Registration no: | | | | | | | | | | |

Total Number of Pages: 2 **M.TECH**

SUBJECT CODE: PEPC202

2nd Sem M. Tech Regular / Back Examination – 2014-15
SUBJECT NAME : ELECTRIC DRIVES – II
BRANCH: POWER ELECTRONICS AND DRIVES
Time: 3 Hours
Max marks: 70
Q.CODE:T234

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 Answer the following questions: (2 x 10)

a) What is self controlled mode of synchronous motor?
b) Why a self controlled synchronous motor drive is free from hunting oscillations?
c) Why rotor flux orientation control is better than other vector control methods?
d) How flux level is selected in a speed controlled drive?
e) What is the control strategy for high speed operation of a drive?
f) What is space vector modulation technique?
g) List all the techniques of sensorless vector control for 3-phase induction motor.
h) What is interior permanent magnet machine?
i) Why 3-level hysteresis controller is used in DTC drives?
j) How does the variable switching frequency method compare with fixed switching frequency method for DTC drives?

Q2 a) Derive the vector-matrix equations for transformation (i) from 3-phase a-b-c to stationary α-β reference frame and vice-versa, (ii) from stationary α-β to synchronously rotating d-q reference frame and vice-versa. (5)

b) Discuss the principle of vector control technique for 3-phase induction motor and compare it with scalar control technique. (5)

Q3 a) Derive the dynamic model of 3-phase induction motor in synchronously rotating d-q reference frame. (5)

b) Explain the direct vector control of 3-phase induction motor. (5)

Q4 a) Describe the different types of current controllers. (5)

b) Discuss the parameter sensitivity of vector controlled drives and techniques to overcome parameter detuning effects. (5)

Q5 a) Explain the indirect vector control of 3-phase induction motor. (5)

b) Derive the equations for rotor flux estimation of 3-phase induction motor using voltage model and current model. (5)

Q6 a) With mathematical derivation, explain the sensorless vector control of 3- (5)

phase induction motor by direct speed synthesis from state equation.

b) Describe the Direct Torque Control scheme of 3-phase induction motor. (5)

Q7 a) Derive the relevant equations for observer based speed estimation for vector control of 3-phase induction motor. (5)

b) Describe a closed loop scalar speed control scheme for 3-phase induction motor without speed sensor. (5)

Q8 Write notes on any **TWO** (5 x 2)

a) Control of permanent magnet synchronous machine

b) Switched reluctance motor drive

c) Brushless dc motor drive