

Sample Question Paper

Course Name : Diploma in Electrical Engineering Group

Course Code : EE/EP

Semester : Fifth

Subject Title : A.C. machine

Marks : 100

17511

Time: 3 hrs

Instructions:

1. All questions are compulsory
2. Illustrate your answers with neat sketches wherever necessary
3. Figures to the right indicate full marks
4. Assume suitable data if necessary
5. Preferably, write the answers in sequential order

Q1 A) Attempt any Three of the following

(12 Marks)

- i) State the method of slip measurement and describe tachometer method
- ii) Define synchronous speed, slip and slip speed for an induction motor.
- iii) Draw and label the neat sketch of autotransformer starter.
- iv) Define Pitch factor & Distribution factor and state the advantages of short pitched coils for an alternator.

Q1 B) Attempt any One of the following

(06 Marks)

- i) Describe star delta starter with neat labeled diagram. State its necessity for three-phase induction motor.
- ii) Describe with neat sketch the principle of operation of permanent magnet stepper motor.

Q2. Attempt any Four of the following.

(16 Marks)

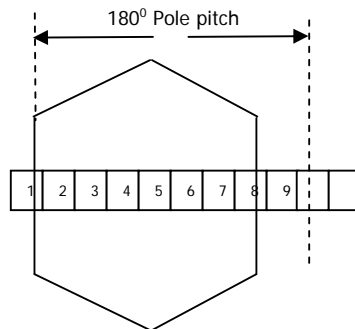
- a) Describe the principle of operation and working of a three-phase induction motor.
- b) Draw power stages of three phase induction motor. Derive relation for rotor copper loss.
- c) Compare salient pole and smooth cylindrical pole type alternators on the basis of Speed, rotor axial length, rotor diameter and windage loss.
- a) Describe working of linear induction motor.
- b) A three phase 16 pole alternator has a star connected winding with 144 slots and 10 conductors per slot. The flux per pole is 0.03 wb sinusoidally distributed and the speed of prime mover is 375 rpm. Find the frequency, phase and line emfs assuming full pitched coils.
- f) A motor is to be operated from 230 V, 50 HZ, single phase AC & 220 V DC supply. Identify above motor and describe its working with neat sketch.

Q3. Attempt any Four of the following.**(16 Marks)**

- Distinguish between squirrel cage & slip ring induction motor on the basis of rotor construction, starting torque, efficiency.
- Derive expression for torque under running condition for an induction motor.
- A 3300 V, 50 Hz star connected alternator has a full load current of 90 A.
When the output terminals of alternator are shorted a field current of 6 A produces a full load current. The open circuit emf for the same field current was 1000 V. If the armature resistance per phase is 0.5Ω , find voltage regulation at 0.8 pf lagging.
- Describe concept of synchronous impedance. Also define the terms leakage reactance, armature reaction reactance with respect to an alternator.
- Describe with phasor diagrams phase splitting technique in capacitor start –run induction motor.

Q4 A) Attempt any Three of the following.**(12 Marks)**

- The power input to six pole, three phase, 50 Hz induction motor is 42 KW, the speed being 970 rpm. The stator losses are 1.2 KW and the friction windage losses are 1.8 KW. Find i) Slip, ii) rotor output, iii) rotor copper losses, iv) efficiency.
- State with reasons the three phase induction motor is used for Conveyor belts, Lift, Tube well and lathe machine.
- Calculate pitch factor for following coil span if the alternator has 36 slots & 4 poles.



- Two alternators are operating in parallel and supply a load of 10 MW at 0.8 lag. The output of one of the alternator is adjusted to 6 MW at 0.92 lag. Find pf of the other alternator.

Q4 B) Attempt any One of the following**(06 Marks)**

- Describe armature reaction with flux distribution wave forms of a three phase alternator when the nature of load on the alternator is resistive, purely inductive and purely capacitive.
- Describe the factors affecting the regulation of three phase alternator and draw the phasor diagrams of loaded alternator when operating power factor is lagging.

Q5. Attempt any FOUR of the following.**(16 Marks)**

- Describe stroboscopic method for measurement of slip with neat sketch.
- An induction motor runs at 1780 rpm when fed from 60 Hz supply. Calculate slip, slip speed & frequency of rotor induced emf.

- c) State why synchronizing of the alternators is necessary. State conditions for synchronization.
- d) Describe the effect of change in excitation of an alternator operating in parallel.
- e) Describe working of a.c. series motor using phasor diagram.
- f) Describe the construction of two phase servomotor.

Q6. Attempt any FOUR of the following.

(16 Marks)

- a) State various types of single phase induction motors and their applications.
 - b) Draw torque- speed characteristics of a.c. series motor. State its any two applications.
 - c) Define the terms pitch factor and chording factor.
 - d) Describe with neat sketch the working of shaded pole Induction motor.
 - e) Describe, why single phase induction motors are not self starting?
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