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**BTECH**  
**(SEM III) THEORY EXAMINATION 2024-25**  
**ELECTRICAL MEASUREMENTS & INSTRUMENTATION**

TIME: 3 HRS

M.MARKS: 100

**Note:** Attempt all Sections. In case of any missing data; choose suitably.

**SECTION A**

**1. Attempt all questions in brief. 2 x 10 = 20**

Q no.	Question	CO	Level
a.	Differentiate between indicating and integrating instruments.	CO1	K1
b.	What are systematic and random errors? Give one example of each.	CO1	K1
c.	What is the purpose of a Megger in electrical measurements?	CO2	K2
d.	What is the principle of an AC bridge?	CO2	K2
e.	Define transformation ratio in instrument transformers.	CO3	K2
f.	Define the burden of an instrument transformer.	CO3	K2
g.	Define the working principle of a multimeter.	CO4	K2
h.	Draw the basic circuit of a digital counter.	CO4	K2
i.	Define gauge factor in strain gauges.	CO5	K2
j.	Define smart sensors and give one example.	CO5	K2

**SECTION B**

**2. Attempt any three of the following: 10 x 3 = 30**

a.	Explain the classification of measuring instruments with examples and their working principles.	CO1	K1
b.	Explain the various methods used for measuring medium resistances.	CO2	K2
c.	Describe the working and applications of a potential transformer with phasor diagrams.	CO3	K2
d.	Explain the working principle, construction, and applications of a digital voltmeter.	CO4	K2
e.	What is an electrical transducer? What are the basic requirements of a transducer? Give the classification of a transducer.	CO5	K2

**SECTION C**

**3. Attempt any one part of the following: 10 x 1 = 10**

a.	What is the error of an instrument? Discuss various types of Errors in measurement.	CO1	K1
b.	Sketch the basic construction of a typical PMMC instrument & show how a PMMC instrument can be used as a DC voltmeter, and explain the circuit operation in detail.	CO1	K1

**4. Attempt any one part of the following: 10 x 1 = 10**

a.	Explain Maxwell's bridge method for inductance measurement with a neat circuit diagram.	CO2	K2
b.	Explain the working principle of Kelvin's double bridge for the measurement of unknown low resistances.	CO2	K2

**5. Attempt any one part of the following: 10 x 1 = 10**

a.	Explain the different methods used for testing current transformers.	CO3	K2
b.	The exciting current of a ring core current transformer of ratio 1000/5A when operating at full primary current and with a secondary burden of non-inductive resistance of 1ohm is 1A at a power factor of 0.4,	CO3	K3

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	Calculate the phase displacement between primary and secondary winding currents and The ratio error at full load assuming that there has been no compensation.		
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**6. Attempt any one part of the following: 10 x 1 = 10**

a.	Discuss the working of a digital frequency meter and explain how it measures frequency accurately.	CO4	K2
b.	Explain the function and operation of a wave analyzer and its role in signal analysis.	CO4	K2

**7. Attempt any one part of the following: 10 x 1 = 10**

a.	A resistance strain gauge with a gauge factor 2 is fastened to a steel member subjected to a stress of 100 N/mm <sup>2</sup> . The modulus of elasticity of steel is approximately 200 GN/m <sup>2</sup> . Calculate the percentage change in the value of the gauge resistance due to the applied stress.	CO5	K3
b.	Discuss the working of thermistors and thermocouples and compare their advantages and disadvantages.	CO5	K2

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