



**RM-6505**

**B. E. - II (Sem. IV) (Electrical) Examination**

**May / June - 2010**

**Electrical Machine : Paper - II**

Time : 3 Hours]

[Total Marks : 100

**Instructions :**

(1)

नीचे दृष्टावित्त निशानीवाणी विगतो उत्तरवडी पर अवश्य लखवी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="text" value="B. E. - 2 (Sem. 4) (Electrical)"/>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="text" value="Electrical Machine - 2"/>	<input type="text"/>
Subject Code No. : <input type="text" value="6"/> <input type="text" value="5"/> <input type="text" value="0"/> <input type="text" value="5"/>	<input type="text"/>
Section No. (1, 2,.....): <input type="text" value="1&amp;2"/>	<input type="text"/>
	Student's Signature

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

**SECTION - I**

- 1 (a) Fill in the blanks : 10
- (1) The most suited type of three-phase induction motor for obtaining high starting torque is \_\_\_\_\_.  
(Squirrel cage / Phase wound)
  - (2) The stator of three-phase induction motor is laminated in order to reduce \_\_\_\_\_ losses.  
(Magnetization losses / Eddy current losses)
  - (3) Blocked rotor test on an induction motor is equivalent to \_\_\_\_\_ test on a transformer.  
(Open circuit / Short circuit)
  - (4) In the circle diagram for a three-phase induction motor, the diameter of the circle is determined by \_\_\_\_\_.  
(Rotor current / Stator current)
  - (5) The effect of increasing the length of air-gap in an induction motor will be to increase the \_\_\_\_\_.  
(Air-gap flux/magnetizing current)

- (b) Answer in short : 10
- (1) List out : Main parts of an induction motor.
  - (2) List out : Types of an induction motor.
  - (3) List out : Methods of starting of an induction motor.
  - (4) List out : Data needed to draw a circle diagram.
  - (5) List out : Disadvantage of an induction motor.
- 2 (a) Draw exact equivalent circuit of induction motor. 6  
Write its voltage and current equations.
- (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. 6  
Determine :
- (1) Full-load speed
  - (2) Speed at maximum torque.

**OR**

- 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 ? 6
- (b) The power input to the rotor of a 400 V, 50 Hz, 6 Pole, three-phase induction motor is 75 kW. The rotor is observed to make 100 complete alteration per minute. 6  
Calculate :
- (1) Slip
  - (2) Rotor speed
  - (3) Rotor copper loss per phase
  - (4) Mechanical power developed.
- 3 Answer any three : 18
- (1) Write a short note on Induction generator.
  - (2) Explain : Construction of 3-phase induction machine.
  - (3) Explain : Any one method of speed control of 3-phase induction motor.
  - (4) Discuss : Torque-Speed characteristics of 3-phase induction motor.
  - (5) Compare : 3-phase squirrel cage induction motor and 3-phase slip ring induction motor.

**SECTION - II**

- 4 (a) Answer in short : 10
- (1) List the advantages of using short-pitch winding in alternator.
  - (2) Define : Pitch factor.

- (3) When alternator are running in parallel, their kW load share is changed by \_\_\_\_\_ and their kVA load share is changed by \_\_\_\_\_.
- (4) What is Distribution factor ?
- (5) For a 4 pole synchronous machine revolving at a speed of 1800 rpm. The emf generated in the winding will have the frequency of \_\_\_\_\_ Hz.
- (b) Discuss advantages and disadvantages and applications of rotating field Static armature over Rotating armature - Static field type alternator. **10**

- 5 (a) Explain how will you find out synchronous impedance of a 3-phase synchronous machine in laboratory. **7**
- (b) The open-and short-circuit test readings 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. leading.

**OR**

- 5 (a) Explain the ZPF method for finding the voltage regulation in brief. **7**
- (b) A 2000 volt 1-phase alternator delivering a current of 100 amp at (i) unity p.f. (ii) 0.8 leading p.f. (iii) 0.71 lagging p.f. Determine the voltage regulation from following test result : **8**
- Test result : Full-load current of 100 amp is produced on short-circuit by a field excitation of 2.5 amp. An e.m.f. of 500 V is produced on open-circuit by same excitation.
- The armature resistance is  $0.8 \Omega$ .

- 6 Short-notes : (any three) **15**
- (1) Write the conditions for parallel operation of an alternator with infinite bus-bar.
- (2) Compare Synchronous - motor with Induction - motor.
- (3) Derive the emf equation of an alternator.
- (4) Synchronous motor as a power-factor corrective device.
- (5) Draw phasor diagram of cylindrical rotor alternator at lagging and leading power factor.