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Q(1)

Ans=> In A.C. motors, The rotor does not receive electric power by conduction but by induction in exactly the same way as the secondary of a 2- winding T/F receives it's power from the primary. That is why such motors are known as induction motor's.

P.T.O

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Advantage & disadvantages of induction motor

Advantages

=> The working of an induction motor is very simple. it can operate in any environmental condition. The construction of an induction motor is robust and sturdy

=> it is very chep in cost to compare other motor

=> it is highly efficient motor The efficiency of Im is varying From 85 to 95%. P.T.O

=> The maintanence of Im. is very Less compared to the DC motor and Synchronous motor.

=> The speed variation from no Load to rated Load is very Less

Disadvantages
// - // - // - //.

=> The Power factor of the motor is very Low during the Light Load condition.

=> Single - phase induction motor is not self starting. it requires some auxiliary for starting →

=> The - three phase induction motor is constant speed motor. The change in speed of the motor is very Low during different Loading condition. so, the speed control of IM is difficult.

=> the motor cannot use in such applications where high starting torque is necessary Like traction and lifting weight.

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Q(2)

Solution:- Since N is 290 rpm; N has
〃- 〃- 〃-

To be somewhere near it say

300 rpm If N_s is assumed as

300 rpm Then $300 = 12 \times 50/P$

Hence, $P = 20$

$\therefore S = (300 - 290)/300 = 3.33\%$

(Q3)

solution:- 100 alternations/minute = $\frac{100}{60}$ cycles/sec

1.6667 Hz = sf

Hence, the slip

$$s = \frac{1.6667}{50} = 0.3333 \text{ P.U. or } 3.33\%$$

(ii) rotor speed

$$N = (1-s)\,N_s = (1-0.03333) \times 1000$$

Since

$$N_s = \frac{120 \times 50}{6} = 1000 \text{ rpm}, \quad N = 966.67 \text{ rpm}$$

(iii) rotor copper Losses/phase = $\frac{1}{3} \times (s \times \text{rotor input})$

Total rotor power input = 80 kw

rotor power input per phase = 80/3 kw

rotor copper Losses per phase

$$= \frac{0.833 \times 80}{3} \text{ kw} = 0.8888 \text{ kw}$$

Q(4)

Ans =>

Principle of Alternator:

=> An alternator is defined as a machine or generator which Produce Ac supply and it converts mechanical energy into electrical energy. so it is also called an Ac generator or synchronous generator. There are different Type of alternators based on applications and design the marine Type alternator

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Automotive Type alternator Diesel electric Locomotive Type alternator. Brushless Type alternator. & Radio alternators are the Type of alternators based on the applications. The salient pole Type & cylindrical rotor Type are the Types of alternator based on the design.

Construction of alternator

=> The main Component of an alternator or synchronous generator are rotor & stator.

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The main difference b/w them

The rotor is rotating part of stator is not a rotating component

The motors are generally run by rotor of stator.

The construction of stator of an alternator is equal to the construction ~~of synchronous motor construction~~ of the stator of an induction motor. So induction motor construction of synchronous construction are same. rotor rotate inside of the stator. The rotor is located on the stator shaft

P.T.O

and the series of the electromagnets arranged in a cylinder causing the rotor to rotate and create a magnetic field

Q5

Solution=>

$$f = PN/120 = 6 \times 375/120 = 50\ Hz$$

Since Ice is not given, it would be taken as unity.

$$n = 144/16 = 9; \beta = 180°/9 = 20°; m = 144/16 \times 3 = 3$$

$$K_d = \sin 3 \times (20°/2) / 3 \sin (20°/2) = 0.96$$

$$Z = 144 \times 10/3 = 480; \quad \overline{T} = 480/2 = 240/\text{phase}$$

$$E_{ph} = 4.44 \times 1 \times 0.96 \times 50 \times 0.03 \times 240$$

$$= 15.34\ V$$

Line voltage

$$E_L = \sqrt{3}\, E_{ph} = \sqrt{3} \times 1534 = 2658\ V$$

Q(6)

Ans:- There are various connection of Three phase Transformer.

(i) Star star connection

=> In the star star arrangement each Transformer has one terminal connected to common junction

(ii) Delta star connection.

=> A delta star connection is a type of Three phase electric power T/F design employes delta - connected winding on its primary & star connected windings on the secondary. A neutral wire can be provided on wye side

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(3) open Delta connections.
" - " " "

=> A usually Temporary or emergency connection of three - phase electrical ckt in which one of the Three Transformers is omitted & its load carried by the Two T/F called also V-connections

(4) Scott connection=>
" " " "

=> A scott connection Transformer is a Type of ckt used To produce Two phase electric Power from a three phase source or vice versa. The scott connection evenly distributes a balance load b/w the phase of source.

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Q(7)

Solution:-

Transformation ratio

$$K = \frac{11,000}{\sqrt{3} \times 33,000} = \frac{1}{3\sqrt{3}}$$

Per phase

$$R_{02} = 0.876 + (1/3\sqrt{3})^2 \times 35 = 2.172\,\Omega$$

Secondary phase current

$$= \frac{500,000}{\sqrt{3} \times 11,000} = \frac{500}{11\sqrt{3}}\ A$$

Full Load Condition

Full Load condition cu loss

$$= 3 \times (500/11\sqrt{3})^2 \times 2.172 = 4,690\ W$$

iron Losses
= 3,050 W

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Total Full-load losses

$= 4,490 + 3,050 = 7,540$ W; output at unity p.f $= 500$ kW

$\therefore$ F.L. efficiency $= 500,000/507,540$

$= 0.9854$ or 98.54%; output at

0.8 p.f. $= 400$ kW

$\therefore$ Efficiency $= 400,000/407.540$

$= 0.982$ or 98.2%

Half-load codition

output at unity p.f $= 250$ kW

Cu losses $= (1/2)^2 \times 4,496$

$= 1,222$ W

Total Losses

$= 3,050 + 1,122 = 4,172$ W

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Q(8)

Q1, What is the general system requirment of alternator?

Ans=> For the generation of emf there should be two basis system

(i) Armature system which houses the conductors on which the EmF is To be induced

(ii) ~~wi~~ magnetic field system to produce the magnetic field.

Q(2) Will the alternators have rotating armature system or stationary armature system?

Ans-> Generally in alternators, the armature is stationary and

P. T. O

The field rotates. Small Low voltage alternators often have a rotating armature and a stationary field winding. But in large alternators rotating armature field type is used

Q(3) what are the advantages of stationary armature and rotating field system?

Ans = (i) the stationary armature coils can be insulated easily

(ii) Higher peripheral speed can be achieved in the rotor.

(iii) cooling of the winding is more efficient.

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(iv) only Two Slip rings are required To give DC supply to the field system.

(v) output current can be easily supplied to the load circuit. Slip rings and brushes are not necessary.

Q(4) what are the advantages of Three Phase motor over single phase motor?

Ans=> (1) Higher starting torque.
(2) improved speed regulation
(3) Less vibration
(4) quieter operation compared To the single phase motor

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Q(5) what is meant by Turbo alternator?

Ans=> Turbo alternator are high speed alternator. Because of high speed rotation, the rotar diameter is reduced and the axial length is increased. Two or four poles are gnerally used Ep ~~system~~ steam turbines are used as prime movers.