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**B.E. / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2013**  
**ELECTRONICS AND COMMUNICATION ENGINEERING BRANCH**  
**FIFTH SEMESTER**  
**EC 9306 – MEASUREMENTS AND INSTRUMENTATION**  
**(REGULATIONS 2008)**

42

Time: 3 Hours

Max. Marks: 100

Answer All Questions

**Part - A**

(10 x 2 = 20 Marks)

- 1) What are the various dynamic characteristics of an instrument?
- 2) Give the significance of calibration.
- 3) What is the difference between photo-emissive, photo-conductive and photo-voltaic transducers?
- 4) Calculate the gage factor S, if a 3mm diameter conductor, that is 12mm long changes length by 2mm and diameter by 0.01mm under a compression force.
- 5) Write any three application of logic analyzer.
- 6) Define a data acquisition system.
- 7) A  $3\frac{1}{2}$  digit seven-segment LED display uses diodes that require a 10mA forward current. Calculate the total supply current required.
- 8) List the various guarding techniques in digital instruments.
- 9) Why synchronization is required in CRO?
- 10) Give the various application of measurement systems in Nano technology.

**Part - B**

(5 x 16 = 80 Marks)

- 11) (a)
- (i) Explain the Normal or Gaussian curve of errors in the study of random effects. (8)
  - (ii) In a survey of 12 owners of certain model of car, the following figures for average petrol consumption were reported. (8)  
19.6, 36.7, 39.4, 25.5, 31.2, 32.7, 21.6, 19.8, 18.9, 11.8, 22.5, 17.3

Calculate:-

- |                          |                   |
|--------------------------|-------------------|
| (i) Mean Value           | (ii) Median Value |
| (iii) Standard Deviation | (iv) Variance     |

12)

(a) (i) Explain the construction, principle and working of a linear voltage differential transformer (LVDT). (8)

(ii) Describe in detail about the Fibre optic sensors. (8)

(or)

(b) (i) Explain the construction of wire wound strain gauges and derive the expression for the gauge factor. (8)

(ii) Describe in detail about the piezo electric transducers. (8)

13)

(a) (i) The arms of an a.c. Maxwell's bridge are adjusted as: (8)

Arm AB: Nonreactive resistance of  $800\Omega$

Arm CD: Nonreactive resistance of  $350\Omega$

Arm AD: Nonreactive resistance of  $1000\Omega$  in parallel with capacitor of  $0.5\mu\text{F}$ .

If the bridge is balanced under this condition, find the components of the branch BC.

(ii) With a neat block diagram, explain the function of a wave analyzer. (8)

(or)

(b) Explain briefly with neat diagram, the working of the following:

(i) Spectrum Analyzer (8)

(ii) Pre-amplifier and Isolation amplifier (8)

14)

(a) Explain briefly with neat diagram, the working of the following instruments:

(i) Millimeters (8)

(ii) Frequency counter (8)

(or)

(b)

(i) Explain in detail about the working of IEEE 488 bus. (8)

(ii) Discuss in detail about the accuracy and resolution in DVM. (8)

15)

(a) Explain the operation of digital recorders and printers with basic block diagram. (16)

(or)

(b) Explain the concept of virtual instrumentation and mention its applications in various fields. (16)