B.E. ELECTRICAL ENGINEERING THIRD YEAR SECOND SEMESTER SUPPLEMENTARY EXAM 2023

ELECTRIC DRIVES

Time : Three hours | Full Marks : 100

(50 marks for each part)
(Use separate Answer Script for each part)

PART – I

1. (a) Find out Motor rating for intermittent load based on average power. 10

or

(b) (i) What do you understand by the term "Motor-Load Stability"? Discuss with suitable examples.

(ii) What is 'Four quadrant operation of electric drive'? Explain with a suitable example.

2. (a) Draw and explain connection diagram of an DOL starter for an induction motor , with provision for forward and reverse operation. 10

or

(b) Draw connection diagram of an automatic SRIM starter and explain its functioning.

3. (a) Find out an expression for Temperature Rise of an electric motor driving intermittent load. 10

or

(b) How electric motors are classified according to their duty cycle? Draw and discuss the load-time, loss-time and temperature rise-time curves for different duty cycles.

4. (a) Derive an expression for speed and current of an D.C. shunt motor during counter current braking. Also draw the variation of speed and current with time. 10

or

(b) Derive an expression for speed and current of an Induction motor during starting. Also draw the variation of speed and current with time.

5. (a) Draw and explain speed-time curve of an electric traction drive. 10

or

(b) What are the relative merits and demerits of different types of current collectors?

Ex/EE/PC/B/T/324/2023(S)

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PART-II.

Answer *any three* questions from this part.
Two marks are reserved for neat and well organised answer

6. a) Describe the closed loop speed control scheme of dc separately excited motor with the help of speed feedback using block diagrams. CO1 — 8

b) Explain with suitable diagrams the "constant torque variable power and constant power variable torque mode" of operations for the speed control of dc separately excited motor. CO1 — 8

7. a) A separately excited dc motor of 1.2 kW, 1150 rpm, 200V rating is operated at full load from a three phase fully controlled rectifier with an input voltage of 415V, 50 Hz, AC. Find (i) the triggering angle of the converter and (ii) the new triggering angle if the speed is to be reduced to 700 rpm at rated armature current. Assume ra=0.7 ohm. CO3 — 8

b) Discuss the different schemes of how motor current can be sensed for a dc drive system and enumerate the advantages and disadvantages of each scheme. CO2 — 8

8. a) Discuss the IR compensation scheme of a dc separately excited motor with necessary diagram. CO2 — 8

b) Explain the speed control of induction motor based on stator voltage variation. Indicate the major application areas of such schemes. CO4 — 8

9 a) Explain the V/f method for the purpose of speed control of three phase induction motor. Also discuss why V/f characteristic near low speed becomes non-linear. CO4 — 10

b) Describe with block diagrams how the frequency control technique for the purpose of induction motor speed control can be implemented. CO1 — 6

10 Write short notes on any Two: — 8 + 8

a) Slip compensation scheme of induction motors. CO2

b) Speed control method of synchronous motors. CO2

c) Thermal protection of motors. CO2