

B. E. DEGREE EXAMINATIONS: APRIL/MAY 2009

Third Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

U07EC304 Measurements and Instrumentation

Time: Three Hours

Maximum Marks: 100

Answer ALL the Questions:-

PART A (20 x 1= 20 Marks)

1. _____ refers the degree of closeness or conformity to the true value of the quantity under measurement.
a) Precision b) Accuracy c) Conformity d) error
2. _____ units in mechanics are measures of length, mass and time.
a) Derived b) Universal c) Metric d) fundamental
3. The Unit of Thermodynamic Temperature is _____
a) Meter b) Kilogram c) Candela d) Kelvin
4. The Maxwell bridge measures an unknown _____ in term of a known capacitance.
a) inductance b) mutual inductance c) Current d) Voltage
5. An Electronic multimeter generally contains the following elements
a) Balanced bridge dc amplifier b) indicating meter
c) Input alternator d) all the above
6. Q meter is an instrument designed to measure some of the
a) Electrical properties of coils and capacitor
b) Mechanical properties of coils and Capacitor
c) Physical properties of coils and capacitor
d) Chemical properties of Coils and capacitor
7. _____ generates the electron beam in an Oscilloscope
a) Cathode ray tube b) Vertical amplifier c) Generator d) Trigger Circuit

8. _____ measures the amplitude of a signal at two points in a circuit and simultaneously measures the phase difference between voltage waveform at these two points
- a) Vector impedance meter b) Vector Voltmeter
c) Vector Ammeter d) Millivoltmeter
9. _____ is defined as the ratio of the average value of the pulse over one cycle to the peak value of the pulse.
- a) On cycle b) Off Cycle c) Duty Cycle d) Pulse Width
10. Astable Multivibrator is known as _____
- a) Free Stopping Multivibrator b) Free running Multivibrator
c) Pulse Generator d) Emitter Follower
11. _____ is an instrument designed to measure the relative amplitudes of Single frequency components in a complex or distorted wave form.
- a) Sine wave Oscillator b) CRO c) Frequency Generator d) Wave analyzer
12. The level range of Heterodyne Harmonic Analyzer is from _____ to _____
- a) -95 dBm to +30 dBm b) -90 dBm to +32 dBm
c) -96 dBm to +32 dBm d) -85 dBm to +32 dBm
13. Short term crystal stability errors are minimized by taking _____ measurements over long gate times
- a) Wavelength b) Amplitude c) Frequency d) decibel
14. The heart of frequency counter is the _____
- a) decade counter b) Ripple Counter c) Decode Counter d) Binary Counter
15. In a period measurement the number of pulses counted equals
- a) $N_p = f_x / f_c$ b) $N_p = f_c / f_x$ c) $N_f = f_x$ d) $N_p = N_f$
16. A _____ is a fast digital counter that divides the input frequency by 10
- a) Display Counter b) Prescaler c) Strain Gauge d) Low Pass filter
17. A shaft encoder provides _____ output
- a) binary b) gray c) excess 3 d) bcd

18. In fiber optics the deviation angle is _____, where θ_1 is angle between surface and incident ray θ_2 is angle between surface and refracted ray

- a) $\cos \theta_1 / \cos \theta_2$ b) $\sin \theta_1 / \sin \theta_2$ c) $\tan \theta_1 / \tan \theta_2$ d) $\sin \theta_1 / \cos \theta_2$

19. The _____ interface is used for distances less than 20 m total cable length where electrical noise is relatively low.

- a) IEEE 1394 b) IEEE 438 c) IEEE 488 d) IEEE 425

20. Ratio of the output voltage to the input current is called the _____ of the amplifier

- a) transconductance b) transresistance c) transimpedance d) transcapacitance

PART B (5 x 16 = 80 Marks)

21.(a) (i) Briefly Describe about different measurement methods. (4)

(ii) Explain the principle of working of a moving Coil Instrument and derive an expression for its deflection and give its errors. How can the range of the Instrument be extended? (12)

(OR)

21.(b)(i) Draw the circuit diagram and Phasor diagram for Schering bridge. Derive the expression for unknown capacitance and dissipation factor. (8)

(ii) Which AC Bridge is used to measure frequency and explain the measurement Procedure? List the applications for the AC Bridge. (8)

22. (a) (i) With a neat diagram explain the various parts of CRO. (10)

(ii) With circuit diagrams explain working of Electronic multimeter, the resistance range selector circuit and commercially available VOM. (6)

(OR)

22.(b)(i) Describe the working of a digital storage Oscilloscope with a neat sketch and how is it different from a analog storage Oscilloscope. (10)

(ii) Draw a test setup to measure power at high frequencies. (6)

23.(a)(i) What is a function generator? What are its basic elements and explain its working with a block diagram? (8)

(ii) Draw a block diagram of heterodyne frequency generator and explain. (8)

(OR)

23.(b)(i) Define harmonic distortion and total harmonic distortion. With the help of block diagram explain the working of Distortion analyzer. (8)

(ii) Explain the functioning of spectrum analyzer with neat diagram (8)

24.(a) (i) Draw a block diagram to show how high frequency waveform can be sampled to create a low frequency dot representation of waveform. Bring out the relationship between the signal frequency, the dot waveform frequency and number of samples per cycle in low frequency wave. (10)

(ii) Explain with neat diagram the working of integrating type digital voltmeter. (6)

(OR)

24 (b) Discuss the measurement of the following with necessary diagrams (16)

(i) Totalizing and Period mode

(ii) Time interval and time interval averaging.

25.(a)(i) Give a block diagram of Computer based data Acquisition system. Explain each block elaborately (10)

(ii) With a block diagrams explain Optical power meter and how can it be modified to display Logarithmic Power (6)

(OR)

25.(b)(i) Draw the Schematic of IEEE 488 Instrumentation Bus and explain its features. (10)

(ii) Write a briefly note on instruments used in Computer Controlled Instrumentation(6)
