School of Advanced Sciences
DEPARTMENT OF PHYSICS

Mid Term Test (MTT)
B.Tech – Fall Semester-2020-21
Course: PHY1701- Engineering Physics

Time: 90 mins.   Max. Marks:

Part – A (10x 6 = 60)
Answer all Questions

1	How can we deduce Stefan- Boltzmann's law from Max Planck's formula of black body radiation?
2	As per the expression of Compton shift, we suppose to get a single wavelength peak at scattered photon. But we have always another peak at incident photon other than $0°$ scattering angle. Why do we have such peaks? Explain.
3	What is the wavelength in meters of a proton traveling at 85% of the speed of light? (mass of the proton is 1.673×10^{-27} kg)
4	Consider a 1-D potential wall $U(x)=0, x \leq a$; $U(x)=U_0, a < x < b$; $U(x)=0, x \geq b$. Draw the appropriate model diagram and give the wave function of a particle (whose energy is less than U_0) of each region with proper explanation.
5	A proton is confined in an infinite square well of width 10 fm. Calculate the energy and wavelength of the photon emitted when the proton undergoes a transition from the first excited state to the ground state.
6	Show that the Numerical Aperture is directly proportional to the difference of square of refractive index of core and cladding?
7	What way the graded index fiber has advantage than step index multimode fiber?
8	Calculate the N.A of a step index fiber having $n_1=1.48$ and $n_2=1.46$. What is the maximum entrance angle θ for this fiber if the outer medium of air with $n_1=1.0$?
9	Why don't we use Si based semiconductor in LED construction? Justify with comparison.
10	Determine a normalized frequency at 820nm for a step index fiber having 25μm core radius. Given $n_1=1.48$ and $n_2=1.46$. Also calculate how many modes propagate in this fiber.