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Question Paper Code : 80381

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Sixth Semester

Electrical and Electronics Engineering

EE 6601 — SOLID STATE DRIVES

(Regulations 2013)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Differentiate active load torque from passive load torque.
2. List the applications of electrical drives.
3. State the functions of freewheeling diode in phase controlled rectifier.
4. List out the drawbacks of rectifier fed DC drive.
5. Highlight the features of variable frequency control.
6. Enumerate the advantages of AC drives with PWM inverters.
7. What are the different types of PMSM motor?
8. Compare true synchronous mode and self controlled synchronous mode.
9. Write down the transfer function of speed controller.
10. What is field weakening mode control?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain in detail the multi quadrant dynamics of a drive with an example. (8)
(ii) List the common factors to be considered for selecting a motor. (8)

Or

- (b) Describe the equation governing load dynamics of drive. Derive the mathematical condition for steady state stability analysis of equilibrium operating point. (16)

12. (a) Discuss the steady state analysis of single phase fully controlled converter fed DC separately excited motor with continuous and discontinuous conduction mode. (16)

Or

- (b) (i) Explain the different control strategies of chopper. (8)
(ii) Explain the four quadrant operation of chopper in detail. (8)
13. (a) (i) Explain the concept of V/f control scheme. (8)
(ii) Highlight the features of an induction motor fed from a square wave inverter. (8)

Or

- (b) (i) Describe the speed control of induction motor by variable frequency supply. (8)
(ii) A 2.8 kW, 400 V, 50 Hz, 4 pole, 1370 rpm, delta connected squirrel cage induction motor has following parameters referred to the stator: $R_s = 2 \Omega$, $R_r = 5 \Omega$, $X_s = X_r = 5 \Omega$, $X_m = 80 \Omega$. Motor speed is controlled by stator voltage control. When driving a fan load it runs at rated speed and rated voltage. Calculate motor terminal voltage, current and torque at 1200 rpm. (8)

14. (a) (i) Discuss the advantages and disadvantages of Margin angle control. (6)
(ii) Compare the features of VSI and PWM fed synchronous motor. (10)

Or

- (b) (i) Explain the power factor control of synchronous motor drives. (8)
(ii) Brief about trapezoidal PMAC motor drives. (8)
15. (a) Derive the transfer function of DC motor-load system with converter fed armature voltage control. (16)

Or

- (b) Explain the design procedure of speed controller with inner current controller of a separately excited DC motor. (16)