NATIONAL INSTITUTE OF TECHNOLOGY, CALLICUT
ELECTRICAL ENGINEERING DEPARTMENT
M.TECH POWER ELECTRONICS END SEMESTER EXAMINATION, JUNE 2022
EE 6306D POWER ELECTRONIC DRIVES

Time: 3 Hiurs

Max marks:50 Marks

1. For a wound field induction motor, derive the expression for maximum slip and maximum torque in terms of induction circuit parameters. [5]

2. Explain chopper control of dc series motor. [5]

3. Explain stator voltage control of induction motor, by drawing the speed torque characteristics. Draw a suitable circuit to achieve the same and explain it. [5]

4. Describe the working of a low cost brushless dc motor by drawing the induced voltages and current through it and explain the circuit to achieve the same. [5]

5. A 500kW, 3-phase, 3.3kV, 50 Hz,0.8 lagging power factor, 4 pole, star connected synchronous motor has following parameters. Stator inductance=15 ohm, stator resistance =0 ohm. Rated field current =10 amp. Calculate a) Armature current and power factor at half the rated torque and rated field current b) Field current to get unity power factor at the rated torque. c)Torque for unity power factor operation at field current of 12.5A.[8]

6. A 230V,960 rpm ad 200A 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 operation. The source has a voltage of 230V. Assuming continuous conduction a) Calculate duty ratio of chopper for motoring operation and braking operation at rated torque and 350 rpm. b) If maximum duty ratio of chopper is limited to 0.95 and maximum permissible motor current is twice the rated. calculate maximum permissible motor speed obtainable without flux weakening and power fed to the source. c)if the motor field current is controlled in (b) calculate field current as a fraction of its rated value for a speed of 1500 rpm.[6]

7. Explain braking and multi quadrant operation of a VSI fed induction motor using Synchronous Link Inverter.[8]

8. With the help of a neat block diagram, explain direct vector control scheme of Induction motor. Clearly explain how torque and flux is processed.[8]

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