Enrollment No......................................

Faculty of Engineering
End Sem (Even) Examination May-2018
EI3CO08 Electronics Measurement and Instrumentation
Programme: B.Tech.   Branch/Specialisation: EI

Duration: 3 Hrs.   **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. In Measurement systems, which of the following are undesirable **1** characteristics?
(a) Accuracy and sensitivity
(b) Drift, static error and precision
(c) Reproducibility and non-linearity
(d) Drift, static error, dead zone and non- linearity

ii. In AC Circuits, the connection of measuring instruments causes **1** loading error which may affects
(a) Only the magnitude of quantity being measured.
(b) Only the phase of quantity being measured.
(c) Both the magnitude and phase of quantity being measured.
(d) Magnitude, Phase and also the waveform of the quantity being measured.

iii. Frequency can be measured by using. **1**
(a) Maxwell's bridge   (b) Scharing bridge
(c) Heaviside Campbell bridge   (d) Wien's bridge

iv. A PMMC meter has an internal resistance 200Ω and the current **1** required for its full scale deflection is $50\mu A$. The meter is capable of measuring a maximum voltage of
(a) 5mV   (b) 10mV   (c) 5μV   (d) 10μV

v. The band width of a CRO is from 0-20Mhz the fastest rise time a sine **1** wave can have to be accurately reproduced by the instrument is
(a) 35ns   (b) 35μs   (c) 17.5ns   (d) 0.175μs

P.T.O.

vi. A LCD requires a power of **1**
(a) 20W   (b) 20mW   (c) 20μW   (d) 20nW

vii. In Signal generators **1**
 (a) Energy is created
 (b) Energy is generated
 (c) Energy is converted from a simple D.C source in to A.C energy at some specific frequency.
 (d) All of these

viii. The pulse rise time is define as the time taken by the pulse **1**
(a) To go from 10% to 90% of its amplitude
(b) To go from 0% to 100% of its amplitude
(c) To go from 0% to 90% of its amplitude
(d) To go from 10% to 100% of its amplitude

ix. A 8 bit converter is used for a (d)C range of 0-10V the weight of LSB is **1**
(a) 39mv   (b) 78mv   (c) 39.2mv   (d) None of these

x. A successive approximation A/D converter has a resolution of 20mv. What will be its digital O/P for an Analog I/P of 2.17V **1**
(a) 01101100   (b) 01101101
(c) 01101011   (d) None of these

Q.2 i. What are the main elements of measuring system? Explain these elements with the help of a block diagram of an instrumentation system. **4**

ii. Explain the terms: **6**
(a) Accuracy   (b) Sensitivity   (c) Precision
(d) Resolution   (e) Linearity   (f) Drift

OR iii. The expected value of the voltage across a resistance is 80V. However the measurement gives a value 79V calculate. **6**
(a) Absolute error   (b) % error
(c) Relative accuracy   (d) % of accuracy

Q.3 i. Explain with diagram operation of the RMS voltmeter. **4**

ii. Draw the circuit and phasor diagram of wien's bridge for frequency determination derive the formula used at balance condition. Mention application and limitation of this bridge. **6**

OR iii. Describe the working principle of chopper type D.C voltmeter. What are advantage and disadvantage of chopper type D.C voltmeter over basic D.C Voltmeter? **6**

Q.4 i. A Lissajous pattern on an oscilloscope is stationary and has 5 horizontal tangencies and 2 vertical tangencies. The frequency of horizontal I/P is 1000Hz determine the frequency of vertical I/P **3**

ii. Draw the block diagram of a general purpose oscilloscope. Explain its working and function of each block. **7**

OR iii. Describe the dual trace and dual beam method for multiple trace oscilloscopes in detail. **7**

Q.5 i. Draw the block diagram of function generator. Explain the function of each block. **4**

ii. Write short note on spectrum analyzer **6**

OR iii. Describe the generation of square wave using Astable Multivibrator. **6**

Q.6 i. Explain successive approximation method for analog to digital conversion of data. **4**

ii. With the help of neat block diagram explain the principle of operation of integrating type DVM. **6**

OR iii. A $4\frac{1}{2}$ digit voltmeter used for voltage measurements. **6**
(a) Find the resolution
(b) How would 0.6973V be displayed on a 1V and 10V ranges.
(c) How would 12.98V be displayed on a 10V range

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Marking Scheme
EI3CO08 Electronics Measurement and Instrumentation

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(d) Drift, static error, dead zone and non- linearity

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(d) Magnitude, Phase and also the waveform of the quantity being measured.

iii. Frequency can be measured by using. **1**
(d) Wien's bridge

iv. A PMMC meter has an internal resistance 200Ω and the current required for its full scale deflection is 50µA. The meter is capable of measuring a maximum voltage of **1**
(b) 10mV

v. The band width of a CRO is from 0-20Mhz the fastest rise time a sine wave can have to be accurately reproduced by the instrument is **1**
(c) 17.5ns

vi. A LCD requires a power of **1**
(c) 20µW

vii. In Signal generators **1**
(c) Energy is converted from a simple D.C source in to A.C energy at some specific frequency.

viii. The pulse rise time is define as the time taken by the pulse **1**
(a) To go from 10% to 90% of its amplitude

ix. A 8 bit converter is used for a (d)C range of 0-10V the weight of LSB is **1**
(a) 39mv

x. A successive approximation A/D converter has a resolution of 20mv. What will be its digital O/P for an Analog I/P of 2.17V **1**
(a) 01101100

Q.2 i. Elements of measuring system 2 marks **4**
Block diagram of an instrumentation system. 2 marks

ii. Explain the terms: 1 mark for each term (1 mark * 6) **6**
(a) Accuracy (b) Sensitivity (c) Precision
(d) Resolution (e) Linearity (f) Drift

OR iii. Each calculation 1.5 mark (1.5 mark * 4). **6**
(a) Absolute error (b) % error
(c) Relative accuracy (d) % of accuracy

Q.3 i. Diagram 1.5 marks **4**
Operation of the RMS voltmeter 2.5 marks

ii. Circuit diagram 1.5 marks **6**
Phasor diagram of wien's bridge 1.5 marks
Formula derivation 2 marks
Application 0.5 mark
Limitation of this bridge. 0.5 mark

OR iii. Working principle of chopper type D.C voltmeter 3 marks **6**
Three Advantage 1.5 marks
Three Disadvantage 1.5 marks

Q.4 i. Frequency of vertical I/P 2500Hz **3**
ii. Block diagram 3 marks **7**
Its working and function of each block. 4 marks

OR iii. Dual trace oscilloscopes 3.5 marks **7**
Dual beam oscilloscopes 3.5 marks

Q.5 i. Block diagram of function generator. 2 marks **4**
Explanation 2 marks

ii. Spectrum analyzer **6**
Diagram 2 marks
Explanation 2 marks
Limitation 0.5 mark
Advantage 1 mark
Disadvantage 0.5 mark

OR iii. Diagram 2 marks **6**
Explanation 2 marks
Input output wave form 2 marks

Q.6 i. Block diagram 2 marks **4**
Explanation 2 marks
ii. Block diagram 2 marks **6**
Explanation operation of integrating type DVM. 4 marks

OR iii. A $4\frac{1}{2}$ digit voltmeter used for voltage measurements. **6**
Each answer 2 marks (2 marks * 3)
(a) Find the resolution Ans 0.0001
(b) How would 0.6973V be displayed on a 1V and 10V ranges.
Ans 12.980
(c) How would 12.98V be displayed on a 10V range
Ans 0.6973, 0.697

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