Register No: ……..

B.E. DEGREE EXAMINATIONS: APRIL/MAY 2011

Fourth Semester

MECHANICAL ENGINEERING

U07MH403: Electrical Machines and Drives

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

Answer ALL Questions:-

PART A (10 x 1 = 10 Marks)

1. If the applied voltage of a certain transformer is increased hr 50% and the frequency is reduced to 50% (assuming that the magnetic circuit remains unsaturated), the maximum core flux density will

   a) change to three times the original value b) change to 1.5 times the original value

   c) change to 0.5 times as the original value d) remain the same as the original value

2. The unit of flux density is

   a) Wb/m^2 b) Weber c) Wb/m d) Weber- meter

3. When a synchronous motor is running at synchronous speed, the damper winding produces

   a) Damping torque b) eddy current torque

   c) Torques aiding the developing torque d) no torque

4. Which of the following statements regarding skewing of motor bars in a squirrel-cage induction motor are correct?

   a) It prevents cogging; b) It produces more uniform torque.

   c) it increases starting torque. d) It reduces motor 'hum' during its operation.

5. An induction motor is

   a) Self starting with high torque. b) Self Starting with low torque.

   c) Self starting with zero torque d) Not- self starting

6. Speed of the stator field of an Induction motor is

   a) Synchronous speed b) Any speed c) Less than Synchronous d) Slip Speed

7. The starting torque of a 3-phase induction motor can be increased by increasing

   a) the rotor reactance b) the rotor resistance c) the stator resistance d) External resistance

8. What determines the thermal loading on the motor?

   a) Duty/Load cycle b) Temperature of the winding

   c) Torque of the motor d) Ambient conditions

9. Which of the following can be used to control the speed of a DC motor?

   a) Thermistor b) Thyristor c) Thyratron d) Transistor

10. During dynamic braking of induction motor

a) Starter connection are reversed b) Motor is used as an induction generator

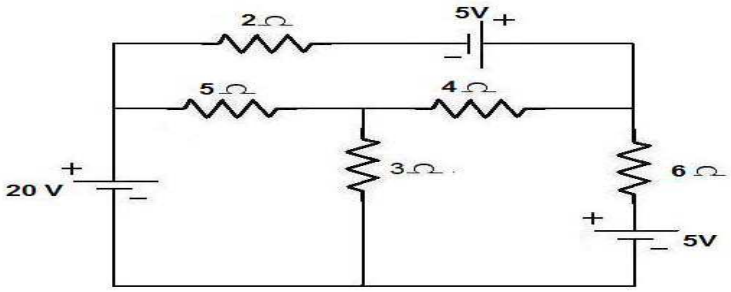
c) Stator winding is excited by direct current d) fictitious load is applied on motor

PART B (10 x 2 = 20 Marks)

11. Explain the terms (a) instantaneous value and (b) average value for an ac signal.
12. State Faraday's Law of Electromagnetic Induction.
13. Draw the speed-torque characteristics of series and shunt motors.
14. List the difference between squirrel cage and slip ring induction motor.
15. What are the necessities of a starter?
16. Define electrical breaking.
17. What is an electric drive?
18. Name any four classes of duty.
19. List the various methods of controlling speed of dc shunt motor?
20. What are the solid state speed control methods used in dc motors?

PART C (5 x 14 = 70 Marks)

21. a) Using Mesh analysis, find current through 4 ohm resistor.



(OR)

b) (i) State and explain Kirchoff's law. (7)

(ii) Explain the principle of operation of single phase 2-winding transformer. (7)

22. a) Explain the principle of operation of a DC generator and derive the emf equation. Discuss in detail about the construction of DC generator with the neat sketch.

(OR)

b) (i) Explain the principle of operation of single phase induction motor (7)

(ii) Write short notes about universal motor. . (7)

23. a) Explain the various methods of speed control of 3Φ induction motor..

(OR)

b) A 500 V dc shunt motor has armature and field resistances of 1.5Ω and 400Ω respectively. When running on no load the current taken is 5A and the speed is 1500 rpm. Calculate the speed when the motor is fully loaded and the total current drawn from the supply is 30A. Also estimate the speed at this load if the shunt field current is reduced by 15%.

24. a) Write short notes about cooling curve and heating curve of an electric drive.

(OR)

b) What are the factors governing the selection of motor for the particular applications? And explain.

25. a) Explain clearly with diagrams chopper control on D.C series motor.

(OR)

b) How the speed of the induction motor is controlled by controlling the number of stator poles.

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