

N. B.

- (1) Question No. 1 is **compulsory**.
- (2) **Attempt** any **three** questions out of remaining questions.
- (3) **Figures** to the **right** indicate **full** marks.
- (4) **Assume** suitable **data** if **necessary**.

1. Attempt the following 20
 - a) State and explain advantages of electrical drives over drives employing other forms of energy.
 - b) Explain fully controlled converter fed DC motor
 - c) Enlist classes of motor duty. State its importance in selection of motor.
 - d) Write a brief note on "switched reluctance motor drives".

2.
 - a) Explain synchronous motor drive with the help of block diagram. 10
 - b) Write a short note on "Choice of motor for a drive." Explain with example 10

3.
 - a) A delta connected three phase, 50Hz, 6pole, 400V, 925rpm squirrel cage induction motor has following parameters $R_s=0.2 \Omega$, $X_s=0.5 \Omega$, $R_r'=0.3 \Omega$, $X_r'=1 \Omega$. The motor is fed from a voltage source inverter with constant V/f ratio from 0 to 50Hz and constant voltage of 400V above 50Hz frequency. Determine 10
 - i) breakdown torque for frequency of 100Hz as a ratio of its value at 50Hz
 - ii) Calculate the motor torque at 30Hz and slip speed of 60 rpm.
 - b) Write a note on 'stepper motor drive' 10

4.
 - a) Explain closed loop speed control of drives. Why inner current loop is needed? 10
 - b) Explain star-delta starting with characteristics. 10

5.
 - a) Show how the time and energy lost in a transient operation are calculated. 10
 - b) A 400 V, star connected 3ph, 6 pole, 50 Hz Induction motor has following parameters referred to stator 10
 $R_s=R_r'=1 \Omega$, $X_s=X_r'=2 \Omega$
for plugging from its initial full load speed of 950 rpm, Stator to rotor turns ratio is 2.3. determine-
 1. Initial braking current and torque as a ratio of their full load values.
 2. Resistance to be incerted in the rotor circuit to reduce the maximum braking current to 1.5 times the fullload current. What will be the initial braking torque, now?

6.
 - a) Explain dynamic braking of dc shunt motor. 10
 - b) Compare scalar and vector control of induction motor. 10