

**DMI-ST. EUGENE UNIVERSITY****ZAMBIA****DEGREE EXAMINATION – JUNE 2024****Semester: III****055PH33 ENGINEERING PHYSICS****Time: 3:00 Hours****Max. Marks: 100****Answer any FIVE Questions (5 x 20 = 100 Marks)**

1. a) Define Hooke's Law. **(2 Marks)**  
b) Derive the formula for the period of oscillation of a torsional pendulum. **(8 Marks)**  
c) Derive the formula for Young's modulus using cantilever method. **(10 Marks)**
2. a) Give the physical significances of grad, curl, divergence operators. **(10 Marks)**  
b) Derive the Maxwell's equation in both integral and differential form. **(10 Marks)**
3. a) Construction and working of co2 laser? **(10 Marks)**  
b) Derivation of Einstein's Co efficient and their relations. **(10 Marks)**
4. a) Derivation of schrodinger time independent equation. **(10 Marks)**  
b) Derive the expression for energy levels of particle in a box using schrodinger equation. **(10 Marks)**
5. a) What is Nanomaterials? Explain about top down method and bottom up method. **(10 Marks)**  
b) Detail the characteristics and properties of NiTi alloy. **(10 Marks)**
6. a) Draw and explain the production of ultrasonic waves by Magnetostriction method. **(10 Marks)**  
b) What is Piezo electric effect? Draw and explain the production of ultrasonic waves by Piezo electric method. **(10 Marks)**
7. a) What is poynting vector? State and prove the poynting theorem. **(10 Marks)**  
b) What is electromagnetic waves? Explain about the electromagnetic spectrum. **(10 Marks)**