

[A-94]

**SARDAR PATEL UNIVERSITY**  
**T.Y.B.Sc. Examination, SIXTH Semester**  
**Wednesday, 6<sup>th</sup> April 2016**  
**Time : 02.30 pm To 05.30 pm**  
**Instrumentation Course Code : USO6CINS05**  
**Course Title : Industrial Electronics - II**

Total Marks : 70

**Q-1 Write answers to the following multiple choice questions in your [10] answer book by selecting the proper option.**

- (1) A synchronous motor running with normal excitation adjusts to load increase essentially by increase in its  
 (a) power factor (b) torque angle (c) back emf (d) armature current
- (2) In a synchronous motor, the magnitude of stator back emf  $E_b$  depends on \_\_\_\_ of the motor.  
 (a) speed (b) load (c) rotor flux (d) d.c. excitation
- (3) In synchronous motor, the rotor  $Cu$  losses are met by  
 (a) motor input (b) armature input (c) supply lines (d) d.c. source
- (4) What is the step angle of a permanent magnet stepper motor having 8 stator poles and 4 rotor poles?  
 (a)  $60^\circ$  (b)  $45^\circ$  (c)  $30^\circ$  (d)  $15^\circ$
- (5) The rotational speed of a given stepper motor is determined solely by the  
 (a) shaft load (b) step pulse frequency  
 (c) polarity of stator current (d) magnitude of stator current
- (6) The property of an SCR to go from OFF state to ON state is called  
 (a) toggling (b) converting (c) switching (d) rearing
- (7) In case of triggering of SCR by a pulsed gate signal,  $t_{gt} =$  \_\_\_\_.  
 (a)  $t_d + t_r$  (b)  $t_d - t_r$  (c)  $t_d \cdot t_r$  (d)  $t_d / t_r$
- (8) A thyristor is generally a \_\_\_\_ layer device.  
 (a) one (b) two (c) three (d) four
- (9) The delay angle  $\alpha^\circ =$  \_\_\_\_  $\times 180^\circ$ .  
 (a)  $v_{control} / V_{st}$  (b)  $V_{st} / v_{control}$  (c)  $V_{st} - v_{control}$  (d)  $v_{control} - V_{st}$
- (10) In the line frequency phase controlled converters, the conversion from ac to controlled dc is achieved by means of  
 (a) alternators (b) thyristors (c) resistors (d) capacitors

**Q-2 Answer the following questions in brief. (Answer any Ten Questions) [20]**

- (1) Explain how synchronous motor can be used for power factor correction.
- (2) Explain how synchronous motor can be used for voltage regulation.
- (3) Enlist any four applications of Synchronous motor.
- (4) Explain in brief about permanent magnet stepper motor.
- (5) Define step angle and resolution.
- (6) Enlist applications of stepper motor.
- (7) Plot the characteristic curves of SCR.
- (8) Explain forward blocking mode of SCR.

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- (9) Enlist any four applications of SCR.
- (10) Draw the circuit diagram of a single-phase practical thyristor converter.
- (11) Draw the block diagram of a line-frequency controlled converter.
- (12) Write a short note on dc-side voltage of a three phase idealized converter.

- Q-3** (a) Describe the construction and working mechanisms of Hybrid stepper motor in detail. [5]
- (b) Describe the constructional features and working mechanism of Permanent Magnet stepper motor in detail. [5]

**OR**

- Q-3** Why a variable reluctance stepper motor is called so? Explain the construction and working methods of variable reluctance stepper motor in detail. [10]

- Q-4** (a) Describe the principle of operation and methods of starting of synchronous motor. [5]
- (b) Discuss the power flow in a synchronous motor with the help of block diagram. [5]

**OR**

- Q-4** (a) Enumerate the characteristic features of synchronous motor. [5]
- (b) Explain the working of synchronous motor on load with constant excitation. [5]

- Q-5** (a) Explain the construction and working of SCR in detail. [5]
- (b) Write a short note on phase control using a triac. [5]

**OR**

- Q-5** (a) Discuss the construction and working of a UJT in detail. [5]
- (b) Write a note on UJT as a relaxation oscillator. [5]

- Q-6** (a) With the help of necessary diagrams explain the working of the idealized three-phase converter circuit in detail. [5]
- (b) Give a detailed account of the idealized single phase converter circuits using the necessary figures and equations. [5]

**OR**

- Q-6** (a) Write a note on thyristor gate triggering. [5]
- (b) Write a note on line-frequency controlled converter. [5]

