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**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

M.Tech II Semester End Examinations (Supplementary) - January, 2018

Regulation: IARE-R16

**POWER ELECTRONIC CONTROL OF AC DRIVES**  
(Power Electronics and Electrical Drives)

Time: 3 Hours

Max Marks: 70

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Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

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**UNIT – I**

1. (a) Discuss how torque is produced in induction motors. [7M]  
(b) Why V/f control method is preferred to control an induction motor over stator voltage or stator frequency control methods? Explain with appropriate tools. [7M]
2. (a) Explain the variable frequency control of an induction motor using necessary aid. [7M]  
(b) Derive an expression for the electromagnetic torque produced by an induction motor. [7M]

**UNIT – II**

3. (a) Suggest ways to improve efficiency of induction motors by flux program at variable torque and constant speed conditions. [7M]  
(b) In order to optimize the efficiency of drive system, why is it required to vary the flux (by employing flux program) when the load varies? Explain with appropriate aid. [7M]
4. (a) Sketch the acceleration and deceleration characteristics of an induction motor when it is controlled by open loop volt/Hz method. [7M]  
(b) Compare the volt/Hz control of voltage fed inverter drive with current fed inverter drive. [7M]

**UNIT – III**

5. (a) While employing static Kramer's driver, the line power factor is poor due the phase controlled inverter. Suggest and explain a suitable scheme to overcome this issue. [7M]  
(b) Briefly discuss the operation of static Scherbius drive. [7M]
6. (a) In relation to vector control, using the equivalent circuit and phasor diagram, explain how the magnitude and phase angle of induction motor stator current can be varied by controlling the quadrature axis and direct axis components. [7M]  
(b) Discuss the principles of direct vector control. [7M]

#### UNIT – IV

7. (a) Explain constant torque mode controller with a neat sketch. [7M]  
(b) Illustrate the operation of the field weakening controller with a diagram. [7M]
8. (a) Draw the block diagram of the PMSM drive control strategy and explain the function of each block. [7M]  
(b) Discuss about the different approaches for field weakening operation in permanent magnet synchronous motors. [7M]

#### UNIT – V

9. (a) Draw the circuit diagram of a three phase brushless DC (BLDC) motor drive and discuss its operations. [7M]  
(b) Explain the operation of current controlled variable reluctance drives. [7M]
10. (a) Discuss about the use of BLDC motor drives for servo applications. [7M]  
(b) Sketch the characteristics of a BLDC motor and write short notes on it. [7M]

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