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2005 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS
INDUSTRIAL INSTRUMENTATION
(ELECTRONICS & INSTRUMENTATION ENGINEERING)

NOVEMBER 2005

TIME – 3 HOUR
MARK – 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Explain in detail about recent gauging techniques.

(b) Describe a method to find out the planners of a surface plate. [11+5]

2. (a) An LVDT is used in an accelerometer to measure seismic mass displacement. The LVDT and signal conditioning outputs are 0.31mv/mm witha ± 20mm core displacement. The spring constant is 240N/m and the core mass is 0.05kg. Find

i. Relation between acceleration in m/s2 and the output voltage.
ii. Maximum acceleration measurable, and
iii. Natural frequency

(b) An accelerometer gives an output of 14mv per g where g = 9.81ms-2. Design signal conditioning that provides

i. A velocity signal scaled at 0.25v/ms-1 and
ii. Determine the gain of the system and feedback resistance ratio. [10+6]

3. Describe in detail about the principle of

(a) Eddy current or drag type tachometers
(b) Electric generator type tachometers [8+8]

4. (a) what are the two different types of Ring type Load cells? Compare them critically in all respects.

(b) The diameter of the steel cylinder of load cell is 30 mm. Four strain Ganges are bounded to it and arranged in a wheat stone bridge fashion. The gauge resistance Rg = 120ohms. Gauge Factor G.F=1.8 Determine the sensitivity of the load cell expressed in V/KN/V. Modulus of elasticity is 200x109N/m2. Poissons' ratio is 0.3.

[8+8]

5. Write notes on any TWO

(a) Frequency counters
(b) Vibration measurement
(c) Variable Reluctance Pickups [4+4+8]

6. Briefly explain Buoyancy method of density measurement and give its advantages, disadvantages and applications. [16]

7. What are the industrial needs which make viscosity determination desirable? Classify the viscosity measuring instruments according to their principle of operation. [16]

8. (a) Explain the importance of humidity measurement in industry.

(b) Name some processes which might require humidity control for efficiency operation. [12+4]