Total No. of Questions : 8]

SEAT No. :

P1500

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S.E. (Electrical Engineering)

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right side indicate total marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume Suitable data if necesary.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) Draw two possible connections of wattmeter for power measurement in single phase circuit. State clearly which connection should be used for respective conditions. **[6]**

b) Two wattmeters are connected in a balanced start-connected load. The circuit is supplied from a 3-phase, 440 V, 50 Hz supply system. The currant in each phase is 20 amperes and lags behind its phase voltage by 40 degrees. Calculate. **[6]**

i) Phase voltage

ii) Load impedance

iii) Readings of the two wattmeters

c) Give any 3 points of comparison between 1 wattmeter method and 2 Wattmeter method for measurement of active power in a 3 phase circuit.**[6]**

OR

Q2) a) Draw circuit diagram and phasor diagram for one wattmeter method for reactive power measurement in a 3 phase star connected (R+L) load. Explain this method in brief. **[6]**

P.T.O.

b) When two wattmeter method is used for measurement of power in a three phase balanced circuit, comment upon the readings of the two wattmeter under following conditions. **[6]**

i) when the power factor is unity

ii) when the power factor is zero

iii) when the power factor is 0.5 lagging

c) Power input to a 150 kW, 440 V, 3-phase induction motor is measured by two wattmeter method. The wattmeter readings are 115 kW and 50 kW. Calculate. **[6]**

i) The input to the motor

ii) Power factor of the motor

iii) Line current drawn by the motor

Q3) a) With suitable block diagram explain working of static energy meter. **[6]**

b) A 230 V. 1 phase energy meter has a constant load of 4A passing through it for 6 hours at unity power factor. If the meter disc makes 2208 revolutions during this period what is the meter constant in revolutions per kWh? Calculate the power factor of the load if the number of revolutions made by the meter is 1472 when operating at 230 V, 5A for 4 hours. **[6]**

c) Explain working of TOD meter with a suitable diagram. **[5]**

OR

Q4) a) With suitable labelled diagram explain constructional details of single phase induction type energy meter. **[6]**

b) What is lag adjustment in case of energy meter? Explain it in detail with suitable diagrams. **[6]**

c) Derive torque equation of induction type energy meter with usual notations. **[5]**

Q5) a) Explain any two types of resistive transducers. **[6]**

b) Explain Phase angle measurement by Lissajous pattern. **[6]**

c) With suitable diagram explain construction and working of McLeod gauge. **[5]**

OR

Q6) a) State detail classification of transducers. **[6]**

b) With suitable diagram explain constructional details and working of pirani gauge. **[6]**

c) With suitable diagram, explain current and frequency measurement by CRO. **[5]**

Q7) a) State 3 advantages and 3 disadvantages of LVDT. **[6]**

b) With suitable diagram explain nucleonic method of level measurement. **[6]**

c) With suitable diagram explain construction and working of semiconductor type strain gauge. **[6]**

OR

Q8) a) With suitable diagram explain construction and working of foil type strain gauge. **[6]**

b) With suitable diagram explain construction and working of LVDT. **[6]**

c) With suitable diagram explain hydraulic method of level measurement. **[6]**

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