B.E. (Met) 3rd Semester Final Examination, 2012

Subject: Instrumentation and Control (MT 306)

Full Marks: 35 Time 2hrs

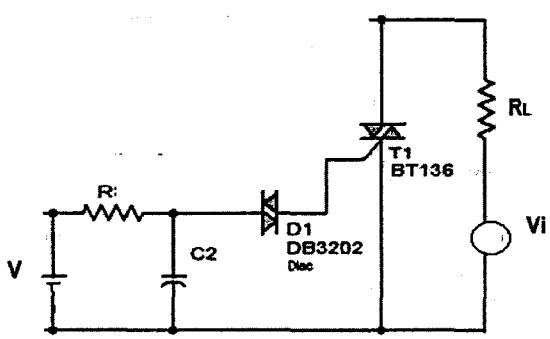
Answer question 1 and any 3 questions

1. (a) Draw sketch of Scanning Electron Microscope , showing following parts:
   i) Electron Gun ii) Condenser Lens iii) Scanning Coil iv) Objective Lens v) CRT monitor vi) Detector.
   (b) Write functions of each part
   (c) How magnification is achieved in SEM?
   (d) Write the names of the different Vacuum Pumps in Electron Microscopes
   4+3+2+2= 11

2. Write the following questions
   (i) How can you define a process?
   (ii) Define process control loop.
   (iii) What do you understand by manual and automatic control?
   (iv) Define PID controller and explain with suitable block diagram 8

3. (a) Explain the Volt-ampere characteristics of a SCR , showing different gate currents , Holding current, Latching current
   (b) Explain how a.c. power is controlled by triac 8

4. (a) A 60Hz source (Vi) is connected to the anode of an SCR as shown in Fig. Value of C2 capacitor is 0.1 μF., V=60V ; Break over voltage (VB)of the SCR is 32 V is the required voltage to trigger the switching device for which Holding voltage (VH) is 10V and Holding current (IH) is 100μA . Find R for a conduction angle of 45°. 5



   (b) If Vi is 230V a.c. and load RL is 200Ω, find power delivered to the load. 3

5. Describe different tasks necessary for process control to occur. Define the terms: (a) Process variable (b) Set point (c) Manipulated variable (d) Measured variable (e) Error. List at least six process variables that are commonly controlled in process measurement industries 8

6. Write short notes on:
   i. LVDT
   ii. Thermistor
   iii. Thermocouple 8