

Mid-West University
Examinations Management Office
End Semester Examinations 2081

Bachelor level/ B.E. Civil/ 1st Semester
Time: 3 hours
Subject: Engineering Physics (SH412/SH105)

Full Marks: 50
Pass Marks: 25

- *Attempt all the questions*
 - *Figures in the margin indicate full marks.*
 - *Assume suitable values, with a stipulation, if necessary.*
 - *Candidates are required to answer the questions in their own words as far as possible.*
1.
 - a) What is meant by a progressive wave? Derive its equation. Also, derive energy stored in progressive waves. (5)
 - b) For a damped oscillator having a mass of 250gm spring constant of 85N/m and damping constant of 70gm/s. What is the period of the motion? How long does it take for the mechanical oscillation to drop to half of its initial value? How long does it take for the mechanical energy to drop to one-half of its initial value? (3)
 - c) A thin, straight, and uniform rod of length 1m and mass 100 gm hangs from a pivot at one end. What is its period for small oscillation? What is the length of a simple pendulum that will have the same period? (2)
 2.
 - a) Define beat. Derive an expression of the beat frequency when two slightly different frequencies of two waves are superimposed. (5)
 - b) Given the dispersive power of the crown and flint glass are in the ratio of 1:2. Find the focal lengths of two components of an achromatic doublet of a focal length of 20cm. (3)
 - c) Define Cardinal points. Explain it with figures. (2)
 3.
 - a) Explain the phenomenon of X-ray diffraction through a crystal. State and prove Bragg's law. (5)
 - b) Newton's ring is formed by Sodium light between a flat glass plate and a planoconvex lens viewed normally. What will be the order of the dark ring which will have double the diameter of the 40th ring? (3)
 - c) The plane of polarization gets rotated through 23.8° as light travels through a 180mm long column of 20% sugar solution. Determine the specific rotation of the solution. (2)
 4.
 - a) Define electric dipole. Find the expression of the electric field due to dipole (Both cases). (5)
 - b) Write Maxwell's equations in differential and integral form. (2)
 - c) A 1.5μF capacitor is charged to 57V. The charging battery is disconnected and a 12mH coil is connected in series with a capacitor so that LC oscillation occurs. What is the maximum current in the coil? Assuming that the circuit contains no resistance. (3)
 5.
 - a) Discuss the LR circuit for growth and decay of current. (5)
 - b) A wire is bent into a loop of radius R and carries a current I. The magnetic field at the center of the loop is B. The same wire is now bent into a loop having two turns. Find the magnetic field at the center of the later one if the loop carries the same current I in the same direction. (2.5)
 - c) A conductor of uniform radius 1.2cm carries a current of 3A due to the potential gradient of 120V/m. What is the specific resistance of the material? (2.5)

The End