

**Duration: 3hrs**

**[Max Marks:80]**

- N.B. : (1) Question No 1 is Compulsory.  
(2) Attempt any three questions out of the remaining five.  
(3) All questions carry equal marks.  
(4) Assume suitable data, if required and state it clearly.

- 1 Attempt any FOUR [20]
  - a Draw and explain VI characteristics of SCR.
  - b Explain the UJT as a relaxation oscillator.
  - c Compare power BJT, Power MOSFET and IGBT.
  - d What is similarities and differences of Microcontroller and Microprocessor.
  - e State and prove Demorgan's Theorems.
- 2 a Explain CMOS NAND gate and compare performance of TTL and CMOS logic families [10]  
b Draw and explain torque speed characteristics of DC series and DC shunt motor. Also state applications of each. [10]
- 3 a With neat circuit diagram and waveforms, explain 180° mode of conduction for 3 phase bridge inverter. [10]  
b With help of circuit diagram explain how Diac can be used to trigger a Triac. What are the applications of this circuit. [10]
- 4 a Draw and explain function block diagram of MSP430 microcontroller. [10]  
b Write short note on : Speed control of 3 phase induction motor. [10]
- 5 a Explain in detail first order low pass filter using OPAMP 741. [10]  
b Draw and explain slip-speed characteristics of 3 phase AC motor. Also explain selection of motors for various industrial applications [10]
- 6 a What is an instrumentation amplifier. Explain with neat circuit diagram and enlist its applications. [10]  
b Explain the operation of IC 555 as an Astable Multivibrator [10]

.....