

**PRAGATI ENGINEERING COLLEGE:**  
**SURAMPALEM(AUTONOMOUS)**  
**I B.Tech II Semester Regular Examinations, June-2024**  
**ENGINEERING PHYSICS**  
**(Common to CIVIL,EEE,ME,ECE,IT and CSE(CS) )**

Time: 3 hours

Max. Marks: 70M

**Note:**

- i. Question 1 shall contain 10 compulsory short answer questions (2 questions from each unit) for a total of 20 marks such that each question carries 2 marks.
- ii. In each of the questions from 2 to the last question, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.

Q. No.	Questions	BTL	CO	Marks
1.	a) Define interference. Give any two applications.	K1	CO1	2M
	b) Distinguish between Fresnel's and Fraunhofer diffraction.	K2	CO1	2M
	c) Define the terms (i) Unit-cell (ii) primitive cell.	K1	CO2	2M
	d) Define Bragg's law.	K1	CO2	2M
	e) What is meant by dielectric loss?	K1	CO3	2M
	f) Define (i) magnetic dipole moment (ii) magnetization	K1	CO3	2M
	g) How matter waves are different from electromagnetic waves?	K1	CO4	2M
	h) Write any two drawbacks of classical free electron theory.	K3	CO4	2M
	i) What is energy band gap?	K1	CO5	2M
	j) State Hall Effect.	K1	CO5	2M
<b>UNIT-I</b>				
2.	a) Derive the expression for path difference between the light rays reflected from thin transparent thin film in terms of uniform thickness and refractive index of the film.	K3	CO1	7M
	b) A parallel beam of light from a wavelength of $5890\text{\AA}$ incident on a thin glass plate with refractive index 1.5, the angle of refraction is $60^\circ$ . Calculate the smallest thickness of the glass plate which will appear dark in reflected light.	K4	CO1	3M
<b>OR</b>				
3.	a) Explain qualitatively Fraunhofer diffraction due to a single slit.	K2	CO 1	8M
	b) A single slit is illuminated by light composed of two wavelengths $\lambda_1$ and $\lambda_2$ . One observes that due to Fraunhofer diffraction, the first minimum obtained for $\lambda_1$ coincides with the second diffraction minimum of $\lambda_2$ . What will be the relation between $\lambda_1$ and $\lambda_2$ ?	K3	CO1	2M
<b>UNIT-II</b>				
4.	a) Obtain the expression for atomic radius and packing fraction of SC, BCC and FCC.	K3	CO2	8M
	b) A substance with the FCC lattice has density $6200\text{ kg/m}^3$ and molecular weight 60.2. Calculate the lattice constant $a$ .	K3	CO2	2M
<b>OR</b>				
5.	a) Explain how the X-ray diffraction can be employed to determine the crystal structure?	K2	CO2	4M

	b)	Explain the determination of crystal structure by Laue method.	K2	CO2	6M
<b>UNIT-III</b>					
6.	a)	Derive an expression for the internal fields in dielectric materials.	K3	CO3	6M
	b)	Derive Clausius Mossotti Equation.	K3	CO3	4M
<b>OR</b>					
7.	a)	Write the difference between diamagnetic, paramagnetic and ferromagnetic substances.	K3	CO3	7M
	b)	Find the relative Permeability of a ferromagnetic material if the field of strength 220 A/m produces a magnetization 3300 A/m in it.	K3	CO3	3M
<b>UNIT-IV</b>					
8.	a)	Derive the Schrodinger's time independent wave equation.	K4	CO4	7M
	b)	An electron has a speed of $1.05 \times 10^4$ m/s with an accuracy of 0.02%. Calculate the uncertainty in the position of the electron.	K3	CO4	3M
<b>OR</b>					
9.	a)	Explain Fermi-Dirac distribution function. Plot this function for various temperatures including 0K.	K2	CO4	8M
	b)	Define Fermi energy.	K1	CO4	2M
<b>UNIT-V</b>					
10.	a)	Distinguish between conductors, semiconductors and insulators.	K2	CO5	7M
	b)	Explain the concept of effective mass of electron.	K1	CO5	3M
<b>OR</b>					
11.	a)	With suitable plots explain the dependence of Fermi-energy on carrier concentration and temperature in n-type and p-type semiconductors.	K2	CO5	6M
	b)	Write a note on drift and diffusion currents.	K1	CO5	4M