Department of Electrical Engineering
Assignment
Date: 20/08/2020

<u>Course Details</u>

Course Title:	Machine 2	**Module:**	B-Tech
Instructor:		**Total Marks:**	30

<u>Student Details</u>

Name:		**Student ID:**	

(Q1) Fill in the blanks?(5 Marks)

(1)Induction motor was invented by ……………………… In …………..

(2)The Stator of the induction motor is ,in principle ,the same as that of ……………………………

(3)Greater the no of poles in induction machine ……………..the speed.

(4)The stator winding when supplied with three phase currents,produce a magnetic flux which has ……………………..magnitude.

(5)Motors employing wound rotor are known as ……………………. Motors.

(Q2) Multiple choice questions?(5 Marks)

(1)Regarding skewing of motor bars in squirrel cage induction motor ,which statement is false?

(a)it prevents cogging (b)it increases starting torque (c)it produces more uniform torque (d)it reduces motor 'hum' during its operation

(2)The principle of operation of a 3-phase induction motor is most similar to that of a

(a)synchronous motor (b)repulsion start induction motor (c)transformer with a shorted secondary (d)capacitor –start ,induction run motors

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Q(1) Fill in The blanks?

(1) Nikola Tesla in 1885

(2) Synchronous Motor

(3) Lesser

(4) of constant

(5) Slip ring

Q(2) Multiple choice questions?

(1) C

(2) C

(3) C

(4) C

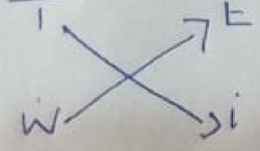
(5) C

Q(3)

Ans=> In case of Generator
=> The input domain is mechanical domain. so Therfore The Potential and Kinetic variable are Torque & w output domain which is Ac electric Power which will have Potential variable E (induced emf) and Kinetic variable will be current

Relationship of input & output

=>



=> we have a relation b/w Torque and current, Emf and w.

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Q(4)

Ans:=> As a general rule, conversion of electrical Power in to mechanical Power take place in The rotating Part of an electric motor. In dc motors The electric Power is conducted directly To The armature (i.e rotating Part) Through brushes and commutor. Hence in This sense, a dc motor can be Called a conduction motor. However in a.c motor, The rotor does not recieve electric Power by conduction but by induction in exactly the

->

→ The same way as the secondary of a 2-winding Transformer recieaves its Power from the primary. That is why such motor known as induction

Working of synchronous machine

⇒ Synchronous motor has a stator with 3-phase winding the 3 phase currents Through This winding produce a rotating magnetic field in the space enclosed by stator. The speed of This field is proportional to the frequency and the number of Poles. it is the same phenomena like in induction motor. The rotor has a winding That creates.

P.T.O

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-> Dc magnetic poles when Dc current is passed Through it. The terminals of This winding is connected to slip rings on the rotor shaft Through which Dc current is passed by brushes connected To Dc volts source. The rotor rotates in The direction of the stator rotating field such That The Dc field Locks with The stator field. Load on the motor does not change the speed of rotor. it only makes the rotor field Lag by a small angle wrt to The stator field.

P.T.O

=>Why it uses separate dc source?

=> Synchronous machine has a field winding has separate dc source for excitation

For example=> if you have a synchronous motor. Then we have to supply Ac power to stator and we have to supply dc power to the field.

Induction machiness=> The rotor actually induce gets its emf from the stator via induction.

-> in synchronous machines usually field is the rotor circuit.

Q5)

Solution:>

(i) $P = 2n$

$P = 2 \times 6 = 12$ Poles

Total No of slots

=> 6 slots/poles/phase × 6 poles × 3 phase

=> 108

(ii) $N_s = \frac{120f}{P} = \frac{120 \times 60}{12} = 600$ r.p.m.

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Q(6)

Solution => stator field revolves at synchronous speed given by.

(i)

$$N_s = \frac{120f}{P}$$

$$N_s = \frac{120 \times 50}{8}$$

$$\boxed{N_s = 750 \text{ r.p.m}}$$

(ii) rotor speed.

$$N = N_s (1 - s)$$

$$N = 750 (1 - 0.001)$$

$$\boxed{N = 749}$$

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=>

(3)

$f' = sf$

$f' = 0.005 \times 50$

$f' = 0.25$

$f' = 0.25 \times 60$

$\boxed{f' = 15}$

Here s is 0.001 because in case of rotor it should be less Than the stator

(4) Since of stand still $s = 1$

$f' = sF = 1 \times 50 = 50 Hz$