(April, 2022)

Subject Code: BAS103(CSE/ECE)

Subject: Applied Physics-I

Time : 3 Hours

Maximum Marks :

Note: Q. 1 is compulsory. Attempt one question each from the Units I, II, III & IV.

Q1.		
	(a) In the formula for a diffraction grating $\sin(\theta) = n\lambda$, n denotes___. Is there any upper limit on n?	(2.5*8=20
	(b) Write the expression for the solution of a damped harmonic oscillator differential equation.	
	(c) Write the expression for uncertainty principle. Explain it with single slit diffraction pattern.	
	(d)Write the three properties of a wave function.	
	(e)What are the conditions necessary to observe interference phenomena?	
	(f)What is Population inversion?	
	(g)Explain what is numerical aperture?	
	(h)What is the condition for a critical damped harmonic oscillator?	
	UNIT-1	
Q2.	Show that the orbital angular momentum of a mass moving in central force is constant. Show that the central force varies as $1/r^3$ for a particle moving with a trajectory defined by $r = \alpha e^{\beta\theta}$.	(10)
Q3.	Explain the modes of a coupled oscillator with the help of two masses attached to three springs.	(10)
	UNIT-2	
Q4.	Derive the expression for Fraunhofer diffraction due to single slits.	(10)
Q5.	What is pulse dispersion. Derive an expression for time interval for the rays to reach the output.	(10)
	UNIT-3	
Q6.	Show that the wave function for a particle in a 1-D box is given by $\Psi(x) = \sqrt{\frac{2}{a}} \sin\frac{m\pi x}{a}$.	(10)
Q7.	Using uncertainty principle show that electron cannot exist inside the nucleus.	(10)
	UNIT-4	
Q8.	Explain the two-level laser system with the example of He-Ne laser.	(10)
Q9.	A light ray enters from air to fiber. The fiber has refractive index of core equal to 1.5 and that of cladding equal to 1.48. Calculate the critical angle, numerical aperture and acceptance angle.	(10)