

Roll No.

Total Pages : 3

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**M.Tech. (PED) - I Semester
Electric Drives System (MPED-101)**

Time : 90 Minutes]

[Max. Marks : 25

Instructions :

1. *It is compulsory to answer all the questions (1 mark each) of Part-A in short.*
2. *Answer any three questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART-A

1. (a) What are the advantages and disadvantages of armature voltage control? (1)
- (b) Give a classification of load torques on the basis of their application. (1)
- (c) Why the slip power recovery scheme is suitable mainly for drives with a low speed range? (1)
- (d) Variable frequency control of induction motor is more efficient than stator voltage control. Why? (1)

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- (e) Why the traction drive should have large torque at low speeds and when just being started. Why the torque required during free running is lower than the torque required during starting? (1)
- (f) Recent trend is to use separately excited motors instead of series motors in traction drives. Why? (1)
- (g) What are the advantages and disadvantages of stepper motors? (1)
- (h) Why a permanent magnet dc motor is preferred for low power applications? (1)
- (i) Field control is employed for getting speeds higher than rated and armature voltage control is employed for getting speeds less than rated. Why? (1)
- (j) When varying speed by field flux control, flux must be varied in small steps only. Why? (1)

PART-B

- 2. (a) Explain the operation of a closed loop speed control scheme with inner current control loop. What are the various functions of inner current control loop? (3)
- (b) What are the various components of load torque? (2)
- 3. (a) A 230 V, 960 rpm and 200 A separately excited dc motor has an armature resistance of 0.02 ohm. 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.
- (i) Calculate duty ratio of chopper for motoring operation at rated torque and 350 rpm.
 - (ii) Calculate duty ratio of chopper for braking operation at rated torque and 350 rpm. (3)
- (b) Discuss multi quadrant operation of a drive? (2)
4. (a) Write short note on 'Vector Control of Induction Motor Drives'. (3)
- (b) 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 : $R_s = 2$ ohm, $R'_r = 5$ ohm, $X_s = X'_r = 5$ ohm, $X_m = 80$ ohm. Motor speed is controlled by stator voltage control. When driving a fan load it runs at rated speed at rated voltage. Calculate motor terminal voltage, current and torque at 1200 rpm. (2)
5. (a) Write a short note on 'Traction motors used in practice and their control'. (3)
- (b) Discuss Speed-time characteristics of Traction Drives. (2)
6. (a) Discuss principle of working of ' Switched Reluctance Motor'. (2)
- (b) Write short note on BLDC drive. (3)