

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Supplementary Summer Examination – 2026

Course: F.Y. B.Tech.

Branch: All Branch

Semester: I

Subject Code & Name: BTBS102P & Engineering Physics

Max Marks: 60

Date: 18 / 06 /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 interference effective path difference (Δ) of thin film due to reflected light is..	Understand (CO1)	1
a. $\Delta = 2\mu\cos$ b. $\Delta = 2\mu t\cos r \pm \lambda/2$ c. $\Delta = 2\mu t\cosh$ d. none		
2 The frequency of ultrasound wave is	Remember (CO1)	1
a. equal to audible b. less than audible c. greater than audible d. none		
range range range		
3 The formula for Specific Rotation (S) is	Understand (CO2)	1
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		
4 He-Ne laser is type of...	Understand (CO2)	1
a. Gas LASER b. Solid LASER c. Helium LASER d. none		
5 The de-Broglie wavelength associated with material particle is given by	Remember (CO3)	1
a. $\lambda = \frac{12.26}{\sqrt{V}}$ b. $\lambda = \frac{1.226}{\sqrt{V}}$ c. $\lambda = \frac{122.6}{V}$ d. $\lambda = \frac{12.26}{V}$		
6 The mathematical equation of Heisenberg's uncertainty principle is	Remember (CO3)	1
a. $\Delta x, \Delta p \geq h/2\pi$ b. $\Delta x, \Delta p \geq 0$ c. $\Delta x, \Delta p \geq h$ d. $x, p \geq \frac{h}{\pi}$		
7 The co-ordination number of BCC structure is	Remember (CO4)	1
a. 4 b. 6 c. 8 d. 12		
8 Differential form of Maxwell's equation of Gauss's Law for magnetostatics is..	Remember (CO4)	1
a. $\nabla \cdot B = 1$ b. $\nabla \cdot B = 0$ c. $\nabla \times B \equiv \infty$ d. $\Delta \cdot B = 1$		
9 Number of atoms in primitive unit cell is	Understand (CO4)	1
a. zero b. one c. two d. none		
10 Microscopic ohm's law is given as,	Remember (CO5)	1
a. $J = \sigma E$ b. $J = \sigma V$ c. $J = VI$ d. $J = h E$		
11 At critical temperature, Resistivity of superconductor becomes...	Understand (CO5)	1
a. zero b. not zero c. infinity d. none		

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	Analyse (CO5)	1
Q. 2	Solve the following.		12
A)	Derive differential wave equation of forced oscillations.	Understand (CO1)	6
B)	Write any three applications of Ultrasonic waves. 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 $8 \times 10^{10} \text{ N/m}^2$.	Remember & analyze (CO1)	6
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)	What is Q-value of Nuclear Reaction? Explain when Q is positive, negative and zero.	Understand (CO3)	6
Q.5	Solve Any Two of the following.		12
A)	Find atomic packing fraction(APF) of SC, BCC and FCC with suitable diagram.	Remember (CO4)	6
B)	Write Maxwell's equation in differential and Intergral form.	Remember (CO4)	6
C)	Prove that lattice constant(a) is inversely proportional to the crystal density (ρ). Tellurium(Te) has SC structure, and its atomic radius is $1.32 \text{ \AA}$. Find the lattice constant (a).	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? Explain Type-I and Type-II superconductor	Remember (CO5)	6
C)	Derive the expression for conductivity(σ) of Intrinsic Semiconductor. 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 ***