Mid-West University
Examinations Management Office
End Semester Examination 2081

Bachelor level/ B. Sc. (CSIT)/ 1ˢᵗ Semester   **Full Marks: 60**

Time: 3 hours   **Pass Marks: 30**

Subject: Physics (PHY413)

Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks.

Group A

Very short answer questions (attempt *all*).   [8x2 = 16]

1. What is standing wave? How is it formed?
2. Differentiate dia, para and ferromagnetic substance.
3. Write the factors on which velocity of sound in gas depends?
4. State and explain Lenz's law?
5. Explain about transmission line?
6. What are cardinal points? Explain.
7. Define Nicol prism with its diagram.
8. State Gauss law in electrostatics and write its uses.

Group B

Numerical questions (attempt *any five*).   [5x4 = 20]

9. In air column resonance tube, the first and second resonance positions were observed at 17 cm and 56.2 cm respectively. The frequency of tuning fork used was 512 Hz and the temperature was 27°C. Calculate the velocity of sound in air at $0°C$ and end correction of the tube.

10. A stationary motion detector sends sound waves of 150 KHz towards a truck approaching at a speed of 120 Km/hr. what is the frequency of wave reflected back to detector? (If the velocity of sound in air is 340m/s.)

11. Calculate the polarizing angle for the light travelling from water, of refractive index $\frac{4}{3}$ to glass of refractive index $\frac{3}{2}$.

12. A 300 V battery is connected across capacitors of $3\mu F$ and $6\mu F$ in parallel. Calculate the charge and energy stored in each capacitor.

13. A square aluminium rod is 2m long and 6mm on edge.
    a) What is the resistance between its ends?
    b) What must be the diameter of a circular 1m long copper rod if its resistance is to be the same? Given; $\rho_{Al} = 2.8 \times 10^{-8} \Omega m$ and $\rho_{Cu} = 1.7 \times 10^{-8} \Omega m$.

14. A plane transmission grating when illuminated with normal light produces a second order diffraction at 30^0 for wavelength 500 nm. Calculate the number of lines per cm on the grating.

15. An object executes S.H.M. with amplitude of 0.17m and a period of 0.84 second. Determine (i) the frequency and (ii) angular frequency of the motion. Also write down expression for the displacement equation.

Group C

Long answer questions (attempt *any three*) [3x8 = 24]

16. Derive the relation for the current flowing in a LCR circuit with sinusoidally varying emf. Find the condition for the current resonance.

17. What do you mean by coherent sources? Describe and explain the phenomenon of interference in thin films with necessary diagram.

18. State and prove ampere's circuital law. Calculate the Magnetic field strength due to long straight current carrying conductor by using it. Two straight wires are kept in air 2m apart carrying currents 80 A and 30 A in the same direction. Calculate the force between them and specify its nature.

19. a) Differentiate between angular simple harmonic motion and simple harmonic motion. Show that motion of simple pendulum is simple harmonic in nature. Does time period of simple pendulum depend upon mass of bob? Explain.

    b) Define ultra sound? Explain production and uses of ultra sound?

The End