Seat No./Enrollment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BACHELOR OF ENGINEERING – SEMESTER 1 – EXAMINATION – SUMMER 2026

Subject Code: BE01000021/ BE01R00021 **Date: 17/06/2026**

Subject Name: Physics

Time: 10:30 AM TO 01:00 PM **Total Marks: 70**

Instructions:

1. Attempt all questions.

2. Make suitable assumptions wherever necessary.

3. Figures to the right indicate full marks.

4. Simple and non-programmable scientific calculators are allowed.

Q.1	**(a)**	Discuss stress-strain diagram in detail.	**03**
	(b)	Explain the terms:(i)Young's Modulus(ii)Bulk Modulus(iii)Shear Modulus(iv)Poisson's Ratio.	**04**
	(c)	What is cantilever? Obtain the expression for depression of cantilever loaded at free end.	**07**
Q.2	**(a)**	Explain Sabine's formula and its usage.	**03**
	(b)	An ultrasonic source of sound of 0.09 MHz sends down a pulse towards the seabed which returns after 0.55 s. The velocity of sound in water is 1800 m/s. Calculate (i) the depth of the sea and (ii) wavelength of pulse.	**04**
	(c)	Discuss ultrasonic flaw detector method for NDT with advantages and disadvantages.	**07**

OR

Q.2	**(c)**	Describe production of ultrasonic waves by magnetostriction method. Give its advantages and limitations	**07**
Q.3	**(a)**	What is interference? Explain constructive and destructive interference.	**03**
	(b)	Differentiate between Fresnel and Fraunhofer diffraction.	**04**
	(c)	Discuss the construction and working of Michelson Interferometer.	**07**

OR

Q.3	**(a)**	What is Anti-reflecting coatings?	**03**
	(b)	State Huygens ' Principle and explain how it explains wave propagation.	**04**
	(c)	Describe the working and applications of Young's double-slit experiment	**07**

Q.4	**(a)**	Explain black-body radiation?	**03**
	(b)	Describe the concept of energy distribution function.	**04**
	(c)	Derive Schrödinger's time-independent wave equation.	**07**

OR

Q.4	**(a)**	State and explain Heisenberg's uncertainty principle.	**03**
	(b)	State de Broglie's hypothesis and derive the expression for matter waves.	**04**
	(c)	Explain Scanning Tunneling Microscope (STM) in detail.	**07**
Q.5	**(a)**	What is a laser? Explain spontaneous and stimulated emission.	**03**
	(b)	Discuss applications of lasers in science, engineering, and medicine.	**04**
	(c)	Explain the working of a PN junction diode and its I-V characteristics.	**07**

OR

Q.5	**(a)**	Explain the following:(i)Population inversion (ii) Metastable (iii) Active medium	**03**
	(b)	Explain various properties of LASER.	**04**
	(c)	What is superconductivity? explain any six properties of superconductor.	**07**

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