

**B.Tech. – VIEP – ELECTRICAL ENGINEERING
(BTELVI)**

Term-End Examination

December, 2017

00509

BIEEE-016 : INDUSTRIAL DRIVES

Time : 3 hours

Maximum Marks : 70

Note : Attempt any seven questions. All questions carry equal marks. Use of scientific calculator is permitted. Assume suitable data, wherever missing.

1. Explain the operation of a separately excited dc motor with closed-loop current control. 10
2. For a separately excited dc motor, explain why regenerative braking using a dc chopper is preferred to braking with a controlled rectifier. 10
3. Give the circuit of a static Kramer-drive system and explain the functions of each of its modules. 10
4. Explain how the supply to the stator winding of a brushless dc motor is switched with electronic components so as to develop a unidirectional torque. 10

5. Give a closed-loop slip regulation scheme with constant volts/hertz control for an induction motor. 10

6. What are the different methods of providing excitation to a cylindrical rotor type of synchronous motor ? Also list out the applications of synchronous motor drives. 10

7. A three-phase, 400 V, 50 Hz, four-pole, star connected induction motor is supplied by a three-phase ac voltage controller with an input supply voltage of 440 V line-to-line. The data for the induction motor is

$R_s = 0.35 \Omega$, $R_r = 0.18 \Omega$, $X_s = 0.9 \Omega$, $X_r = 0.7 \Omega$ and $X_m = 25 \Omega$; all quantities being referred to the stator.

The rotor speed is 1475 rpm. If the no-load losses are negligible, compute

- (a) firing angle of the thyristors of the controller,
- (b) slip,
- (c) air-gap power, and
- (d) slip for maximum torque. 10

8. Explain the principle of phase-locked-loop (PLL) control of dc drives. Also discuss the advantages of this control scheme. 10
9. Explain the principle of three-phase semiconverter-fed dc motor drives. Also list out its advantages and disadvantages. 10
10. Write short notes on any *two* of the following : 2×5=10
- (a) Field Weakening Operation of Induction Motor Drive
 - (b) Self-Controlled Synchronous Motor Drive
 - (c) Components of Electric Drives
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