



(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 132603**

Roll No.

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## B. Tech.

(SEM. VI) THEORY EXAMINATION, 2014-15  
ELECTRICAL MACHINES

Time : 2 Hours]

[Total Marks : 50

**Note :** All questions are compulsory.

1 Attempt any two parts of the following :  $7 \times 2 = 14$

- (a) Derive the expression for the generated e.m.f in A.C. machine.
- (b) Define the term Coil-span factor and distribution factor and Calculate the fundamental, 3<sup>rd</sup> and 5<sup>th</sup> harmonic breadth factor for a stator with slots 36 for 3-phase and 4 poles.
- (c) A 4-pole, lap- wound D.C. machine has 728 armature conductors. Its field winding is excited from a D.C. source to create an air gap flux of 32m wb/pole. The generator is run from a prime mover at 1600 rpm. It supplies a current of 100 A to the load.
  - (i) Calculate the electromagnetic power developed.
  - (ii) What is the torque provided by the prime mover?

**2** Attempt any two parts of the following **6×2=12**

- (a) Define the following terms in the context of D.C. machine
- (i) Armature Reaction
  - (ii) Commutation
  - (iii) Compensating winding
- (b) Explain the different methods of speed control of D.C. motor.
- (c) What do you mean by Braking of D.C. motor? Explain the different types of Braking.

**3** Attempt any two parts of the following : **6×2=12**

- (a) Explain the e.m.f. method of determining the voltage regulation of an alternator.
- (b) What is the need of parallel operation of alternator? Write the necessary conditions for parallel operation.
- (c) A 3- $\phi$ , 1500 KVA, star-connected, 50 Hz, 2300V, alternator has a resistance between each pair of terminals as measured by direct current is  $0.16\ \Omega$ . Assume that the effective resistance is 1.5 times the ohmic resistance. A field current of 70 A produces a short-circuit current equal to full-load current of 376 A in each line. The same field current produces an emf of 700V on open circuit. Determine the synchronous reactance of the machine and its full load regulation and 0.8 power factor lagging.

4 Attempt any two parts of the following : **6×2=12**

- (a) Draw the speed-torque or slip-torque characteristic of Induction motor. Derive the expression for maximum torque of Induction motor.
- (b) Explain the Direct on line starting and Auto-transformer starting of three-phase Induction motor.
- (c) Explain the construction and operation of Commutator motor with neat and clean diagram.
- (d) Why is single phase Induction motor not self-starting? Give different methods of its starting.

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