

[Total No. of Questions - 9] [Total No. of Printed Pages - 3]  
(2125)

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B. Tech 4th Semester Examination

Electrical Machines-II (OS)

EE-4002

Time : 3 Hours

Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

**Note :** Attempt five questions in all, selecting one question each from section A, B, C & D. Section-E is compulsory.

**SECTION - A**

1. (a) Discuss briefly torque-slip characteristics of poly phase induction motors. What do you mean by pull out torque? (10)
- (b) Derive an expression between rotor copper loss and rotor input by making use of equivalent circuit related parameters. (10)
2. (a) A 3 phase induction motor at rated voltage and frequency has a maximum torque of 225 percent and a starting torque of 150 percent of full load torque. Neglect stator resistance and rotational losses and assume constant rotor resistance. Calculate the slip at maximum torque. (12)
- (b) Draw power flow diagram for a 3-phase induction motor. (8)

**SECTION - B**

3. (a) Explain various means to determine efficiency of polyphase induction motors. (10)

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- (b) What is practical significance of circle diagram. (10)
4. (a) What do you mean by double revolving field theory? How rotor slip is evaluated for 1-phase induction motor? (10)
- (b) Explain one method of starting of single phase induction motor. (10)

**SECTION - C**

5. (a) State various advantages of rotating field alternators. (8)
- (b) A 100 kVA 415 V (line) star connected synchronous machine generates rated open circuit voltage of 415 volt at a field current of 15 ampere. The short circuit armature current at a field current of 10 Ampere is equal to the rated armature current. Then what will be the value of synchronous impedance (line) of the synchronous machine? (12)
6. (a) State the causes of harmonics in synchronous generators. How these can be minimized? (8)
- (b) Discuss constant flux linkage theorem in relation to synchronous machines. (8)
- (c) Why cooling is important for synchronous generators? (4)

**SECTION - D**

7. (a) Explain V-curves as applicable for synchronous motors. (10)
- (b) Derive power flow equation for synchronous motor. (10)
8. (a) How synchronous motors are started in industries? (10)
- (b) Enumerate comparison between a polyphase induction motor and a synchronous motor. (10)

**SECTION - E**

9. (a) What do you mean by reluctance torque?
- (b) Draw phasor diagram of a 3-phase induction motor.
- (c) Discuss one method of speed control of wound rotor induction motor from rotor side.
- (d) How starting torque of cage motors can be made high?
- (e) What tests are conducted to determine equivalent circuit parameters of induction motors?
- (f) What is two reaction theory as applicable to synchronous machines?
- (g) What do you mean by symmetrical short circuit transients?
- (h) State necessary and sufficient conditions for parallel operation of alternators.
- (i) What do you mean by torque angle of synchronous motors?
- (j) State practical significance of synchronous condenser.  
(2×10=20)