Course: B. Tech.   **Branch : Electrical Engineering**   **Semester : VII**

Subject Code & Name: Electrical Drives (BTEEC703)

Max Marks: 60   **Date:18/07/2023**   **Duration: 3 Hr.**

Instructions to the Students:
1. *All the questions are compulsory.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level/CO)	Mark
Q. 1	**Solve Any Two of the following.**		**12**
A)	What are the different types of torque that involved in drive system?	Understanding	**6**
B)	Explain four quadrant operation of motor drive system with hoist load.	Understanding	**6**
C)	What are the modes of operation in electric drive system?	Applying	**6**
Q.2	**Solve Any Two of the following.**		**12**
A)	Explain the operation of closed loop speed control with inner current control loop and What are the methods used in current sensing.	Understanding	**6**
B)	Explain a phase locked loop speed control schemes? Where do you use it?	Applying	**6**
C)	Write a brief note on classes of duty for on electric motor in on electric drive	Understanding	**6**
Q. 3	**Solve Any Two of the following.**		**12**
A)	Explain any two methods of braking of DC Shunt Motors with neat diagrams.	Understanding	**6**
B)	Explain with neat sketches about the DC Shunt Motor speed control by using single phase fully controlled bridge converter.	Applying	**6**

C) A single phase bridge converter fed from a 250 V, 50 Hz supply is used to control the speed of a separately excited dc motor having an armature resistance of 1.5 Ω and inductance 30 mH. The back emf at one speed of operation is 100 V and the converter control angle is 30 °. Determine the average and rms values of the armature current, the power input to the motor and power factor of operation   **6**

Q.4 Solve Any Two of the following.   **12**

A) Explain with neat diagram voltage source inverter fed Induction motor drive   Understanding   **6**

B) A slip ring induction motor incorporating slip energy recovery scheme for speed control drives a fan load having a characteristic of $T_L = KN^2$. The motor is rated at 440 V, 50 Hz, 100 kW. The speed is to be controlled from a rated value of 1420 to 750 rpm. The equivalent circuit parameters are $r_1 = 0.052\ ohm, r_2 = 0.06\ ohm,\ X_m = 10\ ohm,\ x_1 + x_2' = 0.29\ ohm, \frac{T_P}{T_S} = 1.2$ Determine the firing angle range.   Applying   **6**

C) Explain in brief drives required for various stages in textile mills   **6**

Q. 5 Solve Any Two of the following.   **12**

A) Explain in detail drives for cement mills application.   Understanding   **6**

B) Draw the block diagram of variable frequency control of multiple synchronous motor drive and explain in brief.   Understanding   **6**

C) Describe the static Kramer drive for speed control of 3-phase Slip ring IM. Draw and explain the speed torque characteristics of static Kramer drive?   Understanding   **6**

*** End ***