
	a. 0.7 eV b. 0 eV c. 0.5 eV d. 1.1 eV		
Q. 2	Solve the following.		12
A)	What are Free Oscillations? Derive differential wave equation of Free Oscillations.	Understand (CO1)	6
B)	Write any three properties of Ultrasonic waves.	Remember &	6
	Calculate the thickness of the quartz plate which is used to produce ultrasonic waves of 3MHz. Density of quartz is $2.65 \times 10^3 \text{ kg/m}^3$ and Young's Modulus is $8 \times 10^{10} \text{ N/m}^2$.	analyze (CO1)	
Q.3	Solve the following.		12
A)	Explain the construction and working of He-Ne Laser with an energy level diagram.	Understand (CO2)	6
B)	What is Double Refraction? Explain production of polarized light using Double Refraction phenomenon.	Understand (CO2)	6
Q. 4	Solve Any Two of the following.		12
A)	Explain Bainbridge Mass Spectrograph with a neat diagram.	Understand (CO3)	6
B)	Derive Schrodinger's time dependent wave equation.	Understand (CO3)	6
C)	Explain the construction and working of G.M. Counter.	Understand (CO3)	6
Q.5	Solve Any Two of the following.		12
A)	Find number of atoms per unit cell of SC, BCC and FCC with suitable diagram.	Remember (CO4)	6
B)	Explain Characteristics and Continuous X-ray Spectra with diagrams.	Remember (CO4)	6
C)	Prove that lattice constant(a) is inversely proportional to the density (ρ). The (110) planes of a calcite crystal have a lattice constant of $3.036 \text{ \AA}$. calculate interplanar spacing.	Remember & Analyze (CO4)	6
Q. 6	Solve Any Two of the following.		12
A)	Explain types of Magnetic Materials with examples.	Remember (CO5)	6
B)	What is a superconductor? State Meissner Effect and prove superconductors are perfect diamagnetic materials.	Remember & Understand (CO5)	6
C)	i) The Hall coefficient (R_H) of silicon specimen was found to be $8.35 \times 10^{-5} \text{ m}^3/\text{C}$. Find the charge carrier density (n). [given charge of an electron is $1.6 \times 10^{-19} \text{ C}$]. ii) A copper strip 3.0 cm wide and 1.5 mm thick is placed in a magnetic field with $B=2.0 \text{ Wb/m}^2$. If a current of 200 A is set up in the strip, calculate the Hall Voltage that appears across the strip. Assume $R_H=6 \times 10^7 \text{ m}^3/\text{C}$	Remember & Analyze (CO5)	6
*** End ***			