Code No: RR320204 **Set No. 1**

III B.Tech II Semester Supplimentary Examinations, Apr/May 2008
INSTRUMENTATION
(Electrical & Electronic Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. Draw the block diagram of the measuring system and explain the each stage with their functions. [16]
2. Explain the technique of frequency modulation and show that it is the most efficient technique of analog modulation. [16]
3. (a) Write short notes on screens used for cathode ray tubes.
   (b) What do you mean by graticules and explain them in detail?
   (c) Explain the function of a delay line in vertical deflection. [5+5+6]
4. Explain with a neat block diagram for time interval measurement and explain each block and its functionalities. [16]
5. (a) Explain the method of measurement of linear displacement using potentiometer.
   (b) A heliport is provided with 40 turns/mm. The gearing arrangement is such that the motion of the main shaft by one revolution causes 5 revolutions of the potentiometer shaft. Calculate the resolution of the Potentiometer? [8+8]
6. (a) Explain in detail the application of RVDT?
   (b) Discuss in detail the operation of a synchros? [8+8]
7. (a) Explain the construction of different types of strain gauges with neat sketches.
   (b) Explain in general how pressure is measured with electrical transducer as secondary transducers. [8+8]
8. (a) Discuss the merits demerits of constant temperature method over constant current method of measurement at flow using hot wire anemometer .
   (b) With a neat sketch explain the measurement by constant - temperature anemometer. [8+8]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: RR320204 **Set No. 2**

III B.Tech II Semester Supplimentary Examinations, Apr/May 2008
INSTRUMENTATION
(Electrical & Electronic Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. Draw the block diagram of the measuring system and explain the each stage with their functions. [16]
2. Derive the expression for a frequency-modulated signal and show how the number of sidebands increases with modulation index. [16]
3. (a) Why are the operating voltages of a cathode ray tube arranged so that the deflection plates are nearly ground potential?
   (b) What is the velocity of electrons that have been accelerated through a potential of 2000v? [8+8]
4. (a) Write short notes on:
      i. Resolution in digital meters
      ii. Sensitivity of digital meters
   (b) A 4 $\frac{1}{2}$ digit voltmeter is used for voltage measurements.
      i. Find its resolution
      ii. How would 12.98 volts be displayed on 10 volt range?
      iii. How would 0.6973 be displayed on 1 volt range?
      iv. How would 0.6973 be displayed on 10 volt range? [10+6]
5. (a) A resistive position transducer with a resistance of 5 kΩ and a shaft stroke of 8 cm is applied with a voltage of 5V.When the wiper is 3cm from the Reference, what is the value of the output voltage?
   (b) A resistance strain gauge with a gauge factor 2.04 is fastened to a beam which is subjected to a strain of 1×10^{-6}.If the original resistance of the gauge is 120 Ω calculate the change in resistance? [8+8]
6. (a) Explain in detail the application of RVDT?
   (b) Discuss in detail the operation of a synchros? [8+8]
7. (a) What is the gauge factor and derive the formula.
   (b) Explain how strain gauge is used for torque measurements. [8+8]
8. (a) Discuss the merits demerits of constant temperature method over constant current method of measurement at flow using hot wire anemometer .
   (b) With a neat sketch explain the measurement by constant - temperature anemometer. [8+8]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: RR320204 **Set No. 3**

III B.Tech II Semester Supplimentary Examinations, Apr/May 2008
INSTRUMENTATION
(Electrical & Electronic Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. Draw the block diagram of the measuring system and explain the each stage with their functions. [16]

2. (a) Define Laplace and Fourier transforms and indicate the conditions under which each is applicable.
   (b) Derive from fundamentals the expression representing a rectangular pulse train by Fourier series. [8+8]

3. What are the major components of a cathode ray tube? and explain the each component. [16]

4. (a) What would a true rms reading meter indicate if a pulse waveform of 5v peak and a 25% duty cycle were applied? What would the meter indicate if a 5v dc input were applied (assume the meter has dc capability).
   (b) To check the distributed capacitance of a coil, the coil is resonated at 10MHZ with 120PF and then is resonated at 15MHZ with 40PF. What is the inductance of the coil and what is the equivalent distributed capacitance [8+8]

5. (a) Discuss in detail about the principle of operation of a capacitive transducer?
   (b) What is the relation between sensitivity and area of plates? [8+8]

6. (a) Discuss in detail the operation of LVDT?
   (b) What are the advantages and disadvantages of LVDT? [8+8]

7. (a) Explain gauge sensitivity in case of a strain gauge. Derive an expression for the output voltage of a wheat stone bridge when one of the arms is a strain gauge.
   (b) A strain gauge bridge has one arm as strain gauge with a gauge factor of 2.2. the resistance value of strain gauge and other arms is 120Ω . Find the bridge output voltage (with output open circuited) for a supply voltage of 3V when the strain gauge is subjected to 600 micro strain. [8+8]

8. (a) Compare the advantages and disadvantages of dc tachometer generation and ac tachometer generator.
   (b) A variable reluctance type tachometer has 60 rotor teeth. The counter records 3600 counts per second. Determine the speed in rpm. [8+8]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: RR320204 **Set No. 4**

III B.Tech II Semester Supplimentary Examinations, Apr/May 2008
INSTRUMENTATION
(Electrical & Electronic Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) What is the difference between accuracy and precision.
   (b) Define: [6+10]
      i. Instrumental error
      ii. Limiting error
      iii. Calibration error
      iv. Probable error
      v. Random error.

2. What are the major blocks of the oscilloscope, and what does each do. [16]

3. (a) An electro statically deflected cathode ray tube has plane parallel deflecting plates which are 2.5cm long and 0.5cm apart, and the distance from their centre to the screen is 20cm. The electron beam is accelerated by a potential difference of 2500v and is projected centrally between the plates. Calculate the deflecting voltage required to cause the beam to strike a deflecting voltage and find the corresponding deflection of the screen.
   (b) What is the relationship between the period of a waveform and its frequency? How is an oscilloscope used to determine frequency? [8+8]

4. Explain in detail about vector impedance meter with a neat block diagram, and also explain how phase angle measurements can be done using this meter. [16]

5. (a) Explain the method of measurement of linear displacement using potentiometer.
   (b) A heliport is provided with 40 turns/mm. The gearing arrangement is such that the motion of the main shaft by one revolution causes 5 revolutions of the potentiometer shaft. Calculate the resolution of the Potentiometer? [8+8]

6. What is the frequency response of piezo electric transducer? [16]

7. (a) Explain the method of adjacent arm compensating gauge for temperature compensation in strain gauge with a neat circuit.
   (b) A single electrical resistance strain gauge of resistance 120Ω and having a gauge factor of 2 is bonded to steel having an elastic limit stress of $400MN/m^2$ and modulus of elasticity 200 GN/m^2. calculate the change in resistance due to a change of temperature of 20^0C co-efficient of linear expansion of steel is 12x$10^{-6/0}$C. [8+8]

8. (a) What is a torsion bar and how is it used for torque measurement.
   (b) Explain how torque can be measured using an inductive transducer. Give the sketch for arrangement of inductive transducers with respect to shaft. [8+8]

⋆ ⋆ ⋆ ⋆ ⋆