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SARDAR PATEL UNIVERSITY
M.Sc. (Electronics) II Semester Examination
Saturday , 1st December, 2012 Time 10:30 am to 1:30 pm
PS02EELE01 – Industrial Electronics
Total Marks – 70

1. Figure to the right indicate maximum marks for the question

Q-1 Multiple Choice Question (One Mark for Each) [8]

1. The threshold voltage of an N-channel MOSFET can be increased by

   a. Increasing the channel dopant concentration.

   b. Decreasing the channel dopant concentration.

   c. Reducing the gate oxide thickness.

   d. Reducing the channel length.

2. The output voltage of a buck-boost converter is

   a. Less than the input voltage.

   b. More than input voltage.

   c. Equal to the input voltage

   d. May be less or more than the input voltage.

3. In stepper motor, the speed of rotation determined by

   a. The load applied to the motor.

   b. The magnitude of the voltage applied.

   c. The frequency of the waveforms used.

   d. None of the above.

4. The efficiency of VR stepper motor is

   a. 95%

   b. 90%

   c. 75 to 85%

   d. 60 to 75 %

5. Which of the following motor is preferred for blowers?

   a. Wound rotor induction motor.

   b. Squirrel cage induction motor.

   c. Dc. Shunt motor.

   d. Dc.Series motor.

6. The typical value of switching frequency in SMPs is

   a. 50 Hz.

   b. 50 KHz.

   c. 50 MHz.

   d. 50GHz.

7. The function of snubber circuit connected across an SCR is to

   a. Suppress dv/dt.

   b. Increase dv/dt.

   c. Decrease dv/dt.

   d. Keep transient voltage at constant value.

8. The frequency of dielectric heating is of the order of

   a. 50 Hz.

   b. 10 KHz.

   c. 100 KHz.

   d. 30 MHz.

Q-2 Answer **any seven**, in short.(Two marks each) 7X2=14 [14]

1. Power BJT is a current controlled device. Why?

2. What are the different types of Power MOSFET? Enlist the application of MOSFET.

3. Define latching current and Holding current in thyristor.

4. What is a snubber circuit? Enlist advantages of snubber circuit.

5. What is the function of freewheeling diodes in controlled rectifier?

6. What is meant by inverter? Enlist the applications of an inverter.

7. What is meant by step-up and step-down cyclo-converters?

8. Distinguish between Switch mode power supply and Linear power supply. Enlist the application of SMPs.

9. State the various methods of Damping of stepper motor.

Q-3 [a] Describe the construction and explain the principle operation of the Power diode. Distinguish between power diode and general purpose diode. [6]

[b] Describe the construction of power MOSFET and explain the principle operation of power MOSFET. [6]

OR

[b] Draw the basic structure of an MCT. Using an equivalent circuit explain the Turn-ON and Turn-OFF process. Enlist the merits of an MCT. [6]

Q–4[a] List the advantages and disadvantages of switch mode power supply. Explain the working principle operation of Buck-Boost converter. [6]

[b] What is Cycloconverter? Draw the circuit diagram of six SCR Cycloconverter and explain how it can be used to control the speed of an AC motor. [6]

OR

[b] Draw the circuit of phase control of SCRs in a three-phase bridge and explain how it works. [6]

Q–5[a] Briefly describe the working of variable reluctance stepper motor and explain the control circuit for VR stepper motor. [6]

[b] What is Servomechanism? Mention the advantages of servo control system over conventional control system. Explain Velocity servo control system. [6]

OR

[b] Draw the physical layout system for maintaining Textile humidity and explain how control circuit controls the relative humidity. [6]

Q–6[a] Construct the ladder diagram that will provide a solution to the discrete control system. The objective is to heat a liquid to a specified temperature and keep it that for thirty minutes. The required sequence of events as under. [6]

1. Fill the Tank.

2. Heat and stir the liquid to the temperature set points and hold it for thirty minutes.

3. Empty the tank.

4. Repeat from step 1.

Explain each rung in detail.

[b]   What is PLC? Using the block diagram of PLC explain briefly the duties of   **[6]**
processor.

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OR

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[b]   Explain the basic principle of operation of dielectric heating and mention   **[6]**
some of its application.

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