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| | **Reg. No.:** | |
| | **Name :** | |

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**TERM END EXAMINATIONS (TEE) – December 2021- January 2022**

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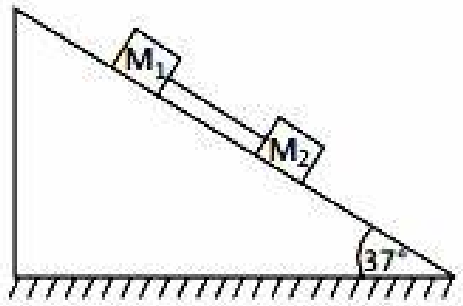
| **Programme** | **:** | **B.Tech. – BCE** | **Semester** | **:** | **Fall 2021-22** |
| **Course Name** | **:** | **Engineering Physics** | **Course Code** | **:** | **PHY1001** |
| **Faculty Name** | **:** | **Dr. Divya Haridas** | **Slot / Class No** | **:** | **C11+C12+C13 / 0019** |
| **Time** | **:** | **1½ hours** | **Max. Marks** | **:** | **50** |

**Answer ALL the Questions**

| Q. No. | | Question Description | Marks |
|---|---|---|---|
| | | **PART - A ( 30 Marks)** | |
| 1 | (a) | Consider two masses M1 and M2. These two masses are connected using a massless string. The blocks are sliding down as shown in Figure 1.<br>Find the (a) The acceleration of the masses<br>(b) tension of the string<br>Given: M1=4kg, M2=2Kg.<br>$\mu 1 = 0.75$ and $\mu 2 = 0.25$, $g = 9.8 m/s^2$.<br>  <br><br>*Figure 1* | 10 |
| | | OR | |
| | (b) | Assume a spectral transition emits lights in the wavelength range 400nm. The average life time is given as $10^{-8}$ s. Determine the spectral width.<br><br>Calculate the de-Broglie wavelength of thermal neutron at 300K<br>(Final Answer should be in nm) | 5<br><br>5 |
| 2 | (a) | Discuss about nano well, nano wire and nano dot and its significance.<br><br>Discuss the energy density diagram of each of the structure in details. | 5<br><br>5 |
| | | OR | |
| | (b) | Illustrate the working of a $CO_2$ laser. The details of construction of laser, working principle (including transition diagram), applications should the part of your answer. | 10 |
| 3 | (a) | Consider a He-Ne laser with wavelength 632.8nm. The light from this laser falls on a screen at a distance of 5 m. The spot produced is having a diameter of 1mm. Considering the above values calculate<br>(a) Areal spread<br>(b) Divergence | 10 |

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| | | OR | |
| | (b) | Describe a typical fibre optics communication system. Explain each system in the communication network in detail.<br>(the answer should contain a neat diagram)<br><br>Distinguish between a single mode step index fibre, multi-mode (step index and graded index) fibres. Discuss in detail using Pulse diagram of the systems. | 5<br><br>5 |
| **PART - B (20 Marks)** | | | |
| 4 | | The energy of electrons in a one dimensional box can be illustrated using Schrodinger equation. Starting from the Schrodinger equation show that the energy Eigen values of an electron varies in square of natural numbers | 10 |
| 5 | | Assume a laser light source of wavelength =5000$A^0$. Calculate the temperature at which spontaneous emission and stimulated emission equal? | 10 |
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