Code No: 126AJ **R13**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, December - 2019
STATIC DRIVES
(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(25 Marks)

1.a) What are the disadvantages of semi converters over full converters? [2]
b) Write speed and torque expressions of separately excited dc motor. [3]
c) Mention the applications of dual converters. [2]
d) What is the suitable braking operating for dc series motor drive? [3]
e) Define time ratio control of choppers. [2]
f) Distinguish between continuous operations and discontinuous operations in case of chopper controlled d.c. motors. [3]
g) Classify the speed control methods of induction motor from rotor side? [2]
h) What is the importance of slip in induction motors? [3]
i) Mention the applications of synchronous motor drives. [2]
j) Difference between VSI and cyclo-converter driven synchronous motor. [3]

PART - B

(50 Marks)

2. Explain the operation of three phase full controlled converter feeding DC series motor with neat diagram and waveforms. [10]

OR

3. Draw and explain speed-torque characteristics of a 1-phase fully controlled converter connected to separately excited dc motor with continuous current operation. [10]

4.a) How many types of electric braking for motors? Explain in brief.
b) A 220 V, 970 rpm, 120 A dc separately excited motor has an armature resistance of 0.05 ohms. It is braked by plugging from an initial speed of 1000 rpm. Calculate resistance to be placed in armature circuit to limit braking current to twice the full load value and braking torque. [6+4]

OR

5. Explain in detail the four-quadrant operation of a d.c motor using dual converters.[10]

6.a) Explain the operation of two quadrant chopper feeding to a separately excited DC motor and also draw the current and voltage wave forms for continuous current operation.
b) Compare the two quadrant and four quadrant operation of chopper fed separately excited DC motor. [5+5]

OR

7.a) Draw the speed-torque characteristics and explain the operation of chopper fed d.c series motor.

b) Draw the block diagram of a closed loop chopper fed dc drive and explain its operation. [5+5]

8. Explain the different slip power recovery schemes for induction motor control drive. [10]

OR

9.a) Discuss the operation of varying the speed of an induction motor by variable frequency control of stator voltage. Draw the speed torque characteristics.

b) What is a PWM inverter? Explain its operation. [6+4]

10.a) Explain the operation of load commutated CSI fed Synchronous motor drive and its advantages.

b) What are the methods available for speed control of synchronous motor? [6+4]

OR

11.a) Explain separate control & self-control of synchronous motor.

b) A 3 phase, 200V, 50 Hz, 30 KW, 8 pole star connected salient pole synchronous motor has X_d = 2.5Ω and Xq = 0.4Ω. The armature resistance is negligible. If the motor operates with an input power of 20 KW at a leading p.f of 0.8. Determine torque angle and torque Td. [5+5]

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