QP Code : **3513**

(3 Hours) [Total Marks : 80]

N.B. (1) Question no. **1** is **compulsory**.
(2) Answer any **three** out of remaining questions.
(3) Each question carry **20** marks.

1. Solve any **four** of the following :-   20
   (a) Discuss the advantage of solid state relays over electromagnetic relays.
   (b) Write the working principle of DC generator and derive emf equation for the same.
   (c) Explain the block diagram of programmable logic controller.
   (d) Explain the Torque-speed characteristics 3 phase Induction motor.

2. (a) Explain the working of multiplexer. Also implement the function   10
   $Y = A\overline{B} + BC$ using suitable multiplexer IC.
   (b) Explain the SCR controlled resistance welding with suitable diagrams.   10

3. (a) Explain the Integrator and differentiator circuit using OP-amp with waveforms.   10
   (b) Draw and explain the working of any one   10
       (i) Counter IC
       (ii) Shift register

4. (a) A 250 V shunt motor with armature resistance of $0.5\,\Omega$ runs at 600 r.p.m. on full   10
       load takes an armature current of 20 A. If resistance of $1\,\Omega$ is placed in the
       armature circuit, find the speed at (i) full load torque (ii) half full load torque.
   (b) Explain the working principle of AC commutator motor.   10

5. (a) Explain application of SCR for speed control of DC Motor.
   (b) A 20 kVA, 2200/220 V, 50 Hz transformer gave following test results :   10
       O.C. Test : 220 V, 4.2 A, 148 W (LV side)   10
       S.C. Test : 86 V, 10.5 A, 36 W (HV side)
       Determine the regulation at 0.8 pf lagging and at full load.

6. Write short notes on the following (any **three**) :-
   (a) Speed control of dc motor.   20
   (b) Timer and its industrial applications.
   (c) Overload protection circuits.
   (d) Circuit Breaker.

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