

6. (a) What are Traps ? How is photoconductivity effected by the presence of traps in insulating crystal. **10**
- (b) What is Photovoltaic Effect ? Discuss the energy conversion process in a photovoltaic cell and also explain the characteristics of photovoltaic cell. **10**
7. (a) Define magnetic susceptibility and relative magnetic permeability ( $\mu_r$ ) and establish a relation : **5**
- $$\mu = \mu_0 (1 + \kappa).$$
- (b) Describe theory of diamagnetism and prove that diamagnetic susceptibility is independent of applied magnetic field and temperature. **15**
8. (a) What is Superconductivity ? Describe Meissner effect. Distinguish type-I and type-II superconductor. **10**
- (b) Drive the London equation and discuss how its solution explain the Meissner effect. **10**

**M-204**

**4**

**180**

**No. of Printed Pages : 04**

**Roll No. ....**

**204**

**B. Tech. EXAMINATION, May 2019**

(Second Semester)

(Old Scheme) (Re-appear)

(Common for All Branches)

**PHY102**

**PHYSICS–II**

*Time : 3 Hours]*

*[Maximum Marks : 100*

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Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

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**Note :** Attempt *Five* questions in all, selecting at least *two* questions from each Part. All questions carry equal marks.

(1-02/23) **M-204**

**3**

**P.T.O.**

### Part A

1. (a) What are miller indices ? How they are determined. Drive the expression for the interplanar spacing between two parallel planes with Miller indices (hkl) and show that for a simple cubic lattice of lattice constant  $a$  : **10**

$$d_{hkl} = \frac{a}{\sqrt{h^2 + k^2 + l^2}} .$$

- (b) Drive Bragg's law for crystal diffraction  $2d \sin \theta = n\lambda$  and give its physical significance. Explain with necessary theory the powder method for X-ray analysis. **10**
2. (a) What is Wave function and also give its physical significance. **5**
- (b) Explain group velocity and phase velocity. Drive an expression for group velocity with which a wave group travels. **15**

3. State the differences between quantum and classical theory of free electron. Obtain Richardson Dushman equation for Thermionic Emission. **20**

4. (a) Write short notes on the following : **10**
- (i) Quarks and Gluons
- (ii) Fermi-Dirac Distribution Function.
- (b) What are the basic assumptions of Lorentz Drude Theory. Drive an expression for conductivity of metal on the basis of Drude-Lorentz Model. **10**

### Part B

5. (a) What is the effect of periodic potential on the energy of the electron in a metal ? Explain it on the basis of Kronig-Penny Model and also explain the formation of energy bands. **14**
- (b) What is Hall Effect ? Drive an expression for Hall coefficient. What are the applications of Hall effect ? **6**