

SEAT No. _____

No. of Printed Pg.: 2

[47]

SC

SARDAR PATEL UNIVERSITY
T.Y.B.Sc. Examination, SIXTH Semester
Wednesday, 4th April 2018
Time : 10.00 am To 01.00 pm
Instrumentation Course Code : US06CINS05
Course Title : Industrial Electronics - II

Total Marks : 70

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

- (1) If the field of a synchronous motor is under-excited, the power factor will be
(a) lagging (b) leading (c) unity (d) more than unity
- (2) What is the step angle of a permanent magnet stepper motor having 8 stator poles and 4 rotor poles?
(a) 60° (b) 45° (c) 30° (d) 15°
- (3) The electric motor in which both the rotor and stator fields rotate with the same speed is called _____ motor.
(a) dc (b) charge (c) synchronous (d) universal
- (4) Operation of stepper motors at high speeds is referred to as _____.
(a) fast forward (b) slewing (c) inching (d) jogging
- (5) The shaft speed of a stepper motor is given by ____ rps.
(a) $\beta \cdot f / 360$ (b) $(\beta + f) / 360$ (c) $(\beta - f) / 360$ (d) $\beta - (f / 360)$
- (6) 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
- (7) 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
- (8) A thyristor is generally a ____ layer device.
(a) one (b) two (c) three (d) four
- (9) The mesa construction of SCR is generally useful in ____ power applications.
(a) high (b) low (c) zero (d) medium
- (10) In converters used in high voltage dc power transmission, it is necessary to be able to control the power flow in ____ directions between ac and dc sides.
(a) both (b) positive (c) negative (d) clockwise

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

- (1) State the applications of synchronous motors.
- (2) Write a short note on dc-side voltage of a single phase idealized converter.
- (3) Explain when a synchronous motor will fail to pull into step?
- (4) Enlist the type of stepper motors.
- (5) State any four disadvantages of PMDC motors.
- (6) Define : (1)step angle & (2)resolution
- (7) Write any four applications of SCR.
- (8) Explain forward blocking mode of SCR.
- (9) Draw the circuit diagram of a three phase practical thyristor converter.
- (10) Write a short note on permanent magnet stepper motor.
- (11) Plot only, the characteristic curves of SCR.
- (12) Enlist the applications of stepper motors.

(PTO)

- Q-3 (a) Describe the principle of operation and methods of starting of synchronous motor. [5]
(b) Write a short note on equivalent circuit of a synchronous motor. [5]

OR

- Q-3 (a) Discuss the power flow in a synchronous motor with the help of block diagram. [5]
(b) Give a detailed comparison between synchronous and induction motors. [5]

- Q-4 (a) Write notes on performance and speed control of PMDC motors. [5]
(b) What is step angle? Giving a brief introduction, derive the equation for step angle, resolution and the stepping frequency of stepper motor. [5]

OR

- Q-4 Describe the constructional features and working mechanism of Hybrid stepper motor in detail. Also give its merits and demerits. [10]

- Q-5 (a) Explain how a TRIAC can be used in phase control. [5]
(b) Write a note on UJT as a relaxation oscillator. [5]

OR

- Q-5 (a) Discuss the construction and working of a UJT in detail. [5]
(b) Discuss the various turn ON methods for SCR. [5]

- Q-6 (a) With the help of necessary equations and figures explain the basic thyristor circuit. [5]
(b) With the help of necessary diagram explain how rectification and inversion is produced by a Line-frequency controlled converter. [5]

OR

- Q-6 (a) With the help of necessary diagrams explain the working of the idealized single-phase converter circuit in detail. [5]
(b) Write a note on thyristor gate triggering. [5]

• • • • •