Total No. of Questions – [3] Total No. of Printed Pages: 2

G.R. No.	

Paper Code - U118-104 CB (T1)

OCTOBER 2018 / IN-SEM (T1)

F. Y. B.TECH. (CB) (SEMESTER - I)

COURSE NAME: Engineering Physics-CB

COURSE CODE: ES10184A-CB

(PATTERN 2018)

Time: [1 Hour] [Max. Marks: 20]

(*) Instructions to candidates:

1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed.**
4) **Use suitable data where ever required.**

Q 1) Attempt any **two**.

a) With the help of a neat diagram, derive the expression for geometrical path difference between the two rays reflected from the top and the bottom surfaces of a thin uniform film. The refractive index μ of the film is greater than that for the media on both sides of the film. **[4]**

b) Draw intensity as a function of angle of diffraction θ for Fraunhofer diffraction from a single slit. Discuss the significance of wavelength to slit width ratio in diffraction effect. **[4]**

c) A laser light of wavelength 6328Å falls normally on a grating which is 2 cm long. The first order spectrum is observed at an angle of 20°. Find the total number of slits on the grating. **[4]**

Q 2) Attempt any **two**.

a) Given the density of states $g_c(E) = \frac{4}{\sqrt{\pi}}\left[\frac{m_e^*}{2\pi\hbar^2}\right]^{3/2}(E - E_c)^{1/2}$, derive the expression for n, the number of electrons per unit volume in the conduction band. **[4]**

b) The effective density of states for the conduction and valence bands for GaAs are N_c=4.7x10^{17} cm^{-3} and N_v=7.0x10^{18} cm^{-3}, respectively and a band gap of 1.42eV at a temperature T=300K. Calculate the intrinsic carrier density n_i. **[4]**

c) Draw the Fermi-Dirac distribution function for temperatures T = 0 K, T1 and T2 where T2 > T1 > 0 K. Discuss the physical significance of the temperature dependence of Fermi-Dirac distribution function. **[4]**

Q 3) Attempt any **one**.

a) Discuss critical angle loss in a planar LED by deriving the expression for $\frac{P_{escape}}{P_{source}}$. **[4]**

b) Draw the I-V characteristics of a solar cell and discuss the significance of open circuit voltage, short circuit current and Fill Factor. **[4]**