R18 Regulation *Subject code: 2E8BF*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech VIII Semester Regular/Supplementary Examinations, April 2023

Electrical Drives

(Electrical and Electronics Engineering)

Maximum Marks: 70 Date:05.05.2023 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10x2M=20 Marks)

1 Write the expression for average output voltage of full converter fed separately excited dc drive.
2 Differentiate between semi converters and fully controlled converters
3 Mark the four quadrant operations of the drive on speed-torque plane.
4 If a dual converter is used as a drive, how do you set the firing angles to operate in the third quadrant?
5 What are the different types of control schemes of Dc choppers.
6 Mention the range of duty cycle for choppers.
7 Define slip speed control.
8 What are the types of slip power recovery system.
9 What are the factors effecting speed of synchronous motor.
10 Write torque equation of synchronous motor

Part-B

Answer All the following questions. (5X10M=50Marks)

11 A. A 220V, 1200 RPM, 80A separately excited DC motor has armature resistance 0.2Ω, which is fed from a single-phase full converter with ac input 230V, 50Hz for continuous conduction. Determine: [5]
(a) Firing angle and rated motor torque at 700rpm.
(b) Motor speed for $\alpha=150^{o}$ and half rated torque.

B. Explain speed-torque characteristic and voltage versus firing angle curves at different firing angles for a single-phase semi converter fed with a separately excited DC motor. [5]

OR

12 Single-phase fully controlled thyristor converter is supplying a separately excited DC Motor. Draw the relevant waveforms and explain various operating modes of the drive. [10]

13 Explain Multi quadrant operation of a DC drive consider the example as A Hoist. [10]

OR

14 A. Explain the operation of the single phase dual converter and draw the characteristics. [5]

B. Analyze the closed-loop control of a DC drive using suitable block diagram. [5]

15 A 230V, 960 rpm and 200A separately excited DC motor has an armature resistance of 0.02Ω.The motor is fed from a chopper which provides both motoring and braking operations. Assuming continuous conduction. Calculate: [10]

(a) Duty ratio for motoring operation at rated torque and 350rpm.

(b) Duty ratio for braking operation at rated torque and 350rpm

OR

16 A. Explain the operation of chopper fed separately excited DC motor. [5]
B. Explain four applications of Closed-Loop Control of DC Drive. [5]

17 A. Draw and explain speed control of 3-phase induction motor using AC voltage controller. [5]

B. At 50 Hz the synchronous speed and full load speed are 1500 rpm and 370 rpm respectively. Calculate the approximate value speed for a frequency of 30 Hz and 80% of full load torque for inverter fed induction motor drive. [5]

OR

18 A.A 400V, 50Hz, 3-phase squirrel cage induction motor develops full load torque at 1470 rpm. If supply voltage reduces to 340 V, with load torque remaining constant, calculate the motor speed. Assume speed–torque characteristics of the motor to be linear in the stable region. Neglect stator resistance. [5]
B. Explain the principle of operation static Kramer drive method with suitable circuit diagrams and characteristics. [5]

19 A. Draw and explain speed- torque characteristics of VSI fed self - controlled synchronous motor drive. [5]
B. Compare self-controlled and separate controlled mode of operation of synchronous motor drive. [5]

OR

20 A. Discuss why frequency control of induction motor is more efficient than stator voltage Control. [5]

B. Distinguish between Synchronous motor drive and Induction motor drive. [5]