Total No. of Questions – [3] Total No. of Printed Pages: 01

G.R. No.	

Paper code - U128-109CB(T1)

MARCH 2019 / IN-SEM (T1)

F. Y. B.TECH. (Common/CB) (SEMESTER - II)

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.**

Q1		Attempt any **two**.	
	(a)	With the help of a neat diagram, derive the expression for fringe width for a thin wedge shaped film.	[4]
	(b)	With the help of neat diagrams, derive the expression $E_\theta = E_m\left(\frac{sin\alpha}{\alpha}\right)$ for Fraunhofer diffraction from a single slit.	[4]
	(c)	Light from Mercury lamp is incident normally on a diffraction grating with 1200 lines/mm. Calculate the angles at which the spectral lines with wavelengths 576 and 579nm will occur in the first order. Hence find the dispersion in degrees per nm.	[4]
Q2		Attempt any **two**.	
	(a)	Derive the expression for number of electrons per unit volume in the conduction band of a semiconductor.	[4]
	(b)	Show that the Fermi energy lies at the centre of the band gap for an intrinsic semiconductor.	[4]
	(c)	Calculate the probability of absence of an electron 0.1eV below the Fermi energy at T = 300K. Will this probability increase or decrease if the temperature is decreased by 100K?	[4]
Q3		Attempt any **one**.	
	(a)	Prove that the maximum in the light spectrum emitted by a semiconductor with a band gap of E_g at a temperature T occurs at an energy $E_g + \frac{kT}{2}$.	[4]
	(b)	Calculate the critical angle and $\frac{P_{escape}}{P_{source}}$ for light emitted by a semiconductor with refractive index 3.3 into a medium with refractive index 1.33.	[4]