B.Tech Even Semester Examination, May, 2025

Electronics & Communication Engineering

(6th Semester)

Course No: ECC-605

(Electronic Instrumentation and Management)

Full Marks: 50

Pass Marks: 25

Time: 2 hours

Note:

1. Attempt any five questions.
2. Begin each answer in a new page
3. Answer parts of a question at a place
4. Assume reasonable data wherever required
5. The figure in the right margin indicates full marks for the question
6. All the mathematical symbols and abbreviations have their usual meanings.

1. a) Determine the equivalent parallel resistance and capacitance that result in a null condition for a Wien bridge circuit with the following component values: R1=2.7K Ω, C1=5μF, R2=22K Ω, R4=100K Ω and the circuit operates at a frequency of 2.2 kHz. 5

   b) Draw the circuit diagram of a Maxwell Bridge used for inductance measurement. Derive expressions for the unknown inductance, quality factor, and power factor. 2+3

2. What are the fundamental differences between analog and digital ammeters, voltmeters, and ohmmeters with neat circuit diagrams and derivations, and how do these variances impact their applications in DC and AC circuits? 4+4+2

Turn Over

3. Explain the working principle and applications of piezoelectric transducers, highlighting their ability to convert mechanical stress into electrical signals. Provide a clear construction diagram to support the discussion. 2+5+3

4. Explain digital frequency counter with neat block diagram and each block in details. How frequency is measured using the digital frequency counter with an example. 5+5

5. Explain RF signal generators with a block diagram. Discuss their primary applications in electronic testing and measurement, emphasizing the significance of frequency range, output power, and modulation capabilities. 4+6

6. Explain the working principle of an X-Y recorder with a neat diagram. Discuss its advantages and applications in detail. 10

7. a) Explain the working mechanism of a sweep frequency generator with a neat diagram. 5

   b) Define the transducer and discuss the classification of transducers based on their principle of operation. 5

8. a) Discuss the principle of operation and applications of piezoelectric transducers with neat construction diagram, emphasizing their ability to convert mechanical stress into electrical signals. 5

   b) Explain how a wave analyzer works with neat block diagram and its role in measuring the harmonic content of signals. What are the key parameters that it can measure? 5

****