

Total No. of Printed Pages:3

**SUBJECT CODE NO: E-203**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**B.E.(EEP/EEE/EE) Examination Nov/Dec 2017**  
**Electrical Drives**  
**(REVISED)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- i. Q. 1 from section A and Q.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 where necessary.

- Q.1 Attempt any five. 10
- a) What are the disadvantages of electrical drives?
  - b) What is meant by load equalization?
  - c) What are the choices of electrical drives?
  - d) What are the three component of load torque?
  - e) What are the drawbacks of rectifier fed Dc drives.
  - f) What are the advantages of closed loop control system?
- Q.2 a) Derive the expression to find equivalent load torque and equivalent inertia of loads in translational and Rotational Motion. 07
- b) A motor is required to drive the take up roll on a plastic strip line. The mandrel on which the strip is wound is 15cm in diameter and strip builds up to a roll 25cm in diameter. Strip tension is maintained constant at 1000N. The strip moves at uniform speed of 25 m/s. The motor is coupled to mandrel by a reduction gear with  $a= 0.5$ . The gears have an approximate efficiency of 87% at all loads. Determine the speed and power rating of the motor required for this application. 08
- Q.3 a) Explain the operation of closed loop speed control scheme with inner current control loop. 08
- b) Explain the dual converter control of dc separately excited motor. 07

2017

- Q.4 a) What is breaking in D.C Motor drive and explain various electrical breaking scheme of dc drives. 07
- b) A 200 volts, 875rpm, 150A separately excited DC 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 condition. 08
- Calculate.
- 1) Firing angle for rated torque and 750 rpm
  - 2) Motor speed  $\alpha = 160^\circ$  and rated torque.

- Q.5 Write short notes.
- i) Current sensing and speed sensing in electrical drivers. 05
  - ii) Single- phase half controlled rectifier control of d. c. motor. 05
  - iii) Multiquadrant operation of electrical drives. 05

### SECTION B

- Q.6 Attempt any five. 10
- a) What is meant by soft start?
  - b) What are the disadvantages of Induction motor operation with unbalanced supply voltages?
  - c) Why the control of a three-phase induction motor is more difficult than D.C motor.
  - d) Mention two modes employed in variable frequency control of synchronous motor drive.
  - e) Give the some applications of load- commutated inverter fed synchronous motor drive.
  - f) What are the applications of BLDC motor drive?
- Q.7 a) Explain in detail the static rotor resistance control in induction motor drive. 07
- b) A 440v,  $3\phi$ , 50 Hz, 6 Pole, 945 rpm. Delta connected induction motor has the following parameters referred to stator:  
 $R_s = 2\Omega$ ,  $R_r' = 2\Omega$ ,  $X_s = 3\Omega$ ,  $X_r' = 4\Omega$  08

When driving a fan load at rated voltage it runs at rated speed. The motor speed is controlled by stator voltage control.

Determine :

- i) Motor terminal voltage
  - ii) Motor current
  - iii) Motor torque
- For 800 rpm.

Q.8 a) Explain the fundamental principle of slip power recovery scheme. Draw and explain the circuit of static scherbius drive. 08

b) What is the basic difference between true synchronous mode and self-controlled mode for variable frequency control of synchronous motor drive? 07

Q.9 a) Describe the operation of brushless d.c. motor drive. State special features of BLDC motor drive. 07

b) A 10MW, 3Phase , 11kv, Y-connected 6 pole , 50Hz, 0.92 P.F (leading) synchronous motor has 08

$X_s = 8.5 \Omega$  and  $R_s = 0$ . Rated field current 52A.

Machine is controlled by variable frequency control at constant  $v/f$  ratio up to the base speed and at constant voltage above the base speed determine,

i) Torque and field current for the rated armature current, 750 rpm and 0.82 leading power factor.

Q.10 Write short note.

i) Load commutated inverter fed synchronous motor drive. 05

ii) Application and advantages of AC – drives. 05

iii) PWM controlled induction motor drive. 05