

**Code No: 137FW****JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B. Tech IV Year I Semester Examinations, December - 2019****POWER SEMICONDUCTOR 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 as sub questions.

**PART – A****(25 Marks)**

- 1.a) What are the advantages of Thyristor controlled drives? [2]
- b) Differentiate between semi converters and fully controlled converters. [3]
- c) What is plugging? [2]
- d) What is a Chopper? What are various applications of Choppers? [3]
- e) List different types and applications of Induction motors. [2]
- f) What is Pulse Width Modulation (PWM)? [3]
- g) What is Slip power? Explain briefly. [2]
- h) List the applications of static scherbuis drive. [3]
- i) What are applications of cycloconverters? [2]
- j) Compare between open loop control and closed loop control of electric drives. [3]

**PART – B****(50 Marks)**

2. Compare between single-phase drives and three-phase drives. With a neat diagram and necessary waveforms, discuss the operation of a three-phase full converter based separately excited DC motor drive. [10]

**OR**

3. A 100 kW, 440V, 960 rpm DC motor is operated at 750 rpm and developing 75% rated torque is controlled by 3-phase, six-pulse thyristor converter feeding from a 3-phase, 415V, 50Hz a.c supply. If the back emf at rated speed is 405V, determine the triggering angle of the converter. [10]
4. What are dual converters? What are their applications? With a neat schematic diagram, discuss the operation of three-phase dual converters. [10]

**OR**

5. List the advantages offered by DC chopper drives over line commutated converter controlled DC drives. Derive the expressions for average motor current and average torque for chopper fed DC separately excited motor. [10]

6. Draw and explain the torque speed characteristics of a three-phase Induction motor. Explain the induction motor operation when the  $V/f$  ratio is held constant. Also derive the expression for maximum torque. [10]

**OR**

7. State and briefly discuss various methods for speed control of Induction motors. Discuss the advantages of variable frequency-controlled Induction motor drives. [10]

8. Compare between stator side control and rotor side control of induction motors. Draw the circuit diagram and explain the operation of rotor-resistance control using chopper. [10]

**OR**

9. What is slip power recovery? What are its advantages? Discuss the operation of static Kramer drive. [10]

10.a) Discuss the applications of synchronous motor drives.

b) With a block diagram, explain the closed loop operation of a synchronous motor drive. [4+6]

**OR**

11.a) Compare between self-control and separate control of synchronous motor drives.

b) Explain the operation of self-controlled synchronous motor drive by voltage sourced converter. [4+6]

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