

Total No. of printed pages = 3

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2022

BINA CHOWDHURY CENTRAL LIBRARY
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Azara, Halkhowapara,
Girwahati - 781017

B.Tech. 4th Semester End-Term Examination

ELECTRO TECHNOLOGY

(New Regulation)

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer Question No.1 and any *four* from the rest.

1. Answer the following questions : (10 × 1 = 10)
- (a) A triplex wave winding will have _____ parallel paths.
 - (b) The greatest eddy current loss occurs in the _____ of a dc machine.
(armature/field poles/yoke)
 - (c) The mechanical power developed in a dc motor is maximum when back emf is equal to _____ the applied voltage.
 - (d) For the same rating _____ motor has the least starting torque.
(cumulatively-compounded/series/shunt)
 - (e) When the rotor of a 3 phase induction motor is blocked, the slip is _____
(zero/0.5/0.1/1)
 - (f) If a 3 phase induction motor is running at slip S, the approximate efficiency of the motor is _____
 - (g) A turboalternator uses _____ field structure.
(salient pole/non salient pole)
 - (h) The field winding of an alternator is _____ excited. (AC/DC/Both)
 - (i) An under-excited synchronous motor behaves as _____
(capacitor/inductor/resistor)
 - (j) The speed of a synchronous machine having 12 poles and frequency 50Hz is _____ rpm

[Turn over

2. (a) Explain the construction and working principle of a DC Generator. (5)
- (b) Derive the condition for maximum efficiency in a DC Machine. (5)
- (c) The armature of a DC generator consists of 40 coils and each coil has 20 turns. When the armature is rotated at 200 rad/s in a 4 pole field structure having a flux of 5m Wb/pole and there are four paths in the armature, calculate (5)
- (i) no of armature conductor
- (ii) the voltage between brushes generated by armature.
3. (a) Derive the condition for maximum power in a DC Motor. (5)
- (b) What do you mean by commutation process in a DC machine? What are the methods to improve commutation? (5+2=7)
- (c) Write the losses in a DC Motor. (3)
4. (a) Define Slip. Explain the principle of operation of three phase induction motor. (7)
- (b) A 4 pole 3 phase 50Hz induction motor has a star connected rotor. The rotor has a resistance of 0.1ohm per phase and stand still reactance of 2ohm per phase. The induced emf between the slip rings is 100V. If the full load speed is 1460rpm, calculate (8)
- (i) slip
- (ii) the emf induced in the rotor in each phase
- (iii) the rotor reactance per phase
- (iv) the rotor current and
- (v) rotor power factor.
5. (a) Derive the expression for the induced emf for an alternator. Why are alternators rated in KVA? (6)
- (b) A 1200KVA, 3300V, 50Hz three phase star connected alternator has armature resistance of 0.25 ohm per phase. A field current of 40A produces a short circuit current of 200A and an open circuit emf of 1100V line to line. Find the voltage regulation on full load 0.8 power factor lagging. (7)
- (c) Define Synchronizing Power of Alternator. (2)

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6. (a) Explain the construction and working principle of Capacitor Start Induction motor. (5)
- (b) A 3 phase 6000kW, 4kV, 180rpm, 50Hz motor has per phase synchronous reactance of 1.2ohm. At fullload, the torque angle is 20 degree electrical. If the generated back emf per phase is 2.4kV, calculate the mechanical power developed. What will be the maximum mechanical power developed? (7)
- (c) Define Armature Reaction and Hunting of Synchronous Machines. (3)
7. (a) Write short notes on synchronous impedance method of alternator. (5)
- (b) Define Pitch factor and distribution factor of alternator with expressions. (5)
- (c) Define Synchronous Speed. Why cannot 3 phase induction run at synchronous speed? (5)

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