Dr. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY
LONERE – RAIGAD – 402103
End Semester Examination – December – 2017

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

Subject: Engineering Physics (PHY103) **Marks: 60**

Date: 15 / 12 / 2017 **Time: 3 Hrs.**

Instructions to the Students:

1. Each question carries 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.

Q1. Attempt the following:

a. Obtain the differential equation of wave motion. **(6)**

b. What is Piezoelectric and Magnetostriction Effect? **(4+2)**

Calculate the natural frequency of 40 mm length of a pure iron rod. Given the density of pure iron is 7.25 X 10^3 kg/m^3 and its Young's Modulus is 115 X 10^9 N/m^2. Can you use it in magnetostriction oscillator to produce ultrasonic waves?

Q2. Attempt any TWO of the following:

a. Derive an expression for the optical path difference for the reflected rays in a thin film of constant thickness and hence find the conditions for maxima and minima. **(6)**

b. What is double refraction? Explain the difference between ordinary ray (O-ray). and extra ordinary ray (e-ray). **(6)**

c. What is population inversion and stimulated emission? **(4+2)**

Calculate the acceptance angle of an optical fibre where the refractive index of core is 1.55 and that of cladding is 1.50.

Q3. Attempt the following:

a. With neat diagram explain principle and working of Bainbridge Mass Spectrograph. **(6)**

b. Derive the time independent Schrodinger's wave equation. **(6)**

Q4. Attempt the following:

a. Define atomic radius. Calculate atomic radii in SC, BCC and FCC lattices with suitable diagrams. **(4+2)**

Lead exhibits FCC structure. Each side of unit cell is of 4.95 A^0 Calculate radius of lead atom.

OR

a. Derive the relation between interplaner spacing 'd ' defined by Miller Indices (hkl) and lattice parameter 'a '. **(4+2)**

Calculate the interplaner spacing for (220) plane where the lattice constant is 4.938 A^0.

b. What is X-ray? How do we get the continuous spectrum in X-rays explain. **(4+2)**

An X-ray is operated at 20 kv. Calculate the minimum wavelength of X-rays emitting from it.

Q5. Attempt the following:

a. On the basis of domain theory explain B-H curve and hence explain retentivity and coercivity. **(6)**

b. What is Superconductivity? Explain Meissner Effect in Superconductors. **(2+4)**

Q6. Attempt the following:

a. What is Hall effect? Derive an expression for Hall Coefficient. **(6)**

b. Derive an expression for electromagnetic wave in free space and hence calculate the value of velocity of light in free space. **(6)**

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