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303

B. E. (Third Semester) EXAMINATION, June, 2009

(Old Scheme)

(Common for AU, CM, EC,EE, EI, FT, IP, IT, ME & TX Engg)

INSTRUMENTATION AND MEASUREMENT

(303)

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Answer any *five* questions. All questions carry equal marks. Assume suitable value for missing data.

1. (a) Giving neat circuit diagram, explain the construction and principle of working of A. C. voltmeter with rectifier and amplifier combination. Mention its limitations.

   (b) Explain the following terms :

   (i) Sensitivity

   (ii) Precision

   (iii) Accuracy

   (iv) Resolution

   (v) Random (residual) errors

2. (a) Draw the circuit and phasor diagram of Wien's bridge for frequency determination. Derive the formula used at balance condition. Mention applications and limitations of this bridge.

P. T. O.

(b) A Schering bridge is used for measuring the power loss in dielectrics. The specimens are in the form of discs 0·3 cm thick and have a dielectric constant of 2·3. The area of each electrode is 314 cm^2 and the loss-angle is known to be 9 for a frequency of 50 Hz. The fixed resistor of the network has a value of 1000 ohm and the fixed capacitance is 50 pF. Calculate the values of variable resistor and capacitor required.

3. (a) What is a transducer ? List *five* most important required characteristics of an ideal transducer. Giving examples, differentiate between active and passive transducers.

(b) A strain gauge having a gauge factor of 4 is used for testing a machine. If the gauge resistance is 100 ohm and the strain is 20×10^{-6}, how much will the resistance of the strain gauge change ? Derive any formula used.

4. Giving suitable diagrams, briefly discuss the construction, principle of working and application areas of the following :

(i) Signal generator

(ii) Function generator

(iii) Sweep frequency generator

(iv) Oscillator

Give output wave form in each case.

5. (a) Giving circuit/block diagrams, explain the working principle of wave analyser. List its applications.

(b) Explain the principle, construction and the method for measurement of temperature by thermocouples.

6. (a) Discuss the advantages of digital instruments over analog instruments. Explain the principle of working of integrating DVM. What are its limitations ?

   (b) What are different types of displays ? Explain the construction and working principle of LCD *or* LED type display. Mention its advantages and disadvantages.

7. (a) What is microwave ? Discuss the importance of microwave in electronic measurements. Explain microwave power measurement method.

   (b) Explain fibre optics networks in brief. List the applications of optical fibres in the telecommunication systems.

8. Write explanatory notes on any *four* of the following :

   (i) Semiconductor strain gauge

   (ii) Ramp type DVM

   (iii) C. R. O.

   (iv) A/D conversion

   (v) Scattering parameters

   (vi) Optical time domains reflectometry