

EE-302-ELECTRIC DRIVES**Time: 1:30 Hours****Maximum Marks:20****Note: Attempt All Questions**

Assume suitable missing data, if any

Attempt all parts of a question at one place. (Marks may not be awarded otherwise)

- 1 Giving reasons explain briefly, why?
- [a] For stable operation of the drive $\frac{dT_L}{d\omega} > \frac{dT_e}{d\omega}$.
- [b] For rotational motion the equivalent moment of Inertia of the load reflected on the shaft of the motor is proportional to the square of the gear ratio.
- [c] Loss during plugging is 3 times that of during dynamic braking in DC drive.
- [d] Short duty overload factor is always higher than that of intermittent duty.
- [e] Type C chopper fed drives are not suitable for large dc motors. 1x5
- 2 A 100kW motor, having rated temperature rise of 80°C, has full load efficiency of 90% occurring on 80% full load. It has heating and cooling time constants of 60 minutes and 75 minutes respectively. It is cyclically loaded to 120% of full load for one hour, followed by 50% of load for next hour. Compute the temperature rise after 4 hours. 4
- 3 From the fundamentals, derive the expression for speed for starting transient of armature controlled separately excited DC motor. 4
- 4 Draw neat voltage and current waveforms during discontinuous operation of 1ϕ converter fed DC drive for motoring operation of separately excited DC motor for the following two conditions:
- a) $\alpha > \gamma > \beta$
- b) $\gamma > \beta > \alpha$ 2
- where α is firing angle, β is extinction angle γ is given by $\sin^{-1} \frac{E}{V_m}$; E -Back Emf and V_m maximum of AC voltage
- 5 A separately excited DC motor is driving an elevator. At a load torque of 300Nm, the motor speed is 100rpm. The rated motor terminal voltage is 210V and field constant $K\phi$ is 3V sec. The drive is fed from a type-E chopper with DC bus of 220V.
- (i) If the duty cycle of 0.7 is impressed compute the steady state motor speed.
- (ii) Calculate the duty cycle required to block the motor. 5