Total No. of Questions—**8**] [Total No. of Printed Pages—**3**

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S.E. (Electrical) (I Semester) EXAMINATION, 2019

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

(2015 PATTERN)

Time : Three Hours **Maximum Marks : 50**

N.B. **:—** (*i*) Attempt Q. No. **1** *Or* Q. No. **2**, Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6**, Q. No. **7** *or* Q. No. **8**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*v*) Assume suitable data, if necessary.

1. (*a*) Compare the following methods of damping on minimum *six* points : [6]

(*i*) Air friction damping

(*ii*) Fluid friction damping

(*iii*) Eddy current damping.

(*b*) With suitable circuit diagram explain Kelvin's double bridge used for measurement of low resistance. Also derive the expression for unknown resistance at balance condition. [7]

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Or

2. (*a*) A PMMC instrument gives reading of 20 mA when potential difference across its terminals is 60 mV. Find :

(*i*) Shunt resistance required to measure current upto 100 Ampere.

(*ii*) Multiplier resistance required to measure voltage upto 300 volt.

Draw diagrams for above cases and mark respective quantities in it. [7]

(*b*) With suitable diagram explain construction and working of Megger instrument. [6]

3. (*a*) Three equal impedances each consisting of (R + L) series elements are connected in star across 400 volt, 50 Hz, 3-phase, 3 wire balanced supply. The power of this circuit is measured by 2 wattmeter method. The two wattmeters read 3 kW and 1 kW respectively. Find the value of R and L in each phase. [6]

(*b*) With a suitable circuit diagram explain calibration of single phase energy meter. [6]

Or

4. (*a*) A single phase energymeter rated 200 volt, 50 Hz, 3200 impulses per kWh is connected across 200 volt supply and the load consists of 40 Ω resistance. This circuit is on for 30 minutes. The energymeter completes 1590 blinks during this time. Determine percentage error in the energymeter. [6]

(*b*) With suitable circuit diagram and phasor diagram explain one wattmeter method for reactive power measurement in 3-phase (R + L) load. Derive the expression for wattmeter reading. [6]

5. (*a*) Explain how phase angle and phase shift is measured using CRO. [7]

(*b*) Explain any *two* electrical transducers used for pressure measurement. [6]

Or

6. (*a*) With suitable diagrams explain working of resisitve transducers and inductive transducers. [7]

(*b*) With suitable diagram explain constructional details of CRT. [6]

7. (*a*) State the methods of level measurement. Explain pneumatic method of level measurement with suitable diagram. [6]

(*b*) (*i*) Explain construction and working of RVDT with suitable diagram. [4]

(*ii*) State any *two* applications of LVDT. [2]

Or

8. (*a*) With suitable diagram explain construction and working of semiconductor strain gauge. State any *two* advantages of it. [6]

(*b*) (*i*) Draw and explain output characteristics of LVDT. [4]

(*ii*) State any *two* desirable characteristics of resistance strain gauge. [2]

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