

**SUBJECT CODE NO:- P-18**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E.(EEP/EE/EEE) Examination MAY/JUNE-2016**  
**Electrical Measuring Techniques**  
**(Revised)**

[Time:Three Hours]

[Max Marks:80]

- N.B
- i) Q.No.1 & Question No.6 are compulsory.
  - ii) Attempt any two Question from remaining question of each section.
  - iii) Assume suitable data, wherever necessary.

**Section A**

- Q.1 Solve any five questions:- 10
- i) Define the terms as static and dynamic regarding measuring instrument.
  - ii) What is need of calibration?.
  - iii) Define the terms as reproducibility and span.
  - iv) What are different sources & detectors used in ac bridges?
  - v) What are advantages of polyphase wattmeter?
  - vi) How electrostatic wattmeter is superior to other wattmeter?
  - vii) The measured value of resistance is  $12.25\Omega$  , where as its value is  $12.22\Omega$ . Determine the absolute error in measurement.
  - viii) What do you mean by linearity?
- Q.2 a) Explain the earth tester for earth resistance measurement with diagram. 08
- b) An ac bridge is connected as below 07
- Arm AB: is an unknown impedance;  
 Arm BC:  $200\Omega$  variable resistance;  
 Arm ED: variable resistance of  $250\Omega$ ;  
 Arm CD: resistance of  $200\Omega$ .  
 Arm DA: resistance of  $200\Omega$ .  
 Arm CE: capacitor of  $1\mu\text{F}$ .  
 The supply is connected between AC and detector is connected between BE. Determine resistance and inductance of AB.
- Q.3 a) Derive the expression for torque for moving iron instrument and comment upon the nature of scale. 08
- b) The coil of pmmc instrument has 42 turns and mean width of the coil is 2.5cm of the axis length of the coil is 2cm. If the flux density is 0.1 tesla. Calculate the torque on moving coil for a current of 15mA. 07
- Q.4 a) Derive expression for power measured in  $3\phi$  circuit with help of 2-wattmeter for a balanced star connected load. Draw the phasor diagram. 08
- b) Two watt meters connected to measure the input to a balanced  $3\phi$  circuit. Indicate 2000W and 500W respectively. Find p.f of circuit. 07
- i) When both reading are positive.
  - ii) When the latter reading is obtained after reversing the connections to the current coil of first instrument?
- Q.5 a) Explain shunt and multiplies for extension range of ammeter & voltmeter. 07
- b) Write short note on megger. 04
- c) What are different types of error in wattmeter? 04

## Section B

- Q.6 Solve any five questions. 10
- i) What is meant by turn's compensation and why is it done?
  - ii) A 5Amp, 230V meter on full load unity p.f test make 60 resolution in 360 sec off the normal disc speed is 480 rev/kwh . What the percentage error.
  - iii) What are the applications of CRO?
  - iv) What is nominal ratio of CT & burden on I.T?
  - v) Why copper shaded bands are used in energy meter?
  - vi) What do you mean by active & passive transducers? Give one example.
  - vii) What is strain gauge?
  - viii) What is the principle on which a inductive transducer work?
- Q.7 a) Explain with block diagram the operation of electronic energy meter. 08
- b) A 230v, 50 Hz 1 $\emptyset$  energy meter has a constant of 200 rev/kwh. While supplying a non-inductive of 5.2A at normal voltage. The meter takes 4 minutes for 10 revolutions. Calculate the percentage error of instrument. 07
- Q.8 a) Explain the measurement can be made with use of CRO. 08
- i) Frequency
  - ii) phase angle.
- b) List the advantage & disadvantage of relation transducers. 07
- Q.9 a) What are error & their compensation in wattmeter? 08
- b) What are advantages of instrument transformer over shunt & multiplies? 07
- Q10 a) Explain the working of low power factor wattmeter. 08
- b) What is ratio and phase angle error of IT on which factor does it depends. 07