Total No. of Questions : 4]

SEAT No. :

P-5383

[Total No. of Pages : 2

[6186]-509

S.E. (Electrical) (Insem)

ELECTRICAL MEASUREMENTS & INSTRUMENTATION

(2019 Pattern) (203144) (Semester-III)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates :

1) ***Answer Q1 or Q2 and Q3 or Q4.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain necessity of controlling torque in indicating type instruments. Also explain spring and gravity control system used in indicating instruments. **[8]**

b) Explain how range can be extended for ammeter, voltmeter and wattmeter using instrument transformers? Draw necessary diagram for the same. **[7]**

OR

Q2) a) Draw neat diagram of CT and PT hence state use of instrument transformers and define the following terms with reference to instrument transformers. **[8]**

i) Nominal ratio for CT

ii) Turns ratio for PT

iii) Burden for CT

iv) Transformation ratio for PT

b) Derive the torque equation for PMMC type of instrument hence comment on scale of PMMC type of instruments. **[7]**

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Q3) a) Classify resistance with one example in each case hence deduce an expression for Wheatstone's bridge. **[7]**

b) State various detectors used for AC bridges hence solve the following. **[8]**

The impedances of the basic AC bridge are as follows

Z1 = 100 Ω∠ 80°

Z2 = 250 Ω (Pure resistance)

Z3 = 400 Ω∠ 30°

Z4 = *Unknown*

Determine constants (Resistance and Inductance/Capacitance) of unknown impedance at bridge balance if supply frequency is 1 kHz

OR

Q4) a) In an Anderson bridge for measurement of inductance Lx and resistance Rx in the arm AB, the arms CD and DA have resistances of 600 Ω each and arm CE has capacitor of 1μF capacitance. With ac supply at 100 Hz supplied across A and C balance is obtained with resistance of 400Ω in arm DE and 800Ω in arm BC. Detector is connected between arm B and E. Draw necessary diagram, write formula used hence calculate value of Lx and Rx. **[7]**

b) State the following statements are true or false hence justify your answer. **[8]**

i) Maxwell's Inductance - capacitance bridge can be used for measurement of inductance at power and audio frequencies.

ii) Thermoelectric effect can be neglected in Kelvin's Double bridge.

iii) In ammeter - voltmeter method, ammeter does not measure true current flowing through unknown resistance when it is connected on supply side and voltmeter across unknown resistance.

iv) Scale of Megger is from infinity to zero.

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