

B

0800MRT201122003

Pages: 2

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third Semester B.Tech Degree Examination December 2020 (2019 Scheme)



Course Code: MRT201

Course Name: ELECTRICAL MACHINES & DRIVES

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions. Each question carries 3 marks*

Marks

- 1 Derive the emf equation of a DC generator. (3)
- 2 Draw and explain the power flow diagram of a DC Motor. (3)
- 3 The primary and secondary of a 25 kVA transformer has 500 and 40 turns, respectively. If the primary is connected to 3000 V, 50 Hz mains, calculate (i) primary and secondary currents at full load; (ii) The secondary emf and (iii) The maximum flux in the core. Neglect magnetic leakage, resistance of the winding and the primary no-load current in relation to the full load current. (3)
- 4 A three-phase, 6-pole induction motor is supplied from a 50 Hz, 400 V supply. Calculate (a) the synchronous speed, and (b) the speed of the rotor when the slip is 4 per cent (3)
- 5 Why a single phase induction motor is not self-starting? How it can be made self-starting? (3)
- 6 Explain the emf method to find the voltage regulation of an alternator. (3)
- 7 Explain the working principle of a synchronous motor. (3)
- 8 Explain the basic concept of a rectifier circuit. (3)
- 9 What are the main factors which decide the choice of electrical drive for a given application? (3)
- 10 State essential parts of an electrical drive. What are the functions of a power modulator? (3)

**PART B**

*Answer any one full question from each module. Each question carries 14 marks*

**Module 1**

- 11 What is the necessity of a starter in a DC motor? Describe the working of 3 point starter with a neat diagram. (14)
- 12 Explain the constructional details of a DC machine with necessary sketches. (14)

## 0800MRT201122003

### Module 2

- 13 What is the working principle of a transformer? Draw and explain the phasor diagram of a practical transformer with inductive load. (14)
- 14 Explain the construction and working principle of a three phase induction motor. (14)

### Module 3

- 15 Explain the following with neat sketches (7)
- a) Split phase induction motor (7)
  - b) Capacitor start induction motor (7)
- 16 A three phase alternator has a rated output of 500 kVA at a terminal voltage of 3300V. The stator winding has a resistance of  $0.6 \Omega$  and a synchronous reactance of  $4\Omega$ . Calculate the voltage regulation for full load at a p.f of
- i. Unity
  - ii. 0.8 lagging
  - iii. 0.8 leading

### Module 4

- 17 a) Draw and explain the VI characteristics of a SCR (7)
- b) Write a short note on Single phase half-wave controlled rectifier with R load (7)
- 18 Explain the construction and working principle of universal motor with necessary sketches. (14)

### Module 5

- 19 Explain the speed torque convention and the multi quadrant operation of an electric drive with relevant diagrams. (14)
- 20 Write a short note on
- a) Load equalization (5)
  - b) Steady state stability (4)
  - c) Different components of load torque (5)

\*\*\*