

BACHELOR OF ENGINEERING (ELECTRICAL ENGINEERING) EXAMINATION, 2023

(4th Year, 2nd Semester)

ELECTRIC DRIVES

Time : Three hours

Full Marks : 100

(50 marks for each part)

(Use separate Answer Script for each part)

PART – I

Answer any three questions.

Two marks are for well-organized answer.

1. (a) Classify electric drives according to their method of speed control. State and discuss their main features. 8
- (b) What do you mean by four quadrant operation of an electric drive? Explain. Why is it necessary? Discuss with an example. 8
2. (a) Draw and explain connection diagram of an automatic DC shunt motor starter using Back emf relay. 8
- (b) Draw connection diagram of DOL starter for starting a three phase induction motor with the provision for speed reversal and overload protection. 8
3. (a) What are different Methods available for the determination of Motor rating for Variable Load Drives? Discuss in brief. 8
- (b) Find out an expression for Temperature Rise of an electric machine with Intermittent Short Time ratings. 8
4. (a) Derive an expression for speed and current of a DC shunt motor during starting. 8
- (b) Derive an expression for speed and current of a DC shunt motor during counter current braking. Also draw the variation of speed and current with time. 8
5. (a) Draw the time-speed curve for short run and derive an expression for maximum speed of an electric train. 8
- (b) What are different types of current collector systems are used in electric traction? Discuss their advantages and disadvantages. 8

[Turn over

Time: Three Hours

Full Marks: 100 (50 each part)

Use a separate Answer-Script for each part.

Question No.	PART - II	Marks
	Answer any three Questions Two marks are reserved for neat and well organized answer.	
1.	Explain why voltage control method for controlling the speed of D.C. motor is called constant torque and variable power drive and field control method is called constant power and variable torque drive ? What are the limitations of field weakening method of speed control of D.C. motor ?	16
2.	Sketch and explain the principle of closed loop control of a D.C. motor considering IR compensation.	16
3.	Sketch and explain the principle of speed control of an induction motor in open loop mode. What is the disadvantage of this method of speed control ?	16
4. (i)	Derive the relation between speed and torque of a D.C. motor fed from single phase fully controlled rectifier for continuous conduction mode of operation.	10
(ii)	Explain why D.C. series motor is preferred in traction drive.	6
5.	Sketch and explain the principle of speed control of a separately excited D.C. motor considering position and current feedback.	16