

**SUBJECT CODE:- 244**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**B.E.(EEP/EEE/EE) Examination Nov/Dec 2015**  
**Electric Drives**  
**(Revised)**

[Time: Three Hours]

[Max. Marks: 80]

“Please check whether you have got the right question paper.”

- N.B i) Q.No.1 from section A and Q.No.6 from section B are compulsory.  
 ii) Attempt any two questions from Q.2 to Q.5 and Q.7 to Q.10.  
 iii) Assume suitable data wherever necessary.

**Section A**

- Q.1 Attempt any five 10
- a) What is meant by electrical drives
  - b) Specify the functions of power modulator
  - c) What is meant by “Load equalization”
  - d) Draw the speed torque characteristics of fan type load.
  - e) Give the some applications of Dc drives.
  - f) What are the advantages of closed loop system?
  - g) What is meant by regenerative braking
  - h) What is called continuous and discontinuous conduction?
- Q.2 a) State essential parts of electrical drives with block diagram and mention their functions. 07  
 b) Derive the expression to find the equivalent load torque and equivalent inertia of loads in translational and rotational motion. 08
- Q.3 a) Explain current limit control in detail with block diagram 07  
 b) Motor drives four loads, two have translational motion and two have rotational motion. Moment of inertia of the 08  
 Motor is  $1.2\text{Kg-m}^2$ . motor runs at a speed of 1000rpm. Following are the details, about the four loads.

Load	Type of Motion	Speed	Inertia/Mars	Torque/Force
1	Rotational	200rpm	$7\text{ kg-m}^2$	10 N-M
2	Rotational	200rpm	$5\text{kg-m}^2$	6 N-M
3	Translational	10m/s	10 kg	20N
4	Translational	10m/s	20 kg	30N

Calculate the equivalent inertia of the system referred to the motor shaft and power rating of the motor, assuming negligible loss in the transmission system.

- Q.4 a) Explain the operation of chopper for forward motoring control of separately excited dc motor with aid of diagrams, Waveforms and speed torque curves. 07  
 b) A-200 volts, 875rpm, 150A separately excited De motor has an armature resistance of  $0.06\Omega$ . It is fed from a single phase fully controlled rectifier with an ac source of 220 volts,50Hz, Assuming continuous conduction Calculate: 08
- 1) Firing angle for rated torque and 750 rpm
  - 2) Motor speed for  $\alpha = 160$  degrees and rated torque.
- Q.5 Write short notes on following 15
- a) Phase locked loop control
  - b) Recent trends in D.C. drive control
  - c) Constant torque and constant power control

**SECTION-B**

- Q.6 Attempt any five. 10
- a) What is meant by soft start

- b) What are the three regions in the speed torque characteristics in the induction motor?
  - c) What is meant by slip power recovery system?
  - d) What is meant by V/F control?
  - e) What do you mean by self-control mode in synchronous motor?
  - f) Mention the special features of BLDC Motor.
- Q.7 a) Explain in detail the static rotor resistance control in induction motor drive. 07
- b) 3Kw, 400V, 50Hz, 4 Pole, 1370 rpm, delta connected squirrel cage induction motor has the following parameters 08  
referred to stator  
 $R_s=2\Omega$ ,  $X_s=X'r=5\Omega$ ,  $R'r=5\Omega$ ,  $X_m=90\Omega$   
 Motor speed is controlled by stator voltage control. When driving a fan load it runs at rated speed at rated voltage. Calculate  
 1) Motor terminal voltage, current and torque at 1200rpm
- Q.8 a) Explain the operation of current source inverter Fed induction motor Drive. 07
- b) Explain the operation of self-controlled synchronous motor drive implying load commutated thyristor inverter. 08
- Q.9 a) Explain the operation of brushless d.c. motor drive and its applications. 07
- b) A 6MW, 3-phase, 11Kv, Y-connected, 6-pole, 50Hz, 0.9(leading) Power factor synchronous motor has  $X_s=9\Omega$  and 08  
 $R_s=0$  Rated current is 50A.  
 Machine is controlled by variable frequency control at constant (V/f) ratio up to the base speed and constant voltage above the base speed. Determine.  
 i) Torque and field current for the rated armature current 750 rpm and 0.8 leading power factors.
- Q.10 Write short notes on following 15
- j) PWM controlled induction motor drive
  - k) Industrial application of A.C. drives
  - l) Synchronous motor drive.