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

DEC-25-0047

EEPC-411 (Electrical Machines-II (EE.EEE))

B.Tech.-4th NEP

Time : 3 Hours **Max. Marks : 60**

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, select one question each from section A, B, C, D. Section E (Question-9) is compulsory.

Section-A

1. (a) Why is a rotating field winding system used in preference to stationary filed winding system? (6)

   (b) What is the significance of winding diagram? What are the advantages of fractional slot winding over integral slot winding? (6)

2. (a) Explain the effect of distribution of winding and use of short-pitch coil on the magnitude of the generated voltage. (6)

   (b) A 3-phase, 6 pole, star-connected alternators revolves at 1000 r.p.m. the stator has 90 slots and 8 conductor per slot. The flux per pole is 0.05 Wb. Calculate the voltage generated by the machine if the winding factor is 0.96. (6)

Section-B

3. (a) Explain how rotating magnetic fields are produced by two-phase currents. (6)

   (b) In uniform air gap machine, show that the space harmonics present in the rotating m.m.f wave, generate only fundamental frequency voltage in stator winding. (6)

4. (a) Demonstrate with the help of diagram magnetic field produced by single winding carrying fixed current. (6)

   (b) Explain how rotating magnetic fields are produced by three-phase current. (6)

Section-C

5. (a) Sketch the typical torque speed characteristics of an induction motor. How is this characteristic modified, if its rotor-circuit resistance is increased? (6)

   (b) Develop the phasor diagram for a polyphaser induction motor. How does it differ from the phasor diagram of a transformer? (6)

6. (a) Explain the principle of operation of a self-excited three phase induction generator. Give the condition under which this generators may fail to build up. (6)

   (b) Draw the equivalent circuit of single phase induction motor and obtain therefrom approximate equivalent circuit stating the various assumption made. (6)

Section-D

7. (a) Give the constructional details of rotor of both salient-pole and cylindrical-rotor synchronous machines. (6)

   (b) Derive an e.m.f expression for an alternator from fundamentals showing clearly the expressions for Pitch and distribution factors. (6)

8. (a) Define the V-curves and inverted V-curves at different loading conditions of synchronous motors. (6)

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(b) Explain the effect of armature flux on the main field flux of a synchronous generator at (a) zero lagging power-factor load. (b) zero leading power-factor load. (6)

Section-E (Compulsory)

9. (a) Explain how the wave shape of the induced e.m.f in an alternator can be made more towards a sinewave by using distributed winding and short-pitch coils.

(b) Illustrate with the help of neat diagrams, the nature of the magnetic field produced when a two-phase supply is connected across a two-phase winding.

(c) Explain the principle of working of a three-phase induction motor on the basis of the concept of alignment of magnetic fields.

(d) Explain why the stator and rotor cores of an induction motor are made of magnetic material.

(e) Draw the phasor diagram of a synchronous generator on load. Explain the meaning of synchronous reactance.

(f) Explain why efforts are made to generate sinusoidal induced e.m.f in an alternator. (6×2=12)