

BACHELOR OF ENGINEERING IN ELECTRICAL ENGINEERING (EVENING) EXAMINATION, 2018
(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.

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| 1. (a) | What are factors are to be considered for selection of drive? | 3 |
| (b) | Classify motors used in drive system according to the required type of duties. Draw the load-time, loss-time and the temperature rise – time curves in the case of S5 and S6 type of duties. | 8 |
| (c) | What do you mean by four quadrant operation of an electric drive? Explain. Why is it necessary? Discuss with an example. | 5 |
| 2. (a) | Draw and explain connection diagram of an automatic DC shunt motor starter using current sensing 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

B.E.ELECTRICAL ENGINEERING (PART TIME) 4TH YEAR 2ND SEMESTER EXAM.2018.**SUBJECT :ELECTRIC DRIVES**

Page 1 of 2

Time: Three Hours

Full Marks: 100

Question No.	PART – II 50 Marks for each part	Marks
	Answer any THREE questions. Two marks are reserved for neat and well organized answer.	
1.(i)	“Armature voltage control of DC motor is called constant torque and variable power drive and field flux control method is called constant power and variable torque drive”- Explain.	6
	(ii) Develop the model of a DC motor for speed control purpose.	4
(iii)	Sketch and explain a simple scheme to control the speed of a separately excited DC motor using armature current control in close loop.	6
2. (i)	Sketch and explain a simple scheme to control the speed of a separately excited DC motor above and below the rated speed in close loop.	8
(ii)	State the various methods of speed control of a 3-phase induction motor. What is the main disadvantage of stator voltage control method?	2
(iii)	Derive the expression of torque of a 3-phase induction motor and show that under constant flux operation, torque is proportional to slip frequency.	6
3.(i)	Sketch and explain the principle of speed control of 3-phase induction motor based on slip compensation in close loop. Explain why this method gives better performance over open loop method.	10
(ii)	Sketch and explain the principle of speed control of 3-phase induction motor using speed feedback.	6
4.(i)	Derive the relation between speed and torque of separately excited DC motor when feeding from a 3-phase fully controlled rectifier.	6
(ii)	What are the main disadvantages of speed control of 3-phase induction motor using frequency control method?	6
iii)	What are the advantages of constant flux operation of 3-phase induction motor?	4

I	5. Draw and explain the power and control circuit of the following protection scheme in motor drive. i) Input under and over voltage protection. ii) Over current protection. iii) Short circuit protection. iv) Protection against excessive regeneration.	4x4
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