Register Number: ……..

B.E. DEGREE EXAMINATIONS: APRIL/ MAY 2014

(Regulation 2009)

Sixth Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

EEE114: Solid State Drives

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions

PART A (10 x 1 = 10 Marks)

1. Operating point of the drive depends on
   a) Motor speed b) Motor torque
   c) Load torque and speed d) Speed & torque of motor and load
2. Motor does not attain steady state temperature when operating on
   a) Continuous duty b) Short time duty
   c) Over loading d) No load
3. Firing angle for fully controlled converter for regenerative braking in a DC motor is
   a) 90° b) 0°
   c) > 90° d) < 90°
4. Sum of the firing angles of dual converters at any time is
   a) 90° b) 120°
   c) 180° d) 240°
5. DC motor armature time constant is
   a) Ra / La b) La / Ra
   c) Ra . La d) Ra + La
6. Step up chopper is used for
   a) Plugging b) Dynamic braking
   c) Regenerative braking d) Frictional braking
7. Aim of the V/f control is to maintain the _____ of induction motor
   a) Speed b) Air gap flux
   c) Power d) Efficiency
8. Controlled parameters in vector control of induction motor, are
   a) Voltage and current b) Current and torque
   c) Voltage and power factor d) Flux and torque
9. In LCI fed synchronous motor drive, commutation is performed using the signals from
   a) Motor b) Rectifier
   c) External circuit d) Commutation circuit
10. _____ drive does not require four quadrant operation
    a) Rolling Mill b) Crane
    c) Lift d) Pump

PART B (10 x 2 = 20 Marks)

11. Draw the speed torque characteristics of fan type load
12. Name the braking methods used for electric drives
13. Mention the merits of dual converter fed DC drives
14. Draw the speed torque characteristics of fully controlled converter fed DC motor
15. Name the control strategies used in chopper fed DC drives
16. Draw the chopper circuit for braking operation of DC motor
17. What are the advantages of CSI fed induction motor drives?
18. What are the control methods of induction motor from rotor side?
19. What is meant by self control of synchronous motor drive?
20. Name the motors used for traction and lifts.

PART C (5 x 14 = 70 Marks)

21. a) (i) With block diagram explain the elements of electric drive system (7)
    (ii) Explain the various classes of duty of electric motors (7)

    (OR)

    b) (i) Draw and explain the heating and cooling curves of electric motors (7)
    (ii) Explain various braking methods of DC motors (7)

22. a) Explain the operation of separately excited DC motor fed by three phase fully controlled converter with neat circuit and waveforms. Obtain the expression for speed.

    (OR)

    b) (i) Explain the working of single phase dual converter fed dc drive with circuit and waveforms (7)
    (ii) A **230V, 960 rpm, 200A** separately excited motor has **Ra = 0.02Ω**. The motor is fed from a DC chopper. (7)
    Assuming continuous conduction, calculate duty ratio of chopper for motoring at rated motor torque and **350 rpm.**

23.	a)	(i)	Derive the instantaneous current for type A chopper fed DC drive on time ratio control	(7)
		(ii)	A **230 V, 960** rpm, **200** A separately excited DC motor has an armature resistance of **0.02 Ω**. The motor is fed from a chopper which provides both motoring and braking operations .The source has a voltage of **230** V. Assuming continuous conduction, calculate duty ratio of chopper for motoring operation at rated torque and **350** rpm	(7)
			(OR)	
	b)		Explain the operation of four quadrant chopper fed DC drive with neat diagrams	
24.	a)	(i)	With neat diagram, explain CSI fed induction motor drive	(7)
		(ii)	Explain a slip power recovery scheme of induction motor	(7)
			(OR)	
	b)	(i)	Draw and explain the static rotor resistance control of three phase induction motor drive	(7)
		(ii)	With block diagram explain the method of vector control of induction motor	(7)
25.	a)	(i)	Explain the V/f control of synchronous motor drive using VSI	(7)
		(ii)	Draw and explain load commutated inverter fed synchronous motor drive	(7)
			(OR)	
	b)	(i)	Explain the drives used for steel rolling mill	(7)
		(ii)	Give the requirements and features of the drives used for traction	(7)

****