Roll No. _____

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4E4132

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B. Tech. IV-Sem. (Main) Exam; April-May 2017
Electronics & Communication Engineering
4EC3A Electronic Measurement & Instrumentation

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No. 205)*

1. NIL _____ 2. NIL _____

UNIT - I

1 (a) Explain the types of errors in measurements in detail.

10

(b) A resistance was rated at 20 Ω and the measured current through this resistor was 8.2 A. The range of the ammeter was 10A. Compute the power in watts dissipated in the resistor. The scale of the ammeter had 100 divisions and could be read with certainty to ± 0.5 division. It was later found that the resistance of the resistor was 0.2% greater than the specified resistance and the ammeter 1.0% more than the true value. Determine the known error in the computed power in watt and in percent of the computed power.

6

OR

1 (a) The stress in a mild steel plate circular diaphragm is given by

$$\delta = \frac{3D^2 P}{16t^2} \ N/m^2$$

where D = diameter of diaphragm, m
t = thickness of diaphragm, m
P = applied pressure, N/m^2
A diaphragm has a diameter of 15 mm and thickness of 0.2 mm and the applied pressure is $300 \times 10^3 \ N/m^2$. Calculate the stress. The known error in diameter is 1% and in thickness is 3%. Calculate the error in stress.

10

(b) Define the following terms :
(1) Accuracy (2) Precision.

6

UNIT - II

2 (a) Explain the true r.m.s. responding a.c. voltmeter with the suitable block diagram.

8

(b) In a dual slop integrating DVM, the reference voltage is 100 mV and the first integrating period is set as 50 ms. The input resistor of the integrator is 100 kΩ and the integrating capacitor 0.047 μF. For an input voltage of 120 mV, determine the second integration (de-integration) period.

8

OR

2 (a) An ideal diode has been connected across a 10 Ω, 100 mA, centre-zero PMMC meter as shown in figure 2 (a). Determine the reading of meter.
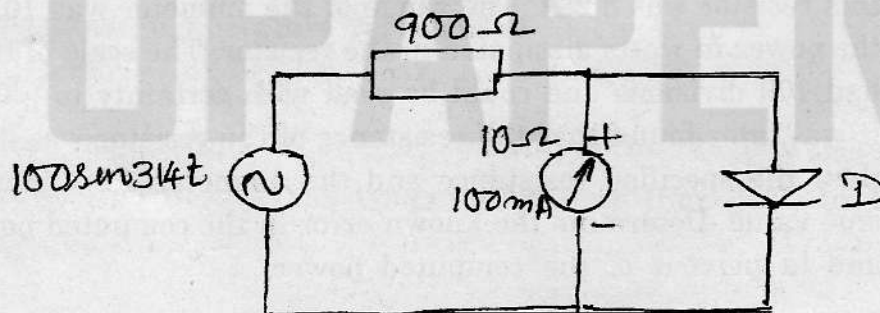

Fig. 2(a)

6

(b) Explain the vector impedance meter with the neat diagram.

10

UNIT - III

3 (a) How can the following quantity be measured using CRO ?
   (1) Current

   (2) Frequency

   (3) Phase angle

   (4) Voltage.

(b) Explain the dual beam oscilloscope.

16

OR

3 (a) Compare the digital storage oscilloscope and analog storage oscilloscope.

8

(b) What value should C_1 have for V_o to be equal to $0.1\ V_i$ in circuit shown below ?

Fig. 3(b)
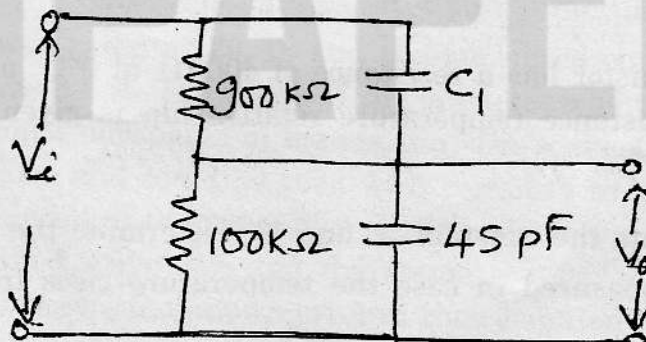
UNIT - IV

4   Explain all kind of attenuators used in signal generators.

OR   16

4   (a)   What is the frequency synthesized signal generator ? Explain direct analog synthesizer.

(b)   Draw the block diagram and explain the working of a random noise generator.   8

8

UNIT - V

5   (a)   An accelerator has a damping ratio of 0.7. Calculate the value of frequency ratio so that ratio of steady relative displacement to amplitude of input displacement is 0.99 (i.e. the error is 1%)

(b)   Explain the loading effect and frequency response of piezoelectric transducer.   6

OR   10

5   (a)   Derive an expressions for the gauge factor of strain gauges. Give its applications and working principle in detail.

(b)   A thermistor has a resistance of $4000\,\Omega$ at $0°C$ and $800\ \Omega$ at $40°C$. The resistance temperature relationship is given by   10

$$R_1 = R_0\alpha\ e^{\beta/T}$$

determine the constant α and β. Determine the range of resistance to be measured in case the temperature rises from $50°C$ to $100°C$.

6