

2022
M.Sc.
Fourth Semester
CORE – 12
PHYSICS
Course Code: MPHC 4.21
(Experimental Methods)

Total Mark: 70
Time: 3 hours

Pass Mark: 28

Answer five questions, taking one from each unit.

UNIT-I

1. (a) Explain the total uncertainty in the reading of an instrument and indicate the factors responsible for this. 4
- (b) Distinguish between systematic and random error in a measuring instrument and how they are minimized? 4
- (c) What do you understand by the term standard deviation and deviation for the set of measured values? 4
- (d) What is significant figures in measuring instrument? 2
2. (a) What are the basic operations on signal and how are signals classified? 4
- (b) Are all sinusoidal signals periodic? What is an analog and digital signal? 4
- (c) Explain the transfer function and frequency response of first and second order system. 4
- (d) What do you understand by the term fluctuations and noise in a measurement system? 2

UNIT-II

3. (a) Discuss the static and dynamic characteristics of a measurement system. 7
- (b) Describe the generalized mathematical model for the dynamic response measurement system. 7

4. (a) Discuss the immediate discharge of electrical energy to the ground in the case of overloading of current. 6
(b) What is an electric coupling? 2
(c) What do you understand by electromagnetic interference? Describe the different types of electromagnetic interference. 6

UNIT-III

5. (a) With the block diagram describe the construction and working principle of scintillation counter. 7
(b) What are capacitive transducers? Explain the change in capacitance when displacement is measured with a movable dielectric material? 7
6. (a) What is a linear variable differential transformer? Describe in detail the construction and theory of linear variable differential transformer. 7
(b) What is a resistance temperature detector? Will a proper electrical circuit diagram describe the construction and working principle of resistance temperature detector. 7

UNIT-IV

7. (a) Draw a simplified block diagram of digital LCR bridge circuit and explain its working principle involved in measuring L and C. 7
(b) With a net electrical circuit of quality meter diagram, find the resonant frequency and voltage across the capacitor. 7
8. (a) Draw a block diagram of digital multimeter and explain its operation. 7
(b) Draw a block diagram of CRO and explain its working principle. 7

UNIT-V

9. (a) What do you understand by vacuum system? Describe the classification of vacuum pumping system. 7
(b) Explain with proper diagram the working principle of diffusion pumps. 7

10. (a) What is pumping speed? With proper diagram describe the working principle of Pirani gauge. 7
- (b) Write a short note on ionization pressure gauge. 5
- (c) State Boyle's and Charles's law of gases. 2
-