

B.TECH SEM - III (2007 COURSE) (ELECTRICAL ENGG.) :

WINTER - 2017

SUBJECT : ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS

Day : **Monday**
Date : **22/01/2018**

Time : **10.00 AM TO 01.00 PM**
Max. Marks : **80**

W-2017-2370

N.B.:

- 1) **Q.No.1** and **Q.No.5** are **COMPULSORY**. Out of the remaining questions attempt **ANY TWO** questions from each section.
- 2) Answer to both the sections should be written in the **SEPARATE** answer books.
- 3) Use of non programmable **CALCULATOR** is allowed.
- 4) Figures to the right indicate **FULL** marks.
- 5) Assume suitable data wherever necessary.

SECTION – I

- Q.1** a) Distinguish between the direct and indirect methods of measurement with examples. [05]
- b) Explain the advantages of instrument transformer over shunt and multiplier. [04]
- c) What are the different factors which affects the precision measurement of medium resistance with Wheatstone bridge? Explain how their effects are eliminated. [05]
- Q.2** a) Explain the terms: [06]
- i) Indicating instruments
 - ii) Recording instrument
 - iii) Integrating instrument
- Give examples of each.
- b) Explain the constructional details and principles of operation of a D'Arsonal galvanometer. Derive the expression for steady state deflection. [07]
- Q.3** a) At its rated load of 25VA, 100/5A, current transformer has an iron loss of 0.2W and magnetizing current of 1.5A. Calculate its ratio error and phase angle error when supplying rated output to a meter having a ratio of resistance to reactance of 5. [07]
- b) Explain the effect of secondary burden on the ratio and phase errors of a C.T. [06]
- Q.4** a) A potential transformer ratio of 1000/100V has a following contents – [07]
- Primary Resistance = 94.5Ω secondary Resistance = 0.86Ω Primary reactance = 66.2Ω , Total equivalent reactance = 110Ω no load current = 0.02A at 0.4 p.f.
- Calculate:
- i) Phase angle error at no load
 - ii) Burden in VA at unity pf
- b) Explain the construction and working of Clip on ammeter. Explain their utility. [06]

P.T.O.

SECTION – II

- Q.5 a)** Explain the instrument for measurement of reactive power in 3 ϕ circuit. [05]
- b)** Derive the expression for deflecting torque in 1 ϕ induction type energy meter. [05]
- c)** Compare Analog and Digital instruments. [04]
- Q.6 a)** A wattmeter has a current coil of 0.03 Ω resistance and a pressure coil of 6000 Ω resistance. Calculate the % error if the wattmeter is so connected that: [07]
- i)** The current coil is on the load side.
- ii)** The pressure coil is on the load side. If the load takes 20A at a voltage of 220V and 0.6 p.f in each case.
- b)** Explain the special features incorporated in an electro-dynamometer type of wattmeter so that it can be used for low p.f application. Also mention various types of errors in Electro-dynamometer type wattmeter. [06]
- Q.7 a)** A 230V, 1 ϕ watt hour meter has a constant load of 4A passing through it for 6 hrs at unity p.f. If the meter disc makes 2208 Revolutions during this period, what is the meter constant in Rev/kwh? Calculate the p.f. of the load if the number of Revolutions 1472 when operating at 230V and 5A for 4 hrs. [07]
- b)** Explain the different errors and their adjustments in case of 1 ϕ induction type energy meter. [06]
- Q.8 a)** Explain the block diagram and principle of operation of digital multimeter. [07]
- b)** Explain with block diagram function generator. [06]

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