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SEAT No. _____

SARDAR PATEL UNIVERSITY

T.Y.B.Sc. Examination, SIXTH Semester

Wednesday, 3rd April 2019

Time : 10.00 am To 1.00 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 by [10] selecting the proper option.

- (1) An electric motor in which both the stator and rotor fields rotate with the same speed is called ____ motor.
(a) dc (b) charge (c) synchronous (d) universal
- (2) The angle between the synchronously rotating stator flux and the rotor poles of a synchronous motor is called ____ angle.
(a) synchronizing (b) torque (c) power factor (d) slip
- (3) 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
- (4) 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
- (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) 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) UJT can be used in ____ oscillator.
(a) Hartley (b) relaxation (c) Colpitt (d) Wein bridge
- (9) The use of thyristors in three phase high power converters has become possible due to their abilities of switching at ____ voltage and currents.
(a) high (b) low (c) zero (d) ground
- (10) In the gate triggering of a thyristor, ____ wave is synchronized with sine wave.
(a) saw-tooth (b) sine (c) cosine (d) binary

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

[20]

- (1) Enlist some specific applications of synchronous motors.
- (2) Under which conditions a synchronous motor will fail to pull into step?
- (3) What could be the reasons if a synchronous motor fails to start?
- (4) Give a brief introduction of stepper motors.
- (5) Enlist any four advantages of PMDC motors.
- (6) Enlist the type of stepper motors.
- (7) Plot the characteristic curves of SCR.

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

- Q-3 (a) Explain the working of synchronous motor on load with constant excitation. [5]
(b) Derive the formula for the gross mechanical power developed by 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 With the help of necessary figures and diagrams discuss the construction and different working methods of Variable reluctance stepper motors. [10]

OR

- Q-4 (a) Explain different types of stepper motors in brief and enlist its applications. [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]

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

OR

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

- Q-6 (a) With the help of necessary diagrams explain the working of the idealized three-phase converter circuit in detail. [5]
(b) Write a note on line-frequency controlled converter. [5]

OR

- Q-6 (a) Give a detailed account of the idealized single phase converter circuits using the necessary figures and equations. [5]
(b) With the help of necessary equations and figures explain the basic thyristor circuit. [5]

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