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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (Electrical Engg.) (Sem.-6)

ELECTRICAL DRIVES

Subject Code : BTEE-603C-18

M.Code : 79316

Date of Examination : 07-07-22

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

- a) Derive the armature torque equation of a dc motor.
- b) Explain the term field weakening in high speed operation of dc motor.
- c) Draw the circuit diagram of braking operation in chopper fed dc motor drive.
- d) Write the armature voltage equation in chopper fed dc motor drive control.
- e) Why stator voltage control is an inefficient method of speed control for induction motor drives?
- f) Explain V/f control mechanism of induction motor drives.
- g) Draw the torque-speed characteristics of fan type of load.
- h) What are the purposes for closed loop control of electric drives?
- i) What is slip regulation?
- j) How are three phase PWM signals generated?

SECTION-B

2. A dc series motor has an armature current of 10A at full load. The motor terminal voltage is 300V. The armature and field resistances are 2Ω and 3Ω respectively. The motor speed at full load is 250 rpm. Calculate the starting torque of the motor.
3. Develop the expression for the line voltage of a induction motor drive.
4. A 3-phase induction motor, at rated voltage and frequency, has a maximum torque of 225% and a starting torque of 150% of full load torque. Neglect stator resistance and rotational losses and assume constant rotor resistance.

Calculate :

- (a) Slip at maximum torque
 - (b) Slip at full load.
5. Draw and explain the different types of braking operations of a dc motor drive.
 6. Draw and explain with the help of a block diagram the simultaneous control of speed and current in a dc motor drive.

SECTION-C

7. A 3-phase, 400V, 6-pole, 50 Hz, star connected wound rotor slip induction motor has a sum of stator and rotor leakage reactance referred to stator of 1ohm . It is connected to a balanced 400V supply and drives a pure inertia load. The moment of inertia of rotor including the load is 10 kgm^2 . DOL starting is used and the rotor circuit resistance is adjusted so that the motor brings its load from rest to 0.95 of synchronous speed. Neglecting losses excepting those of the rotor and the exciting current, calculate the value of the rotor resistance referred to the stator and the minimum time to reach 0.95 of synchronous speed.
8. A 2.8 kW, 400V, 4-pole, 50 Hz, delta connected squirrel cage induction motor has the 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 to be 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. Find also the motor speed, current and torque for a terminal voltage of 300V.
9. A dc chopper is used for dynamic braking of a 230V, 1200 rpm, 15A separately excited dc motor with a braking resistance of 20 ohms from a 230V dc source. Armature resistance is 1 ohm.
 - a) Calculate the duty cycle of the chopper for a motor speed of 1000 rpm and braking torque of 1.5 times the rated torque.
 - b) What will be the motor speed for a duty cycle of 0.5 and motor torque equal to its rated torque?

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.