DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE – RAIGAD – 402103.

Summer Supplementary Semester Examination, May 2018

Branch: F.Y. B. Tech. **Semester:** I
Subject with Subject Code: Engineering Physics [PHY 103] **Marks:** 60
Date: 04 / 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. 1 Attempt the following.

a) Which are the forces involved in Damped Oscillations? Obtain the differential equation of Damped Oscillations. **06**

b) Define Ultrasonic Waves. Write any two applications of Ultrasonics. **06**
Calculate the frequency of the fundamental note emitted by a piezoelectric crystal, using the following data.

Vibrating length = 3 mm
Young's Modulus = 8×10^{10} N/ m^2
Density of crystal = 2.5 gm/ cm^3

Q. 2 Attempt any two of the following.

a) In case of Newton's rings show that the radii of dark rings are proportional to the square root of natural numbers. **06**

b) What is polarising angle? Explain how plane polarized light can be produced by reflection. **06**

c) With a neat diagram explain construction and working of Ruby Laser. **06**

Q. 3 Attempt the following.

a) Explain Millikan's Oil Drop method for determination of charge on an electron. **06**

b) Obtain an expression for de-Broglie's wavelength of an electron. **06**
What is the de-Broglie's wavelength of an electron when accelerated through a p.d of 10,000 volts?

Q. 4 Attempt the following.

a) What is packing density? Calculate the packing density in SC,BCC, FCC lattices. **06**

OR

a) Derive the relation between crystal density 'ρ' and lattice parameter 'a'. **06**
A substance with FCC lattice has density 6250 kg/m3 and Molecular weight 60.2, calculate the lattice constant.

b) Explain continuous and characteristics X-ray spectrum with neat diagram. **06**

Q. 5 Attempt the following.

a) On the basis of dipole moments explain different types of magnetic materials. **06**

OR

a) Prove Bohr magnetron $\mu_B = e\hbar/ 2m$ and find the magnetic moments of Fe, Mn. **06**

b) Derive an expression for conductivity of conducting materials interms of relaxation time. **06**

Q. 6 Attempt any two of the following.

a) Derive an expression for conductivity in intrinsic and extrinsic semiconductor. Calculate the conductivity of pure silicon at R.T. when the concentration of carriers is $1.5 \times 10^{16} / m^3$ and the mobilities of electrons and holes are 0.12 and 0.05 $cm^2/ V\text{-}s$ respectively. **06**

b) What is dielectric constant? Prove $\varepsilon_r = 1 + \chi$. **06**

c) Derive an expression for electromagnetic wave in free space and hence calculate the velocity of light in free space. **06**

@@@@