PAPER ID-410418

Subject Code: KEE075

Roll No: | | | | | | | | | | | | | |

B.TECH
(SEM VII) THEORY EXAMINATION 2021-22
ELECTRIC DRIVES

Time: 3 Hours ***Total Marks: 100***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

a. What are the disadvantages of dc drives?
b. Why electric drive is preferred over mechanical drive?
c. What is meant by classes of duty of motor?
d. What are the problems faced in case a motor of wrong rating is chosen?
e. What do you mean by acceleration time of three phase induction motor?
f. What is the most economical method of electric braking?
g. Why the thyristor control is preferred over Ward Leonard system of speed control?
h. How you can change speed of separately excited dc motor.
i. What are the disadvantages of dc drives due to which the three phase induction motor is replacing it?
j. What do you understand by the steady state stability?

SECTION B

2. Attempt any *three* of the following: 10 x 3 = 30

a. In which type of applications four quadrant operation is employed in industries? Explain in detail the working of such an electric drive.
b. Discuss the dynamics of motor load system and also derive the relations for motor- load torque system.
c. A 220 V, 800 V 60 A dc separately excited motor has an armature resistance of 0.09 Ω. It is broken by plugging from an initial speed of 1500 rpm. Calculate (i) Resistance to be placed in armature circuit to limit braking current to twice the full load value (ii) Braking torque (iii) Torque when the speed has fallen to zero.
d. Explain chopper controlled DC motor drive in detail.
e. What is the basic difference between true synchronous mode and self control mode for variable frequency control of synchronous motor?

SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

(a) Draw the block diagram of an electric drive. Explain the function of Power modulator in detail.
(b) Give the advantages of electric drives over mechanical drive; explain each advantage with respect to industrial application.

4. Attempt any *one* part of the following: 10 x 1 = 10

(a) Explain the loading of an electric motor and its duty cycle with a simpl

diagram.

(b) What is heating time constant? Explain how the rating of motor is affected by the temperature rise of Electric motor.

5. Attempt any *one* part of the following: 10 x 1 = 10

(a) Explain reverse voltage braking of a three phase induction motor drive; also give the speed-torque curve for it.

(b) Derive the expression to calculate the energy loss during starting of Induction motor and also state the various methods used to reduce the energy loss during starting.

6. Attempt any *one* part of the following: 10 x 1 = 10

(a) Draw the necessary circuit diagram and waveforms and explain the working of 3-phase converter fed dc motor drive with continuous conduction only. Derive the average O/P voltage with motor load.

(b) A 230 volts, 1400 rpm, 20 Amps separately excited dc motor has an armature resistance of 15 Ω. It is fed from a single phase fully controlled bridge rectifier with an ac source voltage of 220 volts, at 50 Hz. Assuming continuous load current, compute i. The motor speed at firing angle of 40 degrees and torque of 6 NM ii. Developed torque at the firing angle of 40 degrees and speed of 1400 RPM.

7. Attempt any *one* part of the following: 10 x 1 = 10

(a) Explain how the Static Scherbius drive is used in slip power recovery scheme.

(b) Elucidate the operation of Brushless dc motor drive in detail.