University of Barisal
Department of Computer Science and Engineering
1st Year 1st Semester B. Sc. (Hon's) Final Examination – 2021
Session: 2020-2021
Course Code: PHY-1105   Course Title: Physics

Time: 3:00 Hours   Marks: 60

[Answer any 5 (five) from the following questions]

1.	a)	Describe thermo-electic thermometer.	4
	b)	Derive and discuss the Van der Waals equation of state of a gas.	5
	c)	Calculate the root mean square velocity of a molecule of mercury (*molecular weight 221*) vapour at 300K.	3
2.	a)	Write down the postulates of kinetic theory of gases.	3
	b)	Derive Maxwell's Thermodynamic Relations.	6
	c)	If the temperature of a sink is 20°C and that if the source 250°C, calculate the efficiency of the Carnot engine.	3
3.	a)	How can we explain uniform circular motion as a SHM?	5
	b)	Describe an expression for energy in simple harmonic motion with graphical interpretation.	4
	c)	After landing on an unfamiliar planet, a space explorer constructs a simple pendulum of length 50.0 cm. She finds that the pendulum makes 100 complete swings in 136s. What is the value of g on this planet?	3
4.	a)	Explain the principle of superposition of two waves.	3
	b)	Derive an expression of stationary waves and also discuss the conditions for nodes and antinodes.	6
	c)	The amplitude of a wave is 0.5 cm. Find the displacement of the point at a distance $x=\lambda/6$ from the source at time $t=T/3$.	3
5.	a)	Define single crystal and polycrystalline solids.	3
	b)	What are the three-dimension crystal systems? Mention the characteristics of their unit cells.	6
	c)	Find the d-spacing of d_{110} of a cubic crystal of lattice constant 4.12 Å.	3
6.	a)	Explain Miller indices of a plane of a crystal.	3
	b)	Prove that the direction [hkl] is normal to the plane (hkl) for a cubic lattice.	6
	c)	Visible light of wavelength 5000Å undergoes scattering from a crystal of refractive index 1.5. Calculate the maximum frequency of incident radiation when the velocity of sound is 500 ms^{-1}.	3
7.	a)	Explain Huygens principle.	3
	b)	Briefly describe the condition of bright and dark fringe from Young's double slit experiment.	5
	c)	In Young's double slit experiment the distance between the two slits is 0.8mm and the distance of the screen from the slits is 1m. Calculate the width of the bright band when the slits are	4

		illuminated by a monochromatic light of wavelength of 5890×10^{-10} m.	
8.	a)	What do you mean by diffraction? Write down the condition of diffraction.	
	b)	Explain the method for determination of wavelength of monochromatic light by a plane transmission grating.	6
	c)	A grating containing 4000 slits per centimeter is illuminated with a monochromatic light and produces the second-order bright line at a 30° angle. What is the wavelength of the light used?	3