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[5057]-2073

S.E. (Instrumentation and Control) (I Sem.) EXAMINATION, 2016

BASIC INSTRUMENTATION

(2015 PATTERN)

Time : Two Hours

Maximum Marks : 50

N.B. :— (i) Solve Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4,
Q. No. 5 or Q. No. 6, Q. No. 7 or Q. No. 8.

(ii) Figures to the right indicate full marks.

(iii) Assume suitable data, if necessary.

(iv) Use of non-programmable calculator is allowed.

(v) Neat diagrams must be drawn wherever necessary.

1. (a) A Multimeter having a sensitivity of $1500 \Omega/V$ is used to measure the voltage across the circuit having an output resistance of $10 \text{ k}\Omega$. The open circuit voltage of the circuit is 8 V . Find the reading of Multimeter when it is set to its 10 V scale. Find the percentage error in instrument reading and true value. [6]

P.T.O.

- (b) Explain the construction and working of single phase wattmeter with neat diagram. [6]

Or

2. (a) Explain the desirable static and dynamic characteristics. [6]
- (b) A moving coil instrument gives a full scale deflection of 10 mA when the potential difference across its terminal is 100 mV. Calculate :
- (a) the multiplying factor and
- (b) shunt resistance
- for a full scale deflection corresponding to 100 A current. [6]
3. (a) Draw a neat diagram of analog oscilloscope. Explain the function of each block. [6]
- (b) The basic a.c. bridge consists of the following constants :
Arm AB(Z_1) : $R_1 = 400 \Omega$; Arm BC(Z_2) : $R_2 = 150 \Omega$
in series with $C_2 = 0.2 \mu\text{F}$; Arm CD(Z_4) : Unknown;
Arm DA(Z_3) : $R_3 = 100 \Omega$ in series with $L_3 = 10 \text{ mH}$.
The source oscillator frequency is 1 kHz. Determine the constants of the arm CD. Source is connected across BD and detector is connected across AC. (Construct diagram). [6]

Or

4. (a) Explain the terms vertical coupling, Z-Axis and sources of triggering with reference to oscilloscope. [6]
- (b) Derive the equation to determine the magnitude of unknown resistance with the help of Wheatstone bridge. Explain the errors in bridge circuit. [6]
5. (a) What is energy ? To measure this energy, prepare a block diagram of digital energy measurement system and explain the significance of each block briefly. [7]
- (b) Explain the digital capacitance meter with neat diagram. [6]

Or

6. (a) Draw and explain the block diagram of digital multimeter. Give the specifications of DMM. [8]
- (b) Prepare and explain a block diagram of digital temperature measurement system which consist of a K type thermocouple for measurement of temperature of the process in the range 0°C to 1200°C. The output of transducer contains a noise in the range of 80 Hz to 1.5 kHz. Assume the data and conditions, if any. [5]
7. (a) Explain X-Y recorder with neat diagram. [7]

(b) Explain the following terms (each **2** marks) : [6]

(i) Single and Multichannel recorder

(ii) Marking with heated stylus

(iii) Tracing systems.

Or

8. (a) What is $x-t$ recorder ? Explain each component of it with neat diagram. [7]

(b) Draw a neat diagram of function generator and explain it briefly. [6]