



SF-6505

B. E. II (Sem. IV) (Elect.) Examination

May / June - 2011

Electrical Machine : Paper - II

Time : 3 Hours]

[Total Marks : 100

Instructions :

(1)

નીચે દર્શાવેલ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="checkbox"/> B. E. 2 (Sem. 4) (Elect.)	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="checkbox"/> Electrical Machine : Paper - 2	<input type="text"/>
Subject Code No. : <input type="text"/> 6 <input type="text"/> 5 <input type="text"/> 0 <input type="text"/> 5	<input type="text"/>
Section No. (1, 2,.....) : <input type="text"/> 1&2	<input type="text"/>
	Student's Signature

- (2) All questions are compulsory.
- (3) Write both sections in separate answer book.
- (4) Draw figure wherever necessary and make necessary assumptions wherever required.
- (5) Figures to right indicate full marks.
- (6) Please write the answer in point-wise and try to avoid essay type answer.

SECTION - I

- 1 (a) Answer in brief : 10
- (i) The most suited type of three-phase induction motor for obtaining high starting torque is _____.
(Squirrel cage/Phase wound)
 - (ii) The stator of three-phase induction motor is laminated in order to reduce_____ losses.
(Magnetization losses/Eddy current losses)
 - (iii) Blocked rotor test on an Induction motor is equivalent to _____ test on a transformer. (Open circuit/short circuit)
 - (iv) In a three-phase induction motor, the rotor input per phase is 5 kW. The motor is running at a slip of 5%. What will be the rotor copper losses per phase ?
 - (v) Why iron losses in the rotor of three-phase induction motor are negligibly small ?

- (b) Answer in short : 10
- (i) List out : Main parts of an induction motor.
- (ii) List out : Types of an Induction motor.
- (iii) List out : Methods of starting of an Induction Motor.
- (iv) List out : Data needed to draw a circle diagram.
- (v) List out : Disadvantage of an Induction motor.
- 2 (a) Explain how the rotor develops torque and rotates in the same direction of rotation of MMF when the stator of the induction machine is connected to rated supply. Why rotor does not catch synchronous speed ? 7
- (b) A 4 pole, 50 Hz, 7.46 kW motor has, at rated voltage and frequency, a starting torque of 160 percent and a maximum torque of 200 percent of full-load torque. 8
- Determine :
- (i) Full-load speed
- (ii) Speed at maximum torque.

OR

- 2 (a) Explain torque-slip and torque-speed curves of 3-phase induction motor. 7
- (b) Draw exact equivalent circuit of induction motor. Write its voltage and current equations. 8
- 3 Short notes (any **three**) 15
- (a) Discuss : Speed control of 3-phase Induction motor.
- (b) Compare : 3-phase squirrel cage induction motor and 3-phase slip ring induction motor.
- (c) Discuss various methods of starting an induction motor.
- (d) Explain construction of 3-phase induction motor.
- (e) Explain : Power stages of 3-phase induction motor.

SECTION - II

- 4 (a) Answer in brief : 10
- (i) The frequency of voltage generated by an alternator having 4-poles and rotating at 1800 rpm is _____ Hz.
- (ii) Define : Pitch Factor.
- (iii) When alternators are running in parallel, their kW load share is changed by _____ and their kVA load share is changed by _____.
- (iv) What is Distribution factor ?
- (v) 'V-curves' of synchronous motor gives relation between _____ and _____.

- (b) Compare Rotating field-Static armature type alternator over Rotating armature-Static field type alternator type construction. 10

- 5 (a) Explain the ZPF method for finding the voltage regulation in brief. 7
- (b) The open-circuit test and short-circuit test data for a 3-phase, Y-connected 1000-kVA, 2000-V, 50 Hz, synchronous generator are : 8

Field Amps	10	20	25	30	40	50
O.C. Terminal V	800	1500	1760	2000	2350	2600
S.C. armature current in A	--	200	250	300	--	--

The armature effective resistance is $0.2\ \Omega$ per phase. Draw the characteristics curves and estimate the full-load percentage regulation at (a) 0.8 p.f. lagging (b) 0.8 p.f. lagging.

OR

- 5 (a) Compare Synchronous-motor with Induction-motor. 7
- (b) The open-and short-circuit test readings for a 3-phase, Y-connected, 1000-KVA, 11kV, 50 Hz, synchronous generator are : 8

Field Amps	40	50	110	140	180	
O.C. Terminal V	5800	7000	12500	13700	15000	
Line votat zero p.f.	0	1500	8500	10500	12500	--

The armature effective resistance is $2\ \Omega$ per phase. Draw the characteristics curves and estimate the full-load percentage regulation at 0.8 p.f. lagging by Potier method.

- 6 Answer any **three** : 15
- (a) Explain how will you find out synchronous impedance of a 3-phase synchronous machine in laboratory.
- (b) Write the conditions for parallel operation of an alternator with infinite bus-bar.
- (c) Derive the emf equation of an alternator.
- (d) Draw phasor diagram of cylindrical rotor alternator at lagging and leading power factor.
- (e) Synchronous motor as a power-factor corrective device.