DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY,
LONERE – RAIGAD - 402103
End Semester Examination, May 2018

Branch: F.Y. B.Tech.   **Semester: II**

Subject: Engineering Physics (PHY 203)   **Marks: 60**

Date: 18 / 05 / 2018   **Time: 3 Hrs**

Instructions to the Students:
1. Each question carry 12 marks
2. Attempt any five questions of the following
3. Illustrate your answers with neat sketches, diagrams etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

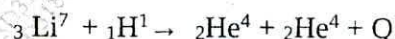
Q. No.1 Attempt the following.

a. Which are the forces involved in Forced Oscillations? Obtain the differential equation   06
   of forced oscillations.

b. What are ultrasonic waves? Describe magnetostriction method for generating ultrasonic   06
   waves.

Q. No. 2 Attempt any two of the following.

a. In case of Newton's rings in reflected light show that diameter of bright rings is   06
   proportional to the square root of odd natural numbers.
   In Newton's rings, the diameter of a certain bright ring is 0.65 cm and that of tenth
   ring is 0.95 cm. If $\lambda = 6000 \text{ A}^0$, calculate the radius of curvature of a convex lense.

b. Give the diagrammatic representation of polarized and unpolarized light.   06
   Explain the method of producing plane polarized light by reflection.

c. Explain the construction and working of He-Ne laser with neat diagram.   06

Q. No. 3 Attempt the following.

a. What is Q-value of nuclear reaction? Calculate the Q-value of given reaction and   06
   state whether reaction is exothermic or endothermic.

$$_3\text{Li}^7 + {_1}\text{H}^1 \rightarrow {_2}\text{He}^4 + {_2}\text{He}^4 + Q$$

Given Mass of Li = 7.01822
Mass of H = 1.00814
Mass of He = 4.00387.

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b. State Heisenberg's Uncertainty Principle and prove that electron cannot exists in the nucleus.   06

Q. No. 4 Attempt the following.

a. Define Packing Density. Find the packing density in SC, BCC, and FCC lattices.   06

OR

a. Derive the relation between crystal density 'ρ' and lattice parameter 'a'.
The density of copper is 8980 Kg/ m³ and unit cell dimension is 3.61 A⁰. Atomic weight of copper is 63.54. Determine crystal structure.   06

b. State and Derive Moseley's law for characteristics X-ray spectrum.   06

Q. No. 5 Attempt the following.

a. Discuss the different types of magnetic materials interms of magnetic moments.   06

OR

a. Prove Bohr magneton $\mu_B = e\hbar/2m$. Differentiate between hard and soft magnetic materials.   06

b. What is Microscopic Ohm's Law? Differentiate between Type I and Type II superconductors.   06

Q. No. 6 Attempt any two of the following.

a. Derive an expression for conductivity in an intrinsic and extrinsic semiconductor.
Calculate conductivity of pure silicon when the concentration of carriers is 1.6×10^{10} / cm³, and $\mu_e = 1500$ cm²/V-s, $\mu_h = 500$ cm²/V-s.   06

b. Explain the terms
    i. Dielectric constant
    ii. Electric Displacement
    iii. Polarizability   06

c. What is displacement current? Write Maxwell's equations in differnetial and integral form.   06