APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY
08 PALAKKAD CLUSTER

Q. P. Code : PE0819232-I **(Pages: 2)** **Name: .....**

Reg. No:.....

SECOND SEMESTER M.TECH. DEGREE EXAMINATION JUNE 2019

Branch: Electrical & Electronics Engineering **Specialization: Power Electronics**

08EE6232 ADVANCED ELECTRIC DRIVES

Time:3 hours **Max. marks: 60**

Answer all six questions.

Modules 1 to 6: Part 'a' of each question is compulsory and answer either part 'b' or part 'c' of each question.

(Add any other instruction specific to course here like the use of IS codes/design tables etc.)

Q.no.	Module 1	Marks
1.a	Draw the block diagram of dynamic modelling of three phase induction motor	3
	Answer b or c	
b	Derive the voltage and torque equations in arbitrary reference frame	6
c	An induction motor has the following parameters:5hp, 200 V,3-phase,50 Hz, 4-pole, star connected, R_s=0.277Ω, R_r=0.183 Ω, L_m=0.0538 H, L_s=0.06 H, L_r=0.058 H, effective stator to rotor turns ratio,a=3. The motor is supplied with its rated and balanced voltages. Using stator reference model, find d and q axes steady state voltage and currents	6

Q.no.	Module 2	Marks
2.a	Write the algorithm for vector control of induction motor	3
	Answer b or c	
b	Draw and explain the block diagram of direct vector control scheme	6
c	Explain the implementation of indirect vector controlled induction motor servo with the help of block diagram	6

Q.no.	Module 3	Marks
3.a	What is meant by parameter sensitivity in vector controlled induction motor	3

Answer b or c

b	Derive the expression for torque and rotor flux linkage under open speed loop condition during parameter variations in indirect vector controlled induction motor	**6**
c	How to compensate for the parameter sensitivity effects using air gap-power feedback control in vector controlled induction motor	**6**

Q.no.	**Module 4**	**Marks**
4.a	How to control the motor speed using rotor circuit chopper. Also draw the torque slip curves of induction motor with variable rotor resistance	**3**

Answer b or c

b	What is modified Scherbius drive? Explain with necessary diagrams	**6**
c	Explain with necessary figures the scheme used for improving power factor in Static Kramer drive	**6**

Q.no.	**Module 5**	**Marks**
5.a	Derive the torque expression with stator and rotor fluxes in direct torque control of induction motor drive	**4**

Answer b or c

b	Explain, with block diagram, the direct torque control in induction motor	**8**
c	Explain the principle of space vector pulse width modulation in induction motor drives with the help of necessary diagrams	**8**

Q.no.	**Module 6**	**Marks**
6.a	Draw the block diagram of speed controlled permanent magnet brushless DC motor drive scheme.	**4**

Answer b or c

b	Explain the principle of vector controlled Permanent Magnet Synchronous Motor drive	**8**
c	The PMSM drive system parameters are as follows.R_s=1.4Ω, L_d=0.0056 H, L_q=0.008 H, λ_{af} =0.155 Wb-turns, B_1=0.01 Nm/rad/sec, J=0.006 kg-m2, Poles=6, Time constant of inverter,T_{in}=0.00025 sec, V_{cm}=10V,H_w=0.05 V/V, H_c=0.8 V/A, Vdc=285 V, damping ratio=0.707. Design a symmetric optimum based speed controller for the drive	**8**