

ELECTRICAL MACHINES - II

(EEE)

Maximum Marks: 100

Date: 06.05.2023

Duration: 3 hours

- Notes:**
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
 3. Part B consists of 4 Units. Answer any two full questions from each unit.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry 2 marks each

(10X10=100 Marks)

	Marks	CO	Bloom Tx
1.a) Define slip?	10	1	L1
b) Why rotor core of induction motor is laminated?	10	1	L2
c) What is the relation between rotor copper loss, rotor input and mechanical power?	10	2	L1
d) List 5 speed control methods of 3 phase induction motor.	10	3	L1
e) Define Power factor.	10	3	L1
f) Explain the effect of resistance in an alternator?	10	3	L2
g) What is a synchronous condenser?	10	4	L1
h) List conditions to be satisfied for parallel operation of alternators?	10	4	L1
i) Write the advantages of universal motor?	10	3	L1
j) Classify different types of synchronous induction motors?	10	5	L2

Part-B

Answer All the following questions.

(5X10=50 Marks)

	Marks	CO	Bloom Tx
1 a) Explain the principle of operation of 3-phase induction motor with the help of reduction of rotating magnetic field?	5	1	L2
b) Explain rotor EMF and rotor frequency in a three-phase induction motor. How do these variables change with slip?	5	1	L2
OR			
2 a) Explain how rotor resistance, rotor current, and power factor vary at standstill and during normal operation in a 3-phase induction motor?	5	1	L2
b) Compare the constructional features of squirrel cage and wound rotor type induction motors.	5	1	L2
3 a) Derive the relation between rotor copper loss, rotor input and mechanical power.	5	2	L3
b) In a 6 pole 3 phase 50Hz induction motor with star connected rotor, the rotor resistance per phase is 0.3 ohms, the reactance at standstill is 1.5 ohms per phase and an e.m.f between the slip rings on open circuit is 173 V. Calculate: a) Slip at a speed of 960 rpm. b) Rotor e.m.f per phase. Rotor frequency and reactance at a speed of 960 rpm.	5	2	L3

OR				
5	a) A three phase, 400V, 100HP, 50Hz, 4-pole induction machine delivers rated output power at a slip of 3%. Determine the i) synchronous speed ii) motor speed iii) frequency of the rotor induced voltage	SM	2	L3
	b) Explain the procedure to conduct no load test and blocked rotor test on three phase induction motor?	SM	2	L2
6	a) Explain the constructional details of salient pole synchronous machines?	SM	3	L2
	b) Derive the expression for EMF equation of three phase synchronous generator.	SM	3	L3
OR				
7	a) Explain the phenomena of armature reaction when an alternator is delivering a load current at $\cos \phi$ is in over factor?	SM	3	L2
	b) Explain the procedural steps to find voltage regulation of synchronous generator by Synchronous Impedance Method?	SM	3	L3
8	a) Explain in detail about synchronous alternator with infinite bus bar?	SM	4	L2
	b) Two generators A and B of rating 250MW each are operating in parallel. Determine the load of 490 MW sharing between A and B generators. Assume the drooping characteristics of A and B are 4% and 5% res. active from no load to full load.	SM	4	L3
OR				
9	a) Explain starting of synchronous machines and methods of its reversion?	SM	4	L2
	b) Explain the different starting methods of synchronous motor.	SM	4	L2
10	a) Explain Double revolving field theory of ϕ in ϕ has induction motor.	SM	5	L3
	b) Describe about capacitor start and capacitor run single phase induction motor.	SM	5	L2
OR				
11	a) Explain in detail about the working principle of a ϕ has motor?	SM	5	L2
	b) Explain the constructional features of ϕ has induction motor?	SM	5	L2