22629

12526

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary, and mention it clearly.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following : **10**

a) State the classification of motor duty class.

b) Draw a neat labelled sketch to show "Torque-speed" characteristics of D.C. shunt motor.

c) Draw a neat labelled circuit diagram to represent single phase full converter drive.

d) State the names of electronics components which are generally used as 'switch' unit in chopper circuit.

e) Write down the formula to find out the speed of synchronous motor and Induction motor.

f) Write down the names of 02 methods employed for control of 3-phase induction motor.

g) Enlist 02 advantages of microprocessor controlled electric motors.

P.T.O.

Marks

2. Attempt any THREE of the following : **12**

a) Explain the working of V to F control method of Induction Motor drive. Support your answer with neatly drawn labelled sketch of it's block diagram.

b) Draw a neat labelled sketch to represent Class - A chopper drive and explain it's working.

c) Draw a labelled circuit diagram for reversible drive using field reversal and explain the functioning of it.

d) Compare 'Individual drive and Multi-motor drive' on given factors –

i) Maintenance

ii) Reliability in operation

iii) Operator's safety

iv) Noise level

3. Attempt any THREE of the following : **12**

a) Draw a neat graphical representation of Speed-Torque characteristics of D.C. Series motor. State the correct reasons for which D.C. series motor is used in application of driving the heavy loads.

b) Enlist 04 methods of improving power factor in SCR motor drives. Explain any one method in brief.

c) Explain the applications of chopper drives in battery charging circuit of battery powered applications.

d) Draw a neat labelled circuit diagram used for 3-phase induction motor's stator voltage control method using thyristors. Explain it's working briefly.

Marks

4. Attempt any THREE of the following : **12**

a) Describe microprocessor based speed control method used for D.C. Motor control. Support your answer with correctly drawn labelled sketch of this technique.

b) Explain how synchronous motor drive units are controlled by using microcontroller?

c) Explain how addition of rotor resistance method is helpful to improve the starting torque of 3-phase induction motor ? State which type of motor is suitable for this technique ?

d) Describe the nature of Load of given applications and suggest correct type of electric motor for driving these loads –

i) Paper mills

ii) Textile mills

iii) Rolling mills

iv) Pumps

e) Explain the operation of basic chopper circuit using SCR with simple but neatly drawn diagram.

5. Attempt any TWO of the following : **12**

a) Write down any 06 factors which are mentioned while specifying the stepper motor's description.

b) List the classification of chopper on the basis of quadrant of operation. Draw and describe Class C chopper drive.

c) Explain semiconverter drives with neat waveform.

6. Attempt any TWO of the following : **12**

a) Draw a neat labelled figure to represent –

i) Block diagram of dual converter unit.

ii) Dual converter operated D.C. motor drive with 3-phase A.C. input

AND State advantages of dual converter drive operation.

Marks

b) Explain the following terms related to four quadrant operation of electric drive used in lifts.

i) Forward Motoring

ii) Forward regenerative braking

c) A 06 Pole, 3-phase induction motor operates on 50 Hz supply. When running at full load; the slip value is 0.04.

Find out –

i) the synchronous speed.

ii) the rotor's speed.

iii) the rotor's frequency.

Also for given motor torque - speed characteristics is shown in Figure No. 1; Name the points marked as A, B, C, D correctly with following mentioned torques on it.

i) Pull up torque

ii) Maximum torque

iii) full load torque.

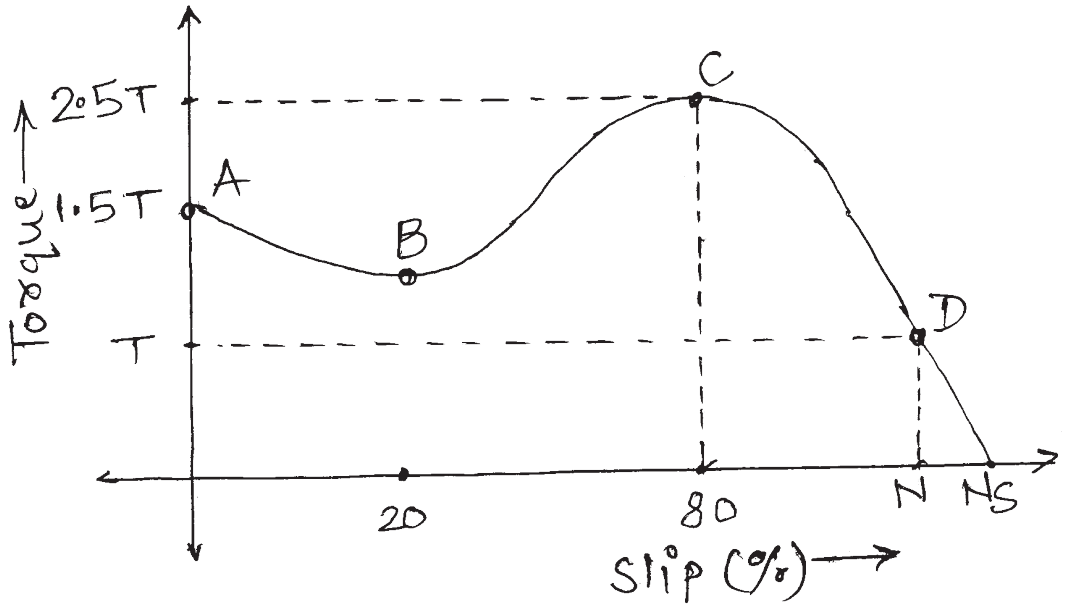

Fig. No. 1