B 113, 114

NOV - 15

EE/INST/Sem-III (CBSGS)/Electrical Networks Analysis & Syntesis

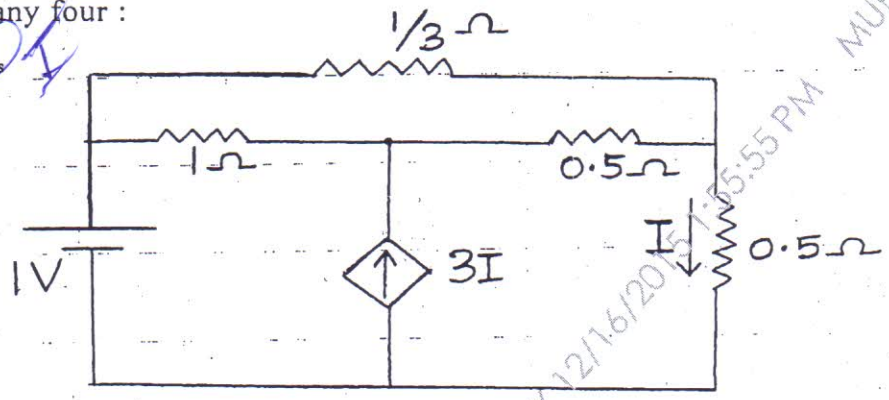
Q.P. Code : 5256

(3 Hours) **[Total Marks : 80**

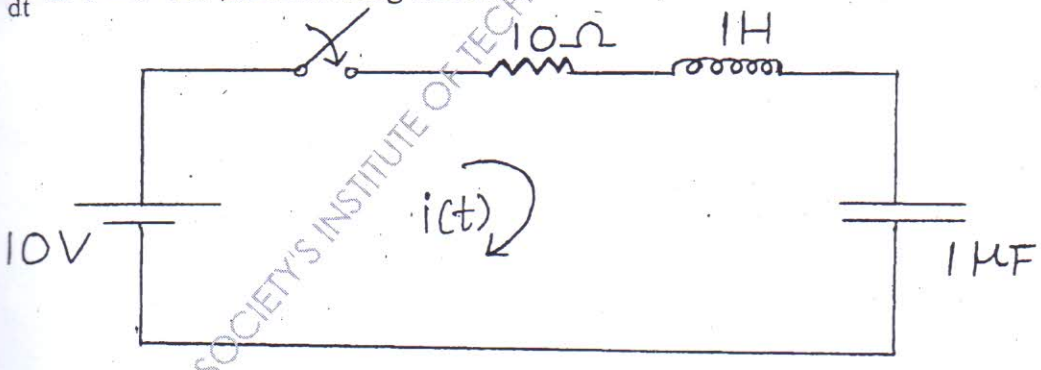
N.B. : (1) Question No.1 is compulsory.
(2) Answer any three out of remaining questions.
(3) Assumptions made should be clearly stated.

1. Attempt any four : 20

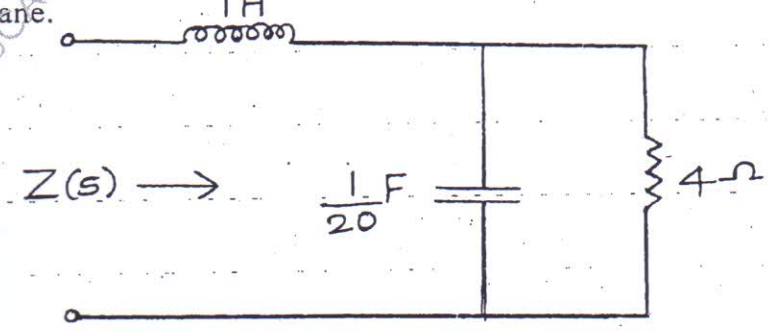
(a) Find V_x.



(b) Switch is closed at t = 0. Assuming all initial conditions as zero, find i and $\frac{di}{dt}$ at $t = 0^+$ for the following network.



(c) Determine Z(s) in the network. Find poles and zeros of Z(s) and plot them on s-plane.



TURN OVER

MD-Con. 11523-15.

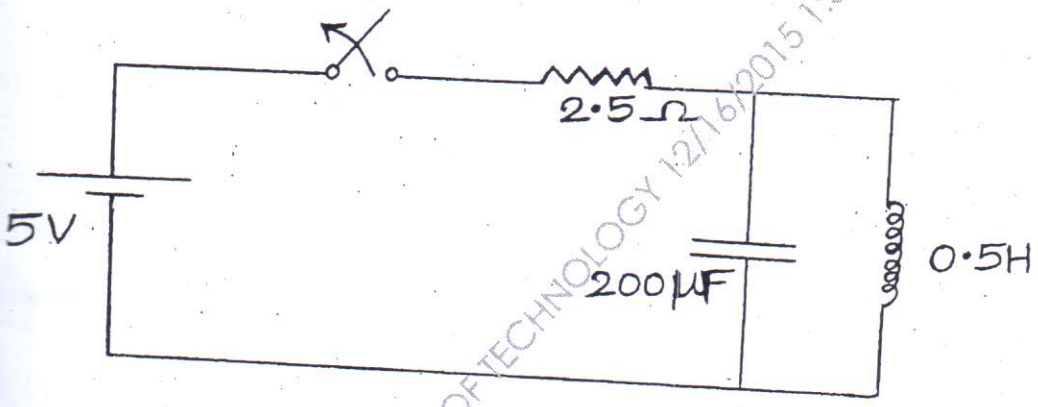
(d) Test whether the following polynomials are Hurwitz.

(i) $P(s) = s4 + s3 + 3s2 + 2x + 12$

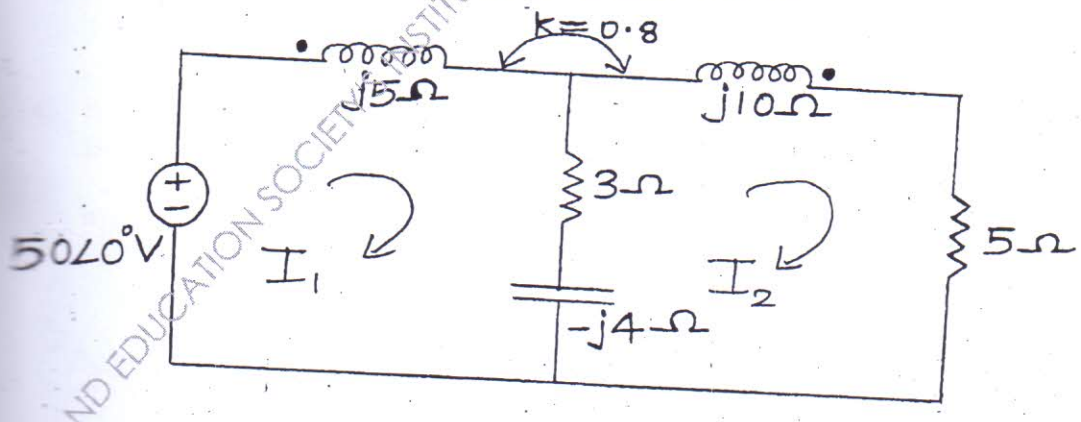
(ii) $P(s) = s4 + 7s3 + 6s2 + 21s + 8$

(e) Using the relation $Y = Z^{-1}$, show that $|z| = \frac{1}{2}\left(\frac{z_{22}}{y_{11}} + \frac{z_{11}}{y_{22}}\right)$

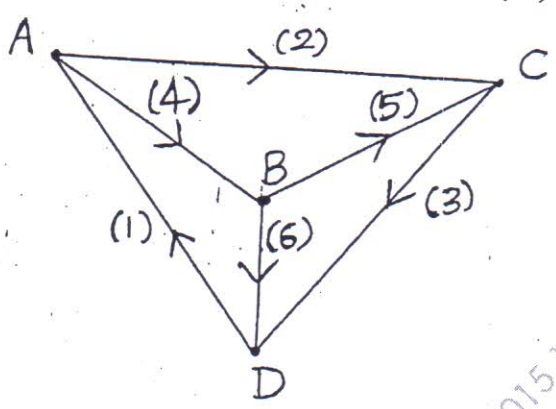
2. (a) For the network shown below, switch is opened at $t = 0$. If steady state is attained before switching, find the current through inductor.



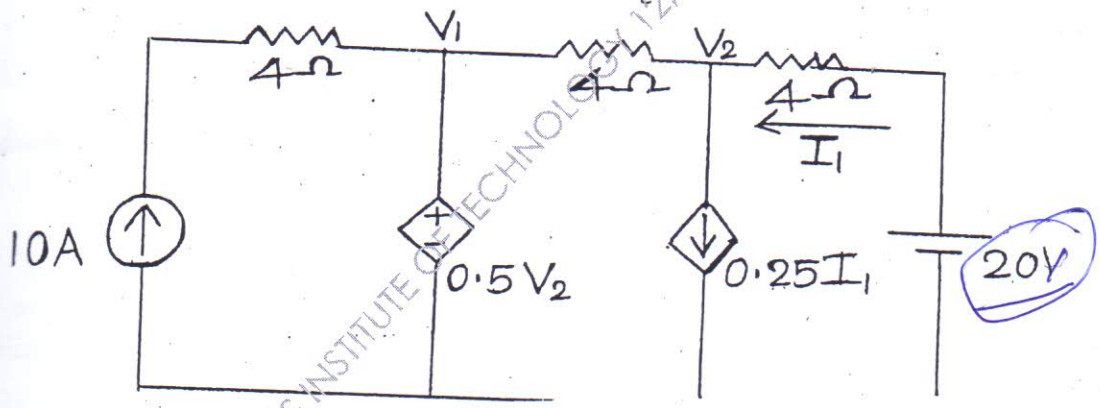
(b) Find voltage across 5Ω resistor using mesh analysis.



3. (a) For the following graph of the network, write.
(i) Incidence Matrix, (ii) Tieset Matrix and (iii) Cutset Matrix

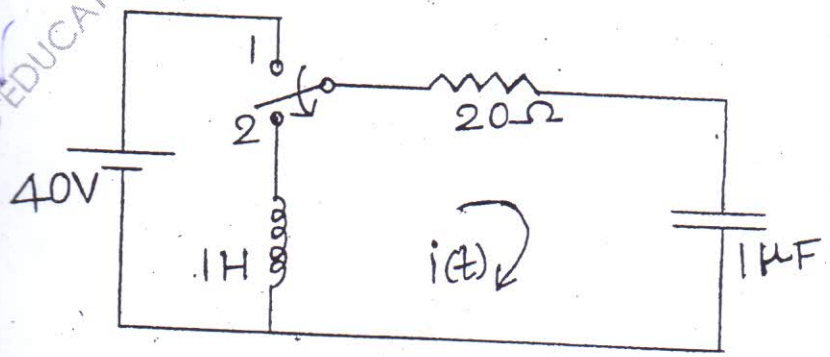


(b) Using Superposition Theorem, determine the voltages V_1 and V_2.

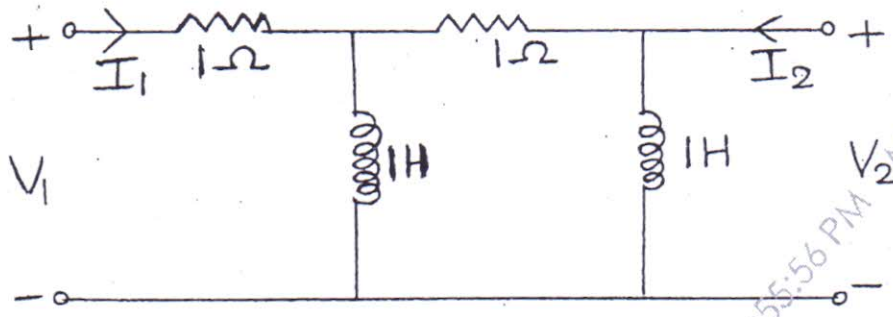


4. (a) In the following network, switch is changed from position 1 to 2 at t = 0. Before switching, steady state condition has been attained.

Find : i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$



(b) Find Z parameters for the network.



5. (a) Test whether the following functions are positive real.

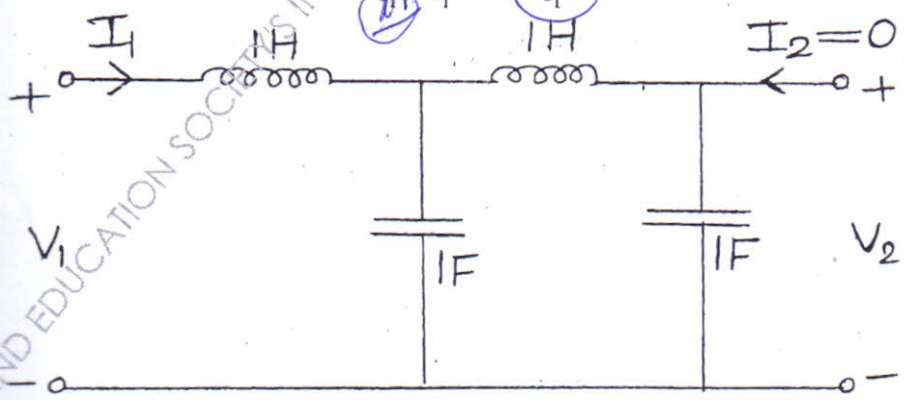
(i) $F(s)=\dfrac{s^2+6x+5}{x^2+9s+14}$

(ii) $F(s)=\dfrac{s^2+1}{s^3+4s}$

(b) Realize Foster I and Foster II forms of the following impedance function.

$$Z(s)\frac{\left(s^2+1\right)\left(s^2+3\right)}{s\left(s^2+2\right)}$$

6. (a) Find th enetwork functions $\frac{V_1}{I_1}, \frac{V_2}{V_1}$ and $\frac{V_1}{I_1}$



(b) Find Cauer I and Cauer II forms of RL impedance function.

$$Z(s)=\frac{2(s+1)(s+3)}{(s+2)(s+6)}$$

S.E./Sem-III/Rev. 2012/CBSGS/INST./Nov. 2015/Analog Electronics.

QP Code : 5214

(3 Hours) **[Total Marks : 80**

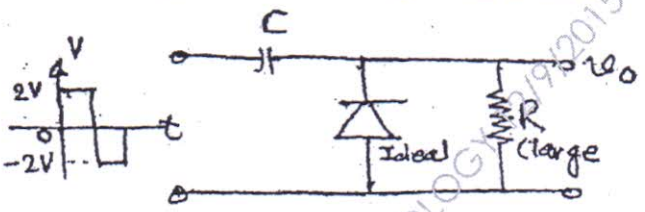
N. B. : (1) Question **1** is **compulsory**.
(2) Attempt any **four** from remaining **five** questions.
(3) **All** questions carry **equal** marks.
(4) Assume suitable data wherever necessary.

1. Attempt any **five** :– **20**

(a) Calculate the CMRR (in dB) for the circuit measurements of V_D = 1 mV, $V_{O\text{-}D}$ = 120 mV, and V_{CM} = 1 mV, $V_{O\text{-}CM}$ = 20 μV.

(b) For an op-amp having a slew rate of SR = 2.4 V/μs, what is the time taken for output to change from -15 V to +15 V.

(c) Determine V_O for the following clamper circuit.

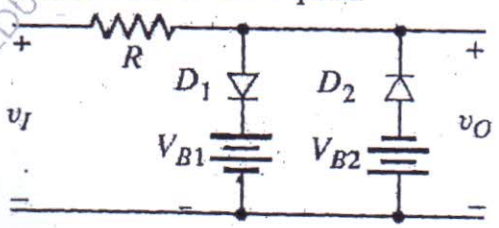


(d) Given I_{DSS} = 16 mA and V_P = -5 V, sketch the transfer characteristics using the data points. Determine the value of I_D at V_{GS} = -3 V from the curve, and compare it to the value determined using Shockley's equation.

(e) Crossover distortion behavior is characteristic of Class A Power amplifier. State true or false with reason.

(f) Compare class A, class B and class C power amplifier based on,
(a) Output waveform for collector current
(b) Linearity
(c) Distortion
(d) Efficiency

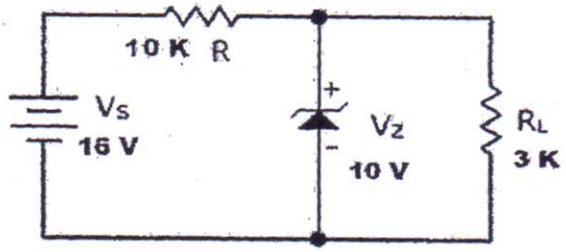
2. (a) Determine output voltage. Assume, V_{B1} = 8 V, V_{B2} = 6 V and input to be sine wave of 20 V peak. **8**



[TURN OVER

MD-Con. 10470-15.

(b) For the Zener diode network, determine V_L, V_R, I_Z and P_Z. Consider supply voltage of 16 v, zener voltage of 10 V, series resistor of 10 K and load resistance of 3 K. 8



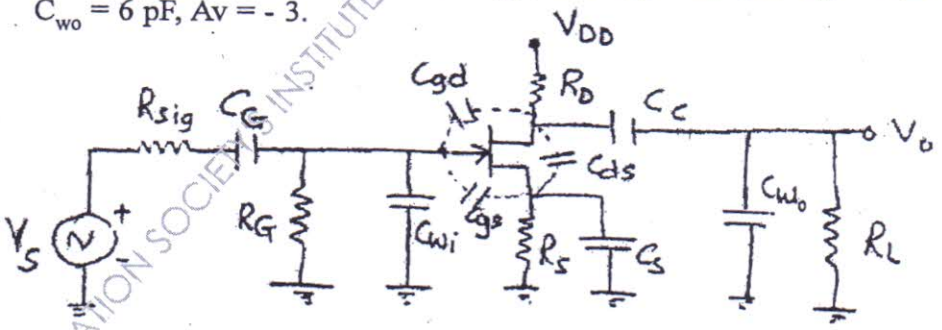
(c) Explain working of bridge rectifier. 4

3. (a) Determine the levels of I_{CQ} and V_{CEQ} for the CE BJT amplifier with voltage-divider configuration. Consider R_1 = 82 K, R_2 = 22 K, R_C = 5.6 K, R_E = 1.2 K, V_{CC} = 18 v and β = 50. 8

(b) Explain constructing and working of D-MOSFET. 8

(c) What is harmonic distortion? Write the equation for total harmonic distortion. 4

4. (a) Determine the higher cut off frequencies for the given circuit diagram. Given: C_G = 0.01 µF, C_C = 0.5 µF, C_S = 2 µF, R_{SIG} = 10 k, R_G = 1 M, R_D 4.7 k, R_S = 1 k, R_L = 2.2 k, I_{DSS}= 8 mA, V_P = - 4 V, rd = ∞, V_{DD} = 20 V, C_{gd} = 2 pF, C_{gs} 4 pF, C_{ds} = 0.5 pF, C_{wi} = 5 pF, C_{wo} = 6 pF, Av = - 3. 10



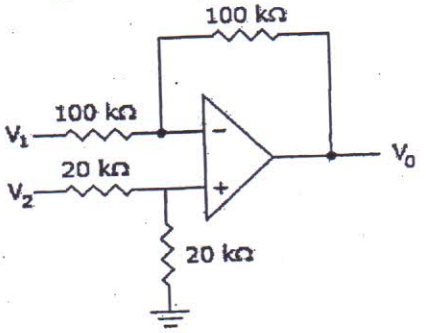
(b) Derive equation for three Op Amp Instrumentation amplifier. Give advantages and applications of Instrumentation amplifier. 10

5. (a) Draw and explain a series voltage regulator. 10

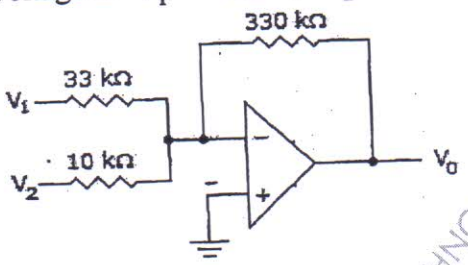
(b) Explain integrator using Op Amp. Draw its frequency response. State disadvantages of basic integrator and how it is overcome in practical integrator circuit. 10

[TURN OVER

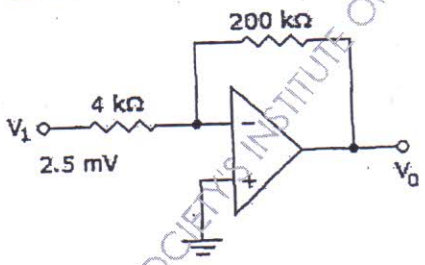
6. (a) Derive the expression for output voltage and hence determine the output voltage when $V_1 = -V_2 = 1$ V. 5



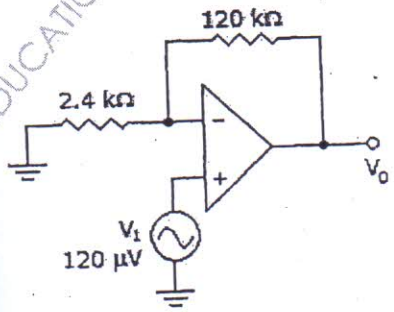
(b) Derive the expression for output voltage and hence calculate the output voltage if $V_1 = -0.2$ V, $V_2 = 0.1$ V. 5



(c) Derive the expression for output voltage and draw the output voltage for this circuit with a sinusoidal input of 2.5 mV. 5



(d) Derive the expression for output voltage and draw the output voltage for this circuit with a sinusoidal input of 120 μV. 5



SE - Sem-III - INST-(CBSGS) - Digital Electronics

Nov-15.

Q.P. Code : **5070**

(3 Hours) [Total Marks : 80

N.B. : (1) Question **No.1** is **compulsory**.
(2) **Attempt** any **three** questions from the remaining.
(3) **Assume** suitable **data** if **necessary**.

1. Answer the following (Any **Four**) : 20
   (a) Convert : (i) $(77)_8 \rightarrow (?)_{10}$
   (ii) $(1110101100000111)_2 \rightarrow (?)_{16}$
   (b) Explain the working of SR Flip-flop. What is meant by edge triggering?
   (c) Design half adder using logic gates.
   (d) Explain the function of CMOS Inverter.
   (e) Determine the value of x, $(193)_x = (623)_8$.

2. (a) Perform the following : 10
   (i) 96 - 78 using 2's complement.
   (ii) Add BCD 87 + 96.
   (iii) Subtract BCD 13 - 06.
   (iv) $(1101)_{\text{Binary}} \rightarrow (?)_{\text{gray}}$
   (v) $(89A)_{16} = (?)_2$
   (b) Design 4 - bit binary to gray code converter. 10

3. (a) Simplify using boolean laws and Implement using logic gates. 10
   (i) $f = \bar{A}\bar{B}C + \bar{A}\bar{B}D + BD + BC$
   (ii) $f = AB + \bar{A}C + BC$
   (b) Simplify following using k-map and implement using logic gates. 10
   $f = \sum(2,5,7,15) + d(6,9,13)$

4. (a) Design an adder to add **two** BCD numbers using four bit binary IC 7483 chips and necessary gates. 10
   (b) Convert D filpflop to T filpflop. 5
   (c) Draw and explain the function of Ring counter. 5

TURN OVER

5. (a) Design MOD - 12 asynchronous ripple counter. **10**

   (b) Explain the operation of 4-bit bidirectional shift register with neat diagram. **10**

6. Write short note on (Any **Four**) : **20**

   (a) De Morgan's Theorem

   (b) FPGA

   (c) DEMUX

   (d) ASCII Codes

   (e) ALU

   (f) PAL and PLA.

INST/Sem-III(CBSGS)/Transducers-I

Q.P. Code : 5165

(3 Hours) [Total Marks :80

N.B. : (1) Question **No.1** is **compulsory.**
(2) Attempt any **three** from the remaining questions.
(3) Assume suitable data wherever required and state the assumptions.

1. Answer in brief (any **Four**) 20
   (a) Define transducer and state their classification.
   (b) Explain working of Bimetallic thermometer.
   (c) Define metrology and write its significance.
   (d) Distinguish between direct and indirect methods of level measurement with example of each of these methods.
   (e) Justify- L VDT can be used as primary as well as secondary transducer.

2. (a) Explain the law of intermediate temperatures and law of intermediate metals in case of thermocouple and give its significance. 10
   b) Draw and explain any one method of humidity measurement. 10

3. a) Potentiometer having resistance of 2500Ω is rated as 2W power. Find maximum allowable excitation voltage? Calculate resolution and sensitivity if the length of potentiometer is 0.1m and number of turns are 150. Calculate% loading error of 0.67 at the travel, if meter is connected across the potentiometer. 10
   (b) State different types of encoders. Explain with a neat sketch any one of them. 10

4. (a) Explain working principle of capacitive transducer. Draw and explain different methods to vary capacitance. 10
   (b) Explain linear and rotary displacement measurement techniques. 10

5. (a) A thermistor has a resistance of 3980 Ω at the ice point (0°C) and 794 Ω at 50°C. The resistance-temperature relationship is given by $R_T = a R_0 \exp(b/T)$. 10
      (i) calculate the constants a and b
      (ii) Calculate the range of resistance to be measured in case the temperature varies from 40°C and 100°C.
   (b) Explain different types of errors in measurements with their remedies. 10

6. Write short notes: (Any **Two**) 20
   (1) Lead wire compensation in RTD.
   (2) Sound pressure Level (SPL) meter
   (3) Strain gauge

MD-Con. 9618-15.