JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
Supplementary Examination- 2026
B.Tech-I Semester (CSE/IT/ECE/CE)

COURSE CODE (CREDITS): 25B11PH111(04) MAX. MARKS: 75
COURSE NAME: Physics-1
COURSE INSTRUCTORS: PBB, SKK, VSA, SKT, SBD, HSR, HAZ MAX. TIME: 2 Hours

Note: *(a) All questions are compulsory. Scientific calculators are allowed.*

Q.No	Question	CO	Marks
Q1	a) Derive an expression for calculating the path difference for reflected interference from a thin film of thickness '**t**' and refractive index '**n**' for incident wavelength '**λ**'. b) Light of wavelength **5893 Å** is reflected at normal incidence from a soap film of refractive index **1.42.** What is the least thickness of the film that will appear (i) bright (ii) dark for the first order?	1 3	7.5
Q2	a) Consider the circular slit diffraction, derive the expression to calculate the radius of the central maxima. b) In a double slit Fraunhoffer diffraction, the screen is **1.6 m** away from the slits. The slit widths are **0.2 mm** and they are **0.4 mm** apart. Calculate the wavelength of light if the fringe width is **$2.5x10^{-3}$ m** and also deduce the missing orders.	1 3	7.5
Q3	a) Discuss the superposition of e- and o-ray and extend the same to obtain the condition for circularly polarized light. b) A sugar solution in a tube of length 20 cm produces an optical rotation of 13 degrees. The solution is then diluted to one-third of its previous concentration. Find the optical rotation produced by 30 cm long tube containing the diluted solution?	2 3	7.5
Q4	a) Establish a co-relation for energy and relativistic mass. b) Calculate the percentage contraction of a rod moving with velocity 0.8 times the velocity of light in a direction at 60 degrees to it own length.	1 2	7.5
Q5	a) Show that the difference of the specific heats is equal to the universal gas constant for a one mole of a gas. b) Show that the slope of adiabatic curve is higher than the isothermal curve in thermodynamics.	1 3	7.5
Q6	a) Obtain adiabatic equation of state for one mole of an ideal gas. b) Air is compressed adiabatically to half of its volume at NTP. Calculate the change in its temperature (Given for air γ=1.4)	3 2	7.5
Q7	a) Using uncertainty principle prove the non-existence of electron within the atomic nucleus. b) Calculate the work function, stopping potential, & maximum velocity of photoelectrons for a light of wavelength 435 nm when it is incident on sodium surface. Consider the threshold wavelength of photoelectrons to be 542 nm.	4 3	7.5
Q8	a) Calculate the kinetic energy of proton and an electron so that the deBroglie wavelength associated with them is the same and equal to 5000 Å. b) An electron is bound to one dimensional potential box which has width 2.5Å. Assuming the height of the box to be infinite, calculate the lowest energy value of the electron.	2 3	7.5
Q9	a) Establish the correlation between thickness, refractive index and wavelength for an antireflecting film. b) Angle of the wedge is 0.3 degree and the wavelength of the sodium D-lines are 5890 and 5896 Å. Find the distance from the apex of the wedge at which the maximum due to the two wavelength first coincides.	4 3	7.5
Q10	a) Show the Zeeman splitting of l=3 to l=2 transition line. b) Why it is impossible for $2^2P_{5/2}$ to exist?	4 3	7.5

Constants: $e=1.6x10^{-19}$ C; $h=6.626x10^{-34}$ Js; $m_e=9.11x10^{-31}$ kg; $c=3x10^8$ m/s; $k_B=1.38x10^{-23}$ J/K; $m_p=1.67x10^{-27}$ kg;