B.E DEGREE EXAMINATIONS: MAY 2015

(Regulation 2013)

Third Semester

MECHATRONICS ENGINEERING

U13MCT303**:** Electrical Machines and Drives

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Neglecting saturation, if current taken by a series motor is increased from 10 A to 12 A, the percentage increase in its torque is _____percent.

   a) 20   b) 44

   c) 30.5   d) 16.6

2. In Fleming's left hand rule, the middle finger indicates _____.

3. Which braking is not possible in series motor?

   a) Regenerative braking   b) Dynamic braking

   c) Rheostatic braking   d) Plugging

4. The speed of the D.C. shunt motor more than its full load speed can be obtained by _____.

5. Which of the following motor duty is required for metal cutting and drilling tool drives?

   a) continuous duty   b) discontinuous duty

   c) short time duty   d) intermittent periodic duty

6. Constant load that appears on the drive for a short time is called as _____.

7. In a DC shunt motor, speed is

   a) Proportional to the square of the current   b) Directly proportional to armature current

   c) Independent of armature current   d) inversely proportional to armature current

8. The DC motor terminal voltage supplied by a solid state chopper for speed control purpose varies _____ with the duty ratio of the chopper.

9. One major disadvantage of slip power recovery scheme is that

   a) efficiency is low   b) power factor is poor

   c) cost is very high   d) slip power is wasted

10. If some of the switching devices in a converter are controlled device and some are diodes, the converter is called _____

PART B (10 x 2 = 20 Marks)
(Not more than 40 words)

11. Determine the armature torque established by the armature of 12 pole d.c motor having 600 conductors, two paths in parallel (wave winding), where the total armature current is 40 Amps. The flux per pole is 0.02 webers.

12. Summarize the effects of armature reaction.

13. Why DC series motor should not be started without any load?

14. Differentiate between Electrical Braking and Mechanical Braking.

15. List the elements of an electric drive system.

16. Mention types of enclosures used in electrical machines.

17. Name the solid state controllers used for the speed control of DC Shunt motor and Series Motor.

18. Write the output equations for single phase half and full converters.

19. Outline the main purpose of freewheeling diode in a converter circuit.

20. List the main features of V/f control.

PART C (5 x 14 = 70 Marks)
(Not more than 400 words)

Q.No. 21 is Compulsory

21.   With neat sketches explain the construction and working principle of DC machine.

22. a) What are the different types of starters used for induction motors and Explain the auto transformer starter with a neat diagram.

(OR)

b) Explain the electric regenerative braking methods used for DC series motors in traction applications.

23. a) Design a thermal model of a motor for heating and cooling with necessary equations.

(OR)

b) i) With respect to thermal overloading, discuss about the selection of power rating   (10) for drive motors.

ii) Summarize the list of factors influencing the choice of electrical drives. (4)

24. a) i) A 200V, 10.5A, 2000rpm DC shunt motor has the armature and field resistance (7) of 0.5Ω and 400 Ω respectively. It drives a load whose torque is constant at rated motor torque. Calculate the motor speed of the source voltage drops to 175V.

ii) With neat sketch explain the Ward-Leonard method of speed control. Give its (7) advantages and disadvantages.

(OR)

b) List and Explain any one class of chopper control method for speed control of DC Motor.

25. a) Describe the Kramer method of slip-power recovery scheme in detail.

(OR)

b) Discuss about the three phase AC regulator used to control the rms value of AC voltage applied to the Induction motor.

∗∗∗∗∗∗∗∗∗∗∗∗∗