

Code: CE2T3, CS2T3, IT2T3

I B. Tech-II Semester–Regular / Supplementary Examinations –April 2019

ENGINEERING PHYSICS
(Common for CE, CSE & IT)

Duration: 3 hours

Max. Marks: 70

PART – A

Answer **all** the questions. All questions carry equal marks

11 x 2 = 22 M

1.
 - a) Explain Heisenberg's uncertainty principle.
 - b) Mention the important postulates of Planck's quantum theory.
 - c) Distinguish between crystalline and amorphous substances.
 - d) Show that in a cubic lattice $d_{100} : d_{110} : d_{111} = 1 : \frac{1}{\sqrt{2}} : \frac{1}{\sqrt{3}}$.
 - e) Explain variation of Fermi distribution function with temperature.
 - f) Define dielectric constant.
 - g) What is Bohr magneton? Explain.
 - h) Write Einstein relations.
 - i) Distinguish between spontaneous and stimulated emissions.
 - j) Discuss basic principle behind optical fibers.
 - k) Why nano-materials exhibit different properties?

PART – B

Answer any **THREE** questions. All questions carry equal marks.

$$3 \times 16 = 48 \text{ M}$$

2. a) Discuss any experiment which confirms the de Broglie's concept of matter waves. 6 M
- b) Show that the energy associated with particle moving in a potential box is quantized by applying Schrodinger wave equation. 8 M
- c) Discuss the physical significance of wave function. 2 M
3. a) What are miller indices? How are they obtained? Mention the important features of Miller indices. 6 M
- b) Explain how crystal structure can be determined by using powder X-Ray diffraction technique. 8 M
- c) The line A of X-ray beam gives a first order reflection maximum at a glancing angle of 30° to the smooth face of a crystal line B of $\lambda = 0.97 \text{ \AA}$ gives a third order reflection minimum at an angle of 60° from the some face of the same crystal. Find the wavelength of line "A" 2 M

4. a) Discuss the postulates of free electron theory of metals.
Mention the success and drawbacks of classical theory. 6 M
- b) Derive the expression for local field or internal field for a cubic system. 8 M
- c) A solid dielectric medium of cubic symmetry has 5×10^{28} atoms / m^3 . If the polarizability is $36 \times 10^{-40} m^3$, calculate the dielectric constant. 2 M
5. a) What are drift and diffusion currents densities and derive the expressions for them. 6 M
- b) Distinguish between dia, para, ferro and antiferro magnetic substances. 8 M
- c) The following data is given for Ge at 300K.
 $n_i = 2.4 \times 10^{19} / m^3$, $\mu_e = 0.39 m^2 / v / sec$, $\mu_p = 0.19 m^2 / v / sec$.
Calculate the conductivity of the sample. 2 M
6. a) Discuss the construction and working He-Ne laser. 8 M
- b) Discuss the synthesis of nano materials using Sol-Gel and Ball milling methods. 6 M
- c) Discuss attenuation in optical fibers. 2 M