

**B.E. / B.TECH. DEGREE EXAMINATIONS, DEC 2020 (Held during April, 2021)**

First Semester

**EE18153 – ELECTRICAL MACHINES AND DRIVES**

*(Chemical Engineering)*

(Regulation 2018)

Time: Three Hours

Maximum : 80 Marks

Answer **ALL** questions

**PART A - (8 X 2 = 16 Marks)**

1. An electrical Iron box takes 2.5 amps at 230 V. What does it cost to operate this iron box for 5 hrs, if the cost of the energy is 65 paise/unit
  - a. Rs.0.18688/-
  - b. Rs.18.688/-
  - c. Rs.186.88/-
  - d. Rs.1.8688/-
  
2. A three-phase, three-pulse, controlled converter has firing angle for one of the SCRs set as  $15^\circ$ . This SCR would start conducting at
  - a.  $0^\circ$
  - b.  $15^\circ$
  - c.  $30^\circ$
  - d.  $45^\circ$
  
3. Starting methods applicable to both squirrel-cage and slip ring induction motors is/are \_\_\_\_\_
  - A. DOL starting
  - B. Auto transformer starting
  - C. Rotor resistance starting
  - a. A, B
  - b. A, B, C
  - c. B, C
  - d. A, C
  
4. For an application which requires smooth and precise speed control over the wide range, the motor is preferred is
  - a. Squirrel cage Induction Motor
  - b. Synchronous Motor
  - c. DC motor
  - d. Wound Rotor Induction Motor

5. Define back EMF and rotating magnetic field (RMF).
6. What are the common electrical hazards and safety measures?
7. List the advantages of solid state speed control of electrical drive system.
8. What are the modes of operation of cycloconverter static Scherbius drive?

**PART B - (4 X16 = 64 Marks)**

9. (a) A bridge circuit ABCD has  $R_{AB}=2$  Ohms;  $R_{BC}=3$  Ohms;  $R_{CD}=40$  Ohms;  $R_{DA}=1$  Ohms and  $R_{BD}=5$  Ohms. A battery of 5V with negligible internal resistance is connected between the terminals A and C. Determine the current in each branch. (16)

**(OR)**

- (b) Three similar coils of resistance 10 Ohms and inductance 0.15 Henry are connected in star across a three phase 440V 50Hz supply. Find the line and phase current, active, reactive and apparent power. Also find the above values when they are connected in delta. (16)
10. (a) With neat circuit diagram explain the operation of full wave bridge rectifier and also derive its rectification efficiency. (16)

**(OR)**

- (b) Draw and explain the circuit diagram, voltage waveforms and conduction of thyristors for a 3-phase full converter. Derive the expression for average output voltage. (16)
11. (a) Explain the construction and working principle of 3-phase induction motor which includes the facility to add resistance in its rotor circuit. (16)

**(OR)**

- (b) With a neat diagram explain the starter used for starting a DC shunt motor. (16)
12. (a) Explain various classes of duties for electrical drives with neat sketch. (16)

**(OR)**

- (b) Explain the static Scherbius drive of slip power recovery scheme. (16)