Seat No.: _____                                      Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY
## BE- SEMESTER–I & II (NEW) EXAMINATION – WINTER 2020
**Subject Code:3110011**                                **Date:17/03/2021**
**Subject Name:Physics**
**Time:10:30 AM TO 12:30 PM**                         **Total Marks:56**
**Instructions:**
  1. **Attempt any FOUR questions out of EIGHT questions.**
  2. **Make suitable assumptions wherever necessary.**
  3. **Figures to the right indicate full marks.**

                                                                **MARKS**

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|---|---|---|---|
| **Q.1** | **(a)** | A load of 2.6 kg produces an extension of 1 mm in a wire of 3.082 m and 1 mm in diameter. Calculate the Young's modulus of a wire. | **3** |
| | **(b)** | Define and describe Elasticity and Plasticity in detail by giving suitable examples. | **4** |
| | **(c)** | Explain the terms: (i) Young's modulus, (ii) Bulk modulus, (iii) Shear modulus and (iv) poison's ratio. Show any one relation between different moduli of elasticity. | **7** |
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| **Q.2** | **(a)** | An empty assembly hall have a volume of 11260 $m^3$ and its total absorption is equivalent to 92 $m^2$ of open window. What will be the effect on reverberation time if an audience fills the assembly hall full and thereby increase the absorption by another 92 $m^2$ of open window? | **3** |
| | **(b)** | Define and differentiate between transverse and longitudinal waves. | **4** |
| | **(c)** | Describe Simple Harmonic motion with some examples. Differentiate Free and Forced oscillations (any four points). | **7** |
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| **Q.3** | **(a)** | Describe any three applications of Ultrasonics. | **3** |
| | **(b)** | Write short note on (i) Ultrasonics and (ii) Non-Destructive Testing | **4** |
| | **(c)** | Write in detail Piezoelectric method for the production of ultrasonic sound using quartz crystal. Give suitable diagram and circuit for the same. | **7** |
| | | | |
| **Q.4** | **(a)** | Superconducting Gadolinium has a critical temperature of 8.6 K at magnetic field of 12.95 Tesla. Find its critical field at 4.1 K. | **3** |
| | **(b)** | What are superconductors? Explain any three properties of superconductors. | **4** |
| | **(c)** | Explain in brief (i) Josephson's junction and its applications, (ii) SQUID | **7** |
| | | | |
| **Q.5** | **(a)** | Describe and differentiate ordinary light and Laser light | **3** |
| | **(b)** | Write properties of Laser light. | **4** |
| | **(c)** | What is the full form of LASER? Explain in detail construction and working of Ruby Laser with the help of necessary schematic and energy level diagram. | **7** |

**Q.6** **(a)** Describe population inversion with suitable diagram. **3**

**(b)** State two advantage and disadvantages of non-destructive testing method **4**

**(c)** Draw: Stress – Strain diagram with necessary notation. Explain: Elastic Limit and Upper Yield Point in detail. **7**

**Q.7** **(a)** Describe role of stimulated emission in lasing action. **3**

**(b)** Describe four methods for detection of ultrasonics. **4**

**(c)** State the acoustic requirements of a good auditorium. Write factors affecting architectural acoustics with remedies. **7**

**Q.8** **(a)** Describe any three property of ultrasonic sound. **3**

**(b)** Describe ultrasonic flaw detector. How is it used in detection of flows in metals? **4**

**(c)** What is Cantilever? Obtain the expression for depression at free end of thin beam clamped horizontally at one end and loaded at other end. **7**

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