

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Supplementary Winter Examination – 2025

Course: F.Y.B.Tech.

Branch: All Branch

Semester: II

Subject Code & Name: BTBS202P/PHY1202 & Engineering Physics

Max Marks: 60

Date: 12/01/2026

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 case of Forced oscillations amplitude will be _____ with respect to time. a. decreases b. increases c. constant d. none	Remember (CO1)	1
2	The frequency of ultrasound wave is a. greater than b. less than c. equal to d. none audible range audible range audible range	Remember(CO1)	1
3	In Brewster's law angle between reflected and refracted ray is a. 57° b. 90° c. 45° d. 33°	Understand(CO2)	1
4	The formula for Specific Rotation (S) is a. $S = \frac{10 \times \theta}{l \times c}$ b. $S = \frac{c}{l \times \theta}$ c. $S = \frac{l \times \theta}{l \times c}$ d. none	Remember(CO2)	1
5	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. $x. p \geq \frac{h}{4\pi}$	Understand(CO3)	1
6	The de-Broglie wavelength associated with material particle is given by a. $\lambda = \frac{h}{p}$ b. $\lambda = \frac{p}{h\sqrt{V}}$ c. $\lambda = hp$ d. $\lambda = hv$	Remember(CO3)	1
7	The co-ordination number of FCC structure is a. 4 b. 6 c. 8 d. 12	Remember(CO4)	1
8	X-Rays discovered by ____ a. Feynman b. Roentgen c. Newton d. curie	Remember(CO4)	1
9	Atomic Packing Fraction of SC is a. 0.74 b. 0.68 c. 0.52 d. 0.85	Remember(CO4)	1
10	Garnets are.... Dielectric Diamagnetic Ferrimagnetic conducting	Remember(CO5)	1
11	At critical temperature resistivity of superconducting material becomes a. zero b. not zero c. infinity d. none	Remember(CO5)	1
12	Hall coefficient R_H is given by, a. $R_H = \frac{1}{n.e}$ b. $R_H = \frac{n}{e}$ c. $R_H = n.e$ d. none	Remember(CO5)	1

Q. 2 Solve the following.		12
A) What are Damped Oscillations? Derive differential wave equation of Damped Oscillations.	Understand(CO1)	6
B) Write any Three applications of Ultrasonic waves. Calculate the natural frequency of 80mm length of a pure iron rod. Given density of pure iron is $7.25 \times 10^3 \text{ kg/m}^3$ and Young's Modulus is $1.15 \times 10^{11} \text{ N/m}^2$	Understand(CO1)	6
Q.3 Solve the following.		12
A) 1) Explain Spontaneous Emission and Stimulated Emission of Radiation. 2) In a Newton's Ring experiment, find the radius of curvature (R) of a plano convex lens when the light of wavelength $5890 \text{ \AA}$ and the diameter of the 3 rd dark ring is 0.32cm.	Understand(CO2)	6
B) Define Acceptance Angle. Derive the expression of Acceptance Angle with suitable diagram.	Understand(CO2)	6
Q. 4 Solve Any Two of the following.		12
A) What is Q-value of Nuclear Reaction? Explain when Q is positive, negative and zero.	Understand(CO3)	6
B) Derive Schrodinger's time independent wave equation.	Understand(CO3)	6
C) Explain Bainbridge Mass Spectrograph with a neat diagram.	Understand(CO3)	6
Q.5 Solve Any Two of the following.		12
A) Explain the atomic radius(r) and lattice constant(a) relation of SC, BCC and FCC with suitable diagrams.	Understand(CO4)	6
B) Write Maxwell's Equations in differential and integral form.	Remember(CO4)	6
C) Prove that lattice constant(a) is inversely proportional to the density (ρ) A metal has a lattice constant(a) of $2.9 \text{ \AA}$, density of 7.87 g/cc , the atomic weight of 55.85 and $N_A = 6.023 \times 10^{23}/\text{mole}$. The number of atoms per unit cell will be?	Understand(CO4)	6
Q. 6 Solve Any Two of the following.		12
A) Explain B-H curve with the help of domain theory.	Understand(CO5)	6
B) What is a superconductor? Distinguish between Type-I and Type-II superconductor	Understand(CO5)	6
C) Derive the expression for conductivity(σ) of Intrinsic Semiconductor. Find the conductivity (σ) of intrinsic Ge at 300K. Given the charge carrier density(n) as $2.5 \times 10^{19}/\text{m}^3$, charge of an electron is $1.6 \times 10^{-19} \text{ C}$, mobility of germanium $\mu_e = 3600 \text{ cm}^2/\text{volt-sec}$.	Understand(CO5)	6

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