Dr. Akhilesh Das Gupta Institute of Technology & Management

(Formerly Northern India Engineering College)
(A unit of BBD Group)
FC 26, Shastri Park, New Delhi-53.

Mid-Term Examination

B. Tech – 1st Semester | **Date: 3/3/2022**
Paper Code: BS105 | **Subject: Applied Physics-1**
Time: 1 .5 hour | **Max. Marks: 30**

Note: Q. No. 1 is compulsory. Attempt any two Question from the rest.

1. All questions are compulsory:
   a) Explain the Continuum model. (2) [CO-1]
   b) Compare the three types of systems in thermodynamics. (2) [CO-1]
   c) Calculate the efficiency of a reversible engine working between the temperatures 460 K and 350 K. (1) [CO-1]
   d) A particle vibrates with simple harmonic motion of the amplitude 0.08m and time period 40 s. Calculate maximum velocity. (2) [CO-2]
   e) If the earth receives 2.0 cal min^{-1} cm^{-1} solar energy, what is the amplitude of electric field of radiation? (2) [CO-2]
   f) Define displacement current. (1) [CO-2]

2. a) Explain Carnot Cycle and calculate the efficiency of Carnot Engine. (5) [CO-1]

   b) Write down the Maxwell's equations in free space. Obtain the differential equation which describe the propagation of plane electromagnetic wave in free space and find the velocity of electromagnetic wave in free space. (5) [CO-2]

3. a) What is the First law of thermodynamics? Apply the first law to the following processes: (i) Adiabatic process, (ii) cyclic process, (iii) isochoric. (5) [CO-1]

   b) Define Poynting vector. Derive the expression for Poynting theorem. (5) [CO-2]

4. a) Write down the Kelvin-Planck statement of Second law of thermodynamics. Explain Entropy and show that: (i) the entropy increases in irreversible process, (ii) change in entropy is zero in reversible process. (5) [CO-1]

   b) Define simple harmonic motion. What are characteristics of simple harmonic motion? Derive differential equation of simple harmonic oscillator. (5) [CO-2]