# Premier University
## Department of Computer Science and Engineering
## CSE 1st Semester Final Examination, June 2019
## Course Title : Engineering Physics – I
## Course Code : PHY-101

**Time : 3 Hours** **Marks : 50**

**Answer any Five (5) questions.**

Q1. a) Write the differential equation of a simple harmonic motion. Solve the equation to get displacement and explain the physical meaning of the different terms those appear in the solution. 2+3+2=7

b) A body oscillates with simple harmonic motion according to the equation: 1+1+1=3

$y = 7 \sin (8\pi t + \pi/3)$ meter.

Find,

1. Displacement
2. Velocity
3. Acceleration at the time t=3 sec.

Q2. a) What is the escape velocity? Show the escape velocity $v_e = (2gR)^{1/2}$, where the symbols have their usual meaning. 2+4=6

b) With what velocity should a body be projected vertically upwards from the surface of the earth so that it may just attain a height of R/2, where R is the radius of the earth (R=6400km). 4

Q3. a) Define the Carnot's cycle and show how the work done in each operation is represented on a pressure volume diagram. 2+4=6

b) An ideal heat engine operates in a Carnot's cycle between $227^0$C and $127^0$C. It absorbs $6.0\times10^4$ Cal of heat at the higher temperature. How much work per cycle is this engine capable to perform? 4

Q4. a) Write physical significance of entropy. Explain entropy for an adiabatic reversible system. 2+4=6

b) Find the change in entropy when 1 gm of ice at $0^0$C changes to water at $0^0$C under 1 atmosphere pressure. Latent heat of fusion of ice 80 cal/gm. 4

Q5. (a) Derive Maxwell's four thermo dynamical relations. 10

Q6. a) Show that for a reversible isothermal and isochoric process the Helmholtz function, F = constant 6

b) A quantity of air at $37^0$C and atmospheric pressure is suddenly compressed to 1/3 its original volume. Find, 2+2=4

1. Pressure
2. Temperature.

Q7. a) Explain Doppler's principle. Calculate the apparent pitch of a note due to the motion of the source and the observer. 2+4=6

(b) A person is standing near a railway track and a train moving with a speed of 36 km/hr is approaching towards him. The apparent pitch of the whistle as heard by the person is 800 Hz. Calculate the actual frequency of the whistle. Here, velocity of sound 350 m/s. 4