# INSTITUTE OF AERONAUTICAL ENGINEERING
## (Autonomous)

B.Tech VI Semester End Examinations (Regular), November – 2020
**Regulation: IARE–R16**
## SOLID STATE ELECTRIC MOTOR DRIVES

**Time: 2 Hours**            **(EEE)**            **Max Marks: 70**

**Answer any Four Questions from Part A**
**Answer any Five Questions from Part B**

## PART – A

1. Summarize the advantages of three phase drives over single phase drives **[5M]**

2. Explain the operation of regenerative braking control of Dc series motor by chopper control. **[5M]**

3. Compare the VSI and CSI fed induction motor drives. **[5M]**

4. List the advantages and applications of slip power recovery schemes **[5M]**

5. Explain the operation of self controlled mode of synchronous motor drive. **[5M]**

6. Draw the speed torque characteristics of DC series motor fed with single phase full converter. **[5M]**

7. Explain the four quadrant operations with converters. **[5M]**

8. Sketch the mechanical characteristics of a three phase induction motor with V/f method. **[5M]**

## PART – B

9. A 200 V, 875 RPM, 150 A separately excited dc motor has an armature resistance of 0.06 Ω. It is fed from a single phase fully-controlled rectifier with an ac source voltage of 220V, 50Hz. Assuming continuous conduction, calculate firing angle for rated motor torque and 750 rpm. **[10M]**

10. Explain how the speed of a DC series motor is controlled using a single phase fully controlled converter by sketching the output voltage and current waveforms. **[10M]**

11. Explain how a DC motor can be operated in four quadrants with the help of a single phase dual converter.

    **[10M]**

12. A 230V separately excited dc motor takes 50A at a speed of 800 rpm. The armature resistance of 0.4 ohm. This motor is controlled by a chopper with an input voltage 230V and frequency of 500Hz. Assuming continuous conduction throughout; calculate the speed of motoring operation at duty ratios of 0.3 and 0.6, regenerative braking operation duty ratios of 0.7 and 0.4. **[10M]**

13. Explain how induction motor control through V/F control (or) frequency control? **[10M]**

14. A 440 V, 3-phase, 50 Hz, 6-pole, 945 rpm, delta connected induction motor has the following parameters referred to the stator: Rs=2 Ω, Rr =2Ω, Xs=3 Ω and Xr =4 Ω When driving a fan load at rated voltage it runs at rated speed. The motor speed is controlled by stator voltage control. Determine motor terminal voltage, current and torque at 800 RPM. **[10M]**

15. Describe the speed control of slip ring induction motor using static Kramer system. **[10M]**

16. Discuss with the help of a block diagram the feed forward vector control of induction motor drives. **[10M]**

17. Explain the variable frequency control of multiple synchronous motor with a neat block diagram. **[10M]**

18. Sketch the block diagram of closed loop control operation of synchronous motor drives and explain its working.

    **[10M]**

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