

Jadavpur University M.Tech 1st year Examination 2025

Department: - IEE

Subject: - Advanced Measurement Techniques

Paper Code:- PG/IEE/PE/T/114B

Full marks :-100

Answer the following questions:

CO1

1. a) What is the basic working principle of resistive displacement transducers? (7)
- b) What are the advantages & disadvantages of inductive displacement transducers? (5)
- c) How does a capacitive transducer measure displacement? (5)
- d) Why is temperature compensation necessary in strain measurement? (3)
- e) Why do inductive transducers require an AC power source for operation? (5)

OR

2. a) What are column, ring, and cantilever-type load cells? (7)
- b) What are the elastic elements for pressure sensing? (3)
- c) What is an electromagnetic tachometer and how does it work? (7)
- d) Why is a photo-electric tachometer preferred in precision speed measurement applications? (3)
- e) Discuss the Inductive type transducer? (5)

CO2

3. a) What is a Smart transducer? What are the main components of a smart transducer? (2+3)
- b) Why is digital communication important in smart transducers? (5)
- c) What advantages do smart transducers provide in the medical field? (5)
- d) What are the advantages of using smart transducers in industrial automation? (5)

OR

4. a) How do smart transducers differ from conventional transducers? (5)
- b) How do smart transducers perform self-calibration? (5)
- c) How do smart transducers achieve energy (5)
- d) How does a conventional transducer work? (5)

CO3

5. a) What are the differences between Signal generator & Function generator? (6)
- b) Draw and explain the basic diagram of VCO. (6)
- c) What is the role of the phase-locked loop(PLL) in the signal generator? (5)
- d) What is the importance of duty cycle in square wave generation? (3)

OR

[Turn over

6. a) What factors are affecting the quality of magnetic recorders? (5)
- b) What are the advantages of magnetic recorders over other storage technologies? (6)
- c) How does modern Signal generator integrate with software and automation systems? (6)
- d) How can we use a function generator to test an amplifier circuit? (3)

CO4

7. a) Briefly describe the Digital frequency meter. 6
- b) Define the resolution and accuracy of the specifications for the digital voltmeter. (4)
- c) A $4\frac{1}{2}$ digit voltmeter is used for voltage measurement. What is its resolution? How would 0.6973V be displayed in 1V and 10V range? What is the maximum countable value of this meter? (1+3+1)
- d) A digital frequency meter with $3\frac{1}{2}$ -digit display has a time base derived from a 1MHz clock generator frequency divided by decade counters. Determine the measured frequency when 1.512kHz sine wave is applied and the time base uses a) Six-decade counters, b) four-decade counters. (5)
- e) Draw and explain about the emitter follower type voltmeter. (5)

OR

8. a) Briefly explain the working principle of the true RMS voltmeter. (5)
- b) How can audio and radio frequency be measured? (5)
- c) Explain ramp generator type digital voltmeter circuit with a suitable diagram. (4)
- d) Discuss an operational amplifier-type digital voltmeter with a suitable diagram. (5)
- e) A three and a half digit DVM has an accuracy specification of ± 0.5 percent of reading ± 1 digit
 - i) What is the possible error in volt when reading 0.10V range?
 - ii) What is the possible error in volts when the instrument reads 5.00V on the 10V range?
 - iii) What is the percentage of the reading is possible error? (2+2+2)