

Enrollment No: _____

Exam Seat No: _____

C.U.SHAH UNIVERSITY

Winter Examination-2018

Subject Name: Advanced Power System

Subject Code: 4TE07APS1

Branch: B.Tech (Electrical)

Semester: 7

Date: 06/12/2018

Time : 10:30 To 01:30

Marks : 70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
 - (2) Instructions written on main answer book are strictly to be obeyed.
 - (3) Draw neat diagrams and figures (if necessary) at right places.
 - (4) Assume suitable data if needed.
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Q-1 Attempt the following questions: (14)

- a) _____ (SCR/Diode/Transistor) requires gate circuit for turning on.
- b) Typical Rating of the power diode is _____(6000 V, 4500 A / 5 V , 10 mA)
- c) The shunt power compensation technique control changes _____(Reactance/Voltage/Torque Angle) of the system to increase the power transmission capability.
- d) The forward voltage drop of power diode is of the order of _____ volt.(1V, 1000 V, 100 V)
- e) _____(Self/Force) Commutated thyristors are turned off naturally.
- f) The harmonics _____(increase/decrease) the temperature of an equipment.
- g) The automatic power factor correction bank uses the _____(Capacitors/Inductors) for reactive power compensation .
- h) The FACTS Controller basically governs the operation of a transmission line at _____. (Any frequency, rated frequency, frequency below rated frequency, frequency above rated frequency).
- i) MOSFET is _____(Voltage/ Current) Control Device.
- j) "*knee*" at *a ms*, *b %* , Explain the meaning of *a* and *b* in the given expression.
- k) Draw the circuit arrangement, Gate Pulse and Output waveform for the GTO.
- l) Smart Grid Technology improves the power distribution capability and increase the reliability of the system. (This statement is True/False)
- m) Using the shunt compensation technique power can be ideally injected at _____ point on the transmission line. (Mid , Start, End, Any)
- n) STATCOM use the _____for regulation of reactive power. (VSI, CSI,VLSI)

Attempt any four questions from Q-2 to Q-8

Q-2 Attempt all questions (14)

- (a) Draw the characteristics of the following power electronics devices : (7)



(1) IGCT (2) GTO (3) IGBT (4) RCT

- (b) A Capacitor is subject to variation of voltage as a function of time . Prove that the relation between initial voltage across capacitor and voltage at any instant of time is given by (7)

$$V(t) = V_0 \sqrt{1 - 4\epsilon \frac{t}{T}}$$

- Q-3 Attempt all questions (14)**
- (a) Explain the principle of Shunt Compensation for FACTS Controller. (7)
- (b) Draw the nature of wave shapes for the following type of voltage signals : (i) Normal(ii) Outage (iii) Surge (iv) Under voltage (v) Harmonics (vi) Voltage sag (vii) Overvoltage (7)
- Q-4 Attempt all questions (14)**
- (a) Briefly explain STATCOM with appropriate block diagram. (7)
- (b) State the adverse effect of harmonics. Also state the causes of harmonics. (7)
- Q-5 Attempt all questions (14)**
- (a) Briefly explain CBEMA curve and its importance in power quality. (7)
- (b) Briefly explain Attributes of Smart Grid. (7)
- Q-6 Attempt all questions (14)**
- (a) Briefly explain operation of TCR for shunt compensation Technique. (7)
- (b) Briefly explain the various methods for solving power quality problems. (7)
- Q-7 Attempt all questions (14)**
- (a) State any seven applications of power electronics. (7)
- (b) Briefly explain the functional block diagram of smart meter. (7)
- Q-8 Attempt all questions (14)**
- (a) Briefly describe about SCR,IGBT, MOSFET and GTO. (8)
- (b) Briefly explain meter data management system. (6)

