



DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

EI 1306-MEASUREMENT AND INSTRUMENTATION

Semester/Year: V/ III

UNIT 1
PART-A

1. What are the basic elements of a generalized measurement system?
2. List various static characteristics of a measuring system.
3. Define the term accuracy
4. Define the term Precision
5. Write difference between accuracy and precision
6. What is an error
7. What is calibration
8. What is measurement and measurand? Give example
9. What is sensitivity? Write sensitivity of an voltmeter
10. What is fidelity?
11. What are the classification of errors in measurement
12. List out different types of possible errors in measurement
13. What are the two basic factors in specifying the dynamic performance of an instrument system?
14. Mention the different types of standards in measurement?
15. Differentiate Zero drift and span drift?
16. Precise instruments need not to be accurate justify your answer?
17. List out various Damping and controlling torque producing system
18. What are the sources of errors in DC voltage measurement
19. Compare attraction and repulsion type instruments
20. What is transfer instruments
21. List out various AC and DC bridges
22. Write bridge balance equation and condition
23. List out Bridges used to measure Inductance
24. List out bridges used to measure capacitance
25. List out bridges used to measure Frequency
26. Draw the phasor diagram for various AC bridge
27. Draw the bridge arrangement diagram for various AC Bridge
28. Draw Construction arrangement for PMMI and PMMC Instruments
29. Why shielding of bridges is required
30. Why high Q value cannot be measured by Maxwell Bridge
31. Compare Attraction and Repulsion type
32. Bring out the differences between moving coil and moving iron instruments
33. What is difference between analog and digital instruments

PART – B

1. Explain various types of errors (8)
2. Explain different types of standards of measurements (10)
3. Draw and explain functional block diagram of an instrument and also explain the overall block diagram of an ammeter with block diagram (12)

4. Discuss Static and Dynamic characteristics of an Instruments (16)
5. Problem based on error precision, accuracy etc., (4 or 6)
6. With a neat diagram explain the construction, working principle, Errors, torque equation, advantage and disadvantages of a
 - a. PMMC Instrument
 - b. PMMI instrument
 - c. Electro dynamo type instrument
7. Explain various types of Control, Damping and Deflection system
8. Explain Voltmeter, Ammeter and Multimeter
9. With neat diagram and Phasor diagram explain various AC Bridge with appropriate derivation
10. What is ayrton shunt?

UNIT-2
PART-A

1. What are the considerations in selecting the voltmeter
2. Define is Form factor, Peak factor and Q factor
3. Draw the diagram for
 - a. Basic electronic voltmeter
 - b. True rms responding voltmeter
 - c. Practical Q-meter
 - d. Electronic Multimeter for Voltage, Current and Resistance
4. What is vector voltmeter
5. What is dummy load and state its requirements
6. Which are the main parts of CRT
7. Define deflection sensitivity of CRO and CRT
8. What is fluorescence
9. What are the different material used in fluorescence screen
10. What is the principle of dual beam oscilloscope
11. What is the principle of sampling oscilloscope
12. What are Lissajous figures and draw the pattern fro $f_v = 4f_h$ and $f_v = 1/3 f_h$
13. What is sampling oscilloscope
14. What deflection system is required for dual beam oscilloscope
15. Difference between analog and digital oscilloscope
16. Give the characteristics of probes used in CRO
17. How a CRO can be regarded as a X-Y recorder
18. List out the disadvantages of storage cathode ray tube.

PART – B

1. With neat diagram explain the working of vector voltmeter
2. With neat diagram explain electronic Multimeter
3. Draw a test setup to measure Power at high frequencies and also discuss problems in RF power measurements
4. Explain the working of a Q-meter with a neat diagram and also explain its applications
5. Explain two types of RMS meter
6. With a neat block diagram explain the function of a general purpose oscilloscope
7. With neat diagram explain its construction, modes of operations of digital storage oscilloscope and digital storage oscilloscope
8. Sketch the basic block diagram for Sampling oscilloscope
9. With neat diagram explain various parts of CRO
10. Explain various CRO Measurements

UNIT-3
PART-A

1. Define Rise time and fall time of a pulse
2. Draw simplified block diagram of a sweep frequency generator and basic block diagram of signal generator
3. What is positive feedback? State barkhausen criterion
4. What are the requirement of signal generator
5. Give the functions of an attenuator in a signal generator
6. Draw block diagram of AF sine and square wave generator
7. What is piezo electric effect
8. Name any two LC oscillators and draw their feedback network and also state expressions for frequency of oscillation.
9. What do you mean by heterodyne principle
10. Define distortion factor
11. What is known as window in FFT spectrum analyzer
12. What is harmonic distortion
13. What is the use of distortion meter
14. Define total harmonic distortion
15. What is spectrum analyzer
16. What is real time spectrum analyzer
17. What are the drawbacks of tuned circuit analyzers?
18. What is wave analyzer? Name two types of the same
19. What is necessity of signal analyzer
20. What is logic analyzer and write its features?

PART – B

1. What is marker generator? How does it overcome the disadvantages of a sweep generator (4)
2. Draw and explain the block diagram of sweep generator covering entire frequency band
3. Draw a block diagram of heterodyne frequency generator and explain (6)
4. Discuss briefly various kinds of signal generator (16)
5. With neat block diagram explain the operation of a sweep frequency generator (16)
6. Give the principle of wave analyzer with the help of suitable diagrams (12)
7. Write applications of spectrum analyzer (16)
8. Explain with the help of block diagram fundamental suppression distortion analyzer explain two modes of operation
9. With the help of block diagram explain digital FFT analyzer
10. With a neat block diagram explain the function of a spectrum analyzer.
11. With a neat block diagram explain the working of harmonic distortion analyzer and intermodulation distortion meter.
12. Define standing wave ratio. Explain in detail the method of measuring standing wave ratio
13. Explain phase locked circuit for the first local oscillator of a spectrum analyzer.

UNIT-4
PART-A

1. What is D/A and A/D converter?
2. Draw block diagram of commercial DAC
3. Draw transfer characteristics for 4 bit and 3 bit DAC
4. Define resolution and quantization error in ADC
5. Name different analog to digital conversion technique
6. Draw the block diagram for successive approximation type ADC

7. Give classification of digital voltmeter?
8. What is the principle of ramp type digital voltmeter
9. What are the essential parts of the ramp type DVM
10. What are the additional features found on individual digital Multimeter?
11. What are the advantages of digital instruments over analog instruments
12. State typical digital instrument accuracy specification. Compare the accuracy of digital and analog multimeters
13. How voltage is converted into frequency in V-F conversion
14. Give the various types of digital voltmeter
15. Why is period mode preferred for measurement of very low frequency in a frequency
16. What is the importance of gate time in frequency counter?
17. How is trigger time error reduced
18. Draw basic block diagram of digital voltmeter
19. State only the performance parameter of digital voltmeter
20. Define different errors in DAC output
21. Write advantages of R/2R ladder DAC
22. Write drawbacks of binary weighted resistor DAC
23. Differentiate synchronous from asynchronous transmission of data

PART – B

1. With neat diagram explain n-bit binary weighted DAC and obtain expression for output voltage
2. With the help of circuit diagram derive condition of output voltage for n-bit inverted R/2R ladder DAC
3. Write a note on performance parameter of DAC and ADC
4. What are the sources of errors in DAC? Explain
5. Explain with neat diagram and differentiate one another
 - a. Single slope ADC
 - b. Successive approximation ADC
 - c. Flash type ADC
 - d. Dual slope ADC
 - e. Flat type
6. Discuss briefly various types of Digital voltmeters
7. Write a note on Auto ranging in DVM
8. Explain the working of a digital Multimeter with a schematic block diagram
9. Draw and explain the circuit of digital frequency meter
10. Explain universal counter with the help of block diagram
11. Write a note on measurement errors in frequency counter
12. Explain Different techniques used for extending frequency measurement range
13. What is an instrumentation amplifier?
14. Explain with neat diagram the working of integrating type digital voltmeter
15. Write a neat block diagram explain the time interval measurement
16. Explain the frequency mode and the frequency ratio mode operation of a frequency counter
17. What method can be used to increase the frequency range of frequency counter?

UNIT-5 **PART-A**

1. Mention the terms used to specify the characteristics of an instrumentation amplifier
2. List any four important features of instrumentation amplifier
3. What are three requirements for a computer operated test system
4. Distinguish between analog and digital data acquisition system
5. What is data acquisition system?

6. Give three objectives of the data acquisition system
7. What is multiplexing
8. What are the three basic requirements of a computer controlled system
9. Give any two application of microprocessor based measurement
10. What is IEEE 488 bus system?
11. Briefly discuss about the handshake signals in the IEEE 488 bus system
12. Define Numerical aperture
13. Mention the single line message for interface function in IEEE 488 bus system?
14. Draw a schematic diagram of a computer controlled measurement system for testing a radio receiver using an automatic system
15. What are the three requirements of an automatic test system
16. What is the necessity of digital interface
17. Write any two instruments used in computer controlled instrumentation
18. What do IEEE 488 standard and GPIB mean?
19. What are the various instruments used in computer controlled instrumentation system?
20. What is cladding
21. Define index of refraction, plane of incidence, Critical angle of incidence
22. What is total internal reflection
23. Give any three characteristics of the light sources in the fiber optic transmission
24. State the drawbacks in the measurement of system loss.
25. What is acceptance angle
26. Draw the cylindrical optical fiber structure and name the different parts.
27. State any three properties of the photo detectors used in fiber optic transmission

PART – B

1. Give block diagram of computer based data acquisition system. Explain each block elaborately
2. Discuss in detail the various techniques of multiplexing
3. Explain the generalized block schematic of a digital data acquisition system and list out its advantages over analog data acquisition system
4. With neat schematic diagram explain the functioning of multichannel data acquisition system
5. What are the various techniques of multiplexing? Discuss any one in detail
6. Explain in detail computer controlled measurement system for testing of an audio amplifier and radio receiver
7. Explain with block diagram microprocessor based instruments
8. Explain sequence of operation in case of IEEE 488 bus system
9. Write a short note on instruments used in computer controlled instrumentation
10. Write a note on digital control
11. How signal is transmitted in a microprocessor based measurements.
12. Draw and explain the block diagram of computer interfaced spectrum analyzer used for audio frequency signal analysis.
13. Explain the various management lines and data byte transfer lines of GPIB
14. Explain with neat diagram a structure of single optical fiber
15. Write a note on sources and detectors in optical fiber transmission
16. Explain how power is measured in optical fiber?
17. Explain with the help of block schematic, a stabilized calibrated light source
18. Explain with the block diagram, optical time domain reflectometers.
19. Explain with the block diagram, Auto ranging power meter.