

--	--	--	--	--	--	--	--	--	--



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

M.Tech II Semester End Examinations (Regular) - July, 2017

Regulation: IARE-R16

POWER ELECTRONIC CONTROL OF AC DRIVES

(Power Electronics and Electrical Drives)

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

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

UNIT – I

1. (a) Explain induction motor characteristics in constant torque and field weakening regions. [7M]
- (b) A 400 V, 50 HZ, 4-pole, 1370RPM, Y connected squirrel cage induction motor has following parameters [7M]
 $R_s = 2\Omega$, $R_r = 3\Omega$, $X_s = X_r = 3.5\Omega$ The motor is fed from a voltage source inverter, which maintains a constant v/f ratio. For an operating frequency of 10 HZ, calculate starting torque and current of this drive as a ratio of their values when motor is started at rated voltage and frequency.

(OR)

2. (a) Draw and explain the speed torque characteristics of induction motor at variable voltage and constant frequency operation. [7M]
- (b) Draw and explain the speed torque characteristics of induction motor at variable frequency and constant voltage operation. [7M]

UNIT – II

3. Explain in detail with necessary block-diagram the open loop volts/Hertz speed control with voltage fed inverter. Sketch and explain briefly the Torque-speed curves showing effect of frequency variation, load torque and supply voltage changes, the acceleration/deceleration characteristics with Volts/Hz control. [14M]

(OR)

4. (a) With block diagram explain current fed inverter control of induction motor drive with speed and flux control . [7M]
- (b) Explain efficiency optimization control by flux program. Show the efficiency improvement by flux program at variable torque but constant speeds. [7M]

UNIT – III

5. With neat schematic diagram explain static Kramer drive. Derive the torque expression and draw the torque speed curves at different inverter firing angle [14M]

(OR)

6. What is indirect vector control of induction motor? Draw the phasor diagram for indirect vector control. Derive equations for indirect vector control . Draw indirect vector control block diagram and describe its operation. [14M]

UNIT – IV

7. (a) Explain Constant torque angle control with its characteristics. [7M]
(b) Explain Unity power factor control with its characteristics. [7M]

(OR)

8. (a) Explain Constant torque mode control with neat schematic diagram. [7M]
(b) Explain Flux weakening controller with neat schematic diagram. [7M]

UNIT – V

9. Explain briefly variable reluctance motor operation and also derive its torque expression. [14M]

(OR)

10. Explain current regulated Brushless DC motor drive, along with its characteristics and also explain in detail about the operation of the drive. [14M]

— o o ○ o o —