SRM VALLIAMMAI ENGINEERING COLLEGE
(An Autonomous Institution)
SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF
ELECTRICAL AND ELECTRONICS ENGINEERING

QUESTION BANK

IV SEMESTER

EE3461 -ELECTRICAL MACHINES – II

Regulation – 2023

Academic Year 2024-2025 (Even)

Prepared by
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SUBJECT : EE3461 -ELECTRICAL MACHINES - II

SEM / YEAR : II / IV - 2024-2025 (Even)

UNIT-I - THREE PHASE INDUCTION MOTOR				
Constructional details –magnetic fields in rotating machines- Types of rotors – Principle of operation – Slip – cogging and crawling - Equivalent circuit – Torque-Slip characteristics – Condition for maximum torque – Losses and efficiency – Load test - No load and blocked rotor tests - Circle diagram – Separation of losses – Double cage induction motors – Induction generators – Synchronous induction motor.				
PART-A				
Q. No	**Questions**	**BT Level**	**Competence**	**CO**
1.	Demonstrate why the stator core of induction motor made of silicon content steel stamping.	BTL 3	Apply	CO1
2.	Why are the slots on the cage rotor of induction motor usually skewed.	BTL 2	Understand	CO1
3.	Classify the two types of 3-phase induction motor.	BTL 2	Understand	CO1
4.	Describe why an induction motor is called a'rotating transformer'.	BTL 1	Remember	CO1
5.	Why is it objectionable to start large three phase induction motor by switching it directly on the line?	BTL 6	Create	CO1
6.	A 3-phase induction motor is wound for 4 poles and is supplied from 50 Hz system. Calculate the speed at which the magnetic field of the stator is rotating.	BTL 4	Analyze	CO1
7.	Why an induction motor will never run at its synchronousspeed?	BTL 2	Understand	CO1
8.	Define Pullout torque.	BTL 1	Remember	CO1
9.	Describe cogging in an induction motor.	BTL 1	Remember	CO1
10.	What measure can be taken for minimizing the effect ofcrawling in a 3-phase induction motor?	BTL 4	Analyze	CO1
11.	Explain the power development stages in an induction motor.	BTL 3	Apply	CO1
12.	Identify the condition of maximum torque developed inthree phase induction motor.	BTL 1	Remember	CO1
13.	Explain why an induction motor, at no-load, operates atvery low power factor.	BTL 3	Apply	CO1
14.	Describe how do change in supply voltage and frequency affect the performance of a 3-phase	BTL 2	Understand	CO1

	induction motor.				
15.	Generalize why staring torque of a squirrel cage induction motor cannot be altered when the applied voltage is constant.		BTL 6	Create	CO1
16.	State the merits and demerits of double squirrel cage induction machines.		BTL 1	Remember	CO1
17.	Explain the purpose of conducting blocked rotor test.		BTL 4	Analyze	CO1
18.	Draw the torque-slip double-cage induction motor.		BTL 5	Evaluate	CO1
19.	List the applications of 3-phase induction motor.		BTL 1	Remember	CO1
20.	Explain about an induction generator.		BTL 5	Evaluate	CO1
21.	Explain slip in induction machine.		BTL 4	Analyze	CO1
22.	Generalize about fixed losses in induction generator.		BTL 6	Create	CO1
23.	Explain how harmonics effects performance of 3 phase induction motor.		BTL 3	Apply	CO1
24.	Why maximum torque line differs with change in rotor resistance.		BTL 2	Understand	CO1
PART-B					
1.	Describe the construction and working principle of 3 phase induction motor.	(16)	BTL 1	Remember	CO1
2.	Distinguish between Synchronous motor and Induction Motor.	(16)	BTL 2	Understand	CO1
3.	Discuss the phenomena of Cogging or Magnetic locking and crawling in an induction motor.	(16)	BTL 2	Understand	CO1
4.	Explain in detail about equivalent circuit of induction motor.	(16)	BTL 4	Analyze	CO1
5.	Explain in detail about region of torque slip characteristics of 3 phase induction motor.	(16)	BTL 4	Analyze	CO1
6.	Explain how the rotating magnetic field is produced in an induction motor.	(16)	BTL 5	Evaluate	CO1
7.	Derive the expression for torque under running condition of a 3-phase induction motor and obtain the condition for maximum torque.	(16)	BTL 1	Remember	CO1
8.	Discuss the different power stages of an induction motor with losses.	(16)	BTL 2	Understand	CO1
9.	Develop an equivalent circuit for three phase induction motor. State the difference between exact and approximate equivalent circuit.	(16)	BTL6	Create	CO1
10.	A 3-phase, 400 V induction motor gave the following test reading: No-load: 400 V, 1250 W, 9 A Short circuit: 150 V, 4 kW, 38 A Draw the circle diagram. If the normal rating is14.9 kW, find from the circle diagram, the full-load value ofcurrent, power factor and slip.	(16)	BTL 6	Create	CO1
11.	Analyze the effect of harmonics in performance of 3 - phase induction motor.	(16)	BTL 5	Evaluate	CO1

12.	Explain about Synchronous-induction motor and different methods.	(16)	BTL 5	Evaluate	CO1
13.	100kW, 330V, 50Hz, 3 phase, star connected induction motor has a synchronous speed of 500 rpm. The full load slip is 1.8% and full load power factor 0.85. Stator copper loss is 2440W, iron loss is 3500W, and rotational loss is 1200W. Calculate (i) rotor copper loss, (6) (ii) the line current and (5) (iii) the full load efficiency. (5)	(16)	BTL3	Applying	CO1
14.	Describe the following: (i) induction generator (8) (ii) double cage rotor induction motors. (8)	(16)	BTL3	Applying	CO1
15.	Point out the effect of variation of rotor resistance and rotor reactance on maximum torque, efficiency and power factor of an induction motor.	(16)	BTL6	Creating	CO1
16.	Describe about no load and blocked rotor test on 3 phase induction motor.	(16)	BTL1	Remembering	CO1
17.	Generalize about Synchronous-induction motor and different methods of DC excitation of rotor winding.	(16)	BTL6	Create	CO1
18.	Explain in detail the construction of circle diagram of an induction motor.	(16)	BTL3	Applying	CO1

UNIT-II - STARTING AND SPEED CONTROL OF THREE PHASE INDUCTION MOTOR

Need for starting – Types of starters – DOL, Rotor resistance, Autotransformer and Star - delta starters – Speed control – Voltage control, Frequency control and pole changing – Cascaded connection - V/f control – Slip power recovery scheme -Braking of three phase induction motor: Plugging, dynamic braking and regenerative braking.

PART-A

Q. No	Questions	BT Level	Competence	CO
1.	What is the need of starter for induction motor?	BTL 1	Remember	CO2
2.	Identify the cheapest method of starting a 3phase induction motor?	BTL 1	Remember	CO2
3.	Express the relationship between staring torque and full load torque of DOL Starter?	BTL 2	Understand	CO2
4.	List the advantages of rotor resistance starter-based induction motor starting.	BTL 1	Remember	CO2
5.	Illustrate Auto transformer starting of 3-phase	BTL 3	Apply	CO2

	Induction motor.			
6.	Describe about the star-delta starter.	BTL 1	Remember	CO2
7.	Give the typical magnitude of starting current & torque forinduction motor?	BTL 2	Understand	CO2
8.	What are the different methods of speed control employed in three phase cage induction motor?	BTL 1	Remember	CO2
9.	Summarize the different methods of speed control on statorside of induction motor.	BTL 5	Evaluate	CO2
10.	Summarize the different methods of speed control from rotor side of induction motor.	BTL 2	Understand	CO2
11.	Criticize “is speed control by changing the applied voltage issimpler”.	BTL 5	Evaluate	CO2
12.	What if “the number of poles of an induction motor Increases”.	BTL 6	Create	CO2
13.	Show the cascade connections of induction motor	BTL 3	Apply	CO2
14.	Illustrate the advantages and disadvantages of V/F speedcontrol of an induction motor.	BTL 3	Apply	CO2
15.	Generalize how is super-synchronous speed achieved, while controlling the speed of an induction motor.	BTL 6	Create	CO2
16.	Discuss the advantages of slip power scheme. And also mention the types.	BTL 2	Understand	CO2
17.	Point out the two advantages of speed control of induction motor by injecting an e.m.f in the rotor circuit.	BTL 4	Analyze	CO2
18.	What type of braking is employed during deceleration ofinduction motor?	BTL 1	Remember	CO2
19.	What are the conditions for regenerative braking of an induction motor to be possible?	BTL 4	Analyze	CO2
20.	Compare Plugging and Regenerative braking.	BTL 4	Analyze	CO2
21.	Explain Dynamic braking.	BTL 3	Apply	CO2
22.	Discuss merits of slip power recovery scheme.	BTL 2	Understand	CO2
23.	Formulate equation to calculate rotor resistance starter.	BTL 5	Remember	CO2
24.	What are the types of slip power recovery scheme.	BTL 1	Understand	CO2

PART-B

1.	Summarize the different types of braking of three phase induction motor.	(16)	BTL 5	Evaluate	CO2
2.	Explain the different methods of slip power recovery schemes.	(16)	BTL 5	Evaluate	CO2
3.	Explain the different types of Starters used to start the induction motors.	(16)	BTL 5	Evaluate	CO2
4.	A 3 phase 50 Hz, 12 pole, 200 kW slip-ring induction motor drives a fan whose torque is proportional to the square of speed. At full load, the motor slip is 0.045. The rotor resistance measured between any two slip-rings is 61 mΩ.	(16)	BTL 6	Create	CO2

	Invent what resistance should be added in the rotor circuit to reduce the fan speed to 450 rpm?				
5.	Generalize V/F method of speed control of an induction motor in detail.	(16)	BTL 6	Create	CO2
6.	Discuss auto transformer and rotor resistance methods ofinduction.	(16)	BTL 1	Remember	CO2
7.	Describe why starters are necessary for starting 3-phase induction motors?	(16)	BTL 1	Remember	CO2
8.	With neat diagrams explains the working of any two types ofstarters used for squirrel cage type 3 phase induction motor with neat diagrams explain the working of any two types of starters used for squirrel cage type 3 phase induction motor.	(16)	BTL 4	Analyze	CO2
9.	Discuss the following starters for three phase induction motor: (i) Pole changing method (8) (ii) Star-Delta Starter. (8)	(16)	BTL 2	Understand	CO2
10.	Illustrate the rotor rheostat control of 3 phase slip ringinduction motor.	(16)	BTL 3	Apply	CO2
11.	Discuss the cascade operation of induction motors to obtain Variable speed.	(16)	BTL 2	Understand	CO2
12.	Explain briefly the various speed control schemes of induction motor.		BTL 4	Analyze	CO2
13.	Explain in detail the scherbius system of speed control.	(16)	BTL 4	Analyze	CO2
14.	Illustrate in detail the static kramer system of speed control.	(16)	BTL 3	Apply	CO2
15.	A 4 pole, 50 hz, 3phase induction motor as rotor resistance of0.2Ω per phase and rotor standstill reactance of 1Ω per phase. On full load it is running with a slip of 4%. Calculate the extra resistance required in rotor circuit per phase to reduce the speed to 1260 r.p.m, on the same load condition.	(16)	BTL 3	Apply	CO2
16.	Describe starting to full load torque ratio for star-delta starter.	(16)	BTL 2	Understand	CO2
17.	With detailed expression, compare the starting and full load torque in auto transformer starting.	(16)	BTL5	Evaluate	CO2
18.	A 400 V induction motor runs at a speed of 1440 rpm when supplied from a 50 Hz source. Find its speed at 30 Hz when the load torque is constant.	(16)	BTL 3	Apply	CO2

UNIT-III - SYNCHRONOUS GENERATOR

Constructional details – Types of rotors – winding factors - emf equation – Synchronous reactance – Armature reaction – Phasor diagrams of non salient pole synchronous generator connected to infinite bus - Synchronizing and parallel operation – Synchronizing torque - Change of excitation and mechanical input - Voltage regulation – EMF, MMF, ZPF and A.S.A methods – steady state power-angle characteristics – Two reaction theory – slip test -short circuit transients - Capability Curves.

PART-A

Q. No	Questions	BT Level	Competence	CO
1.	Identify the type of synchronous generators that are used in Hydroelectric generation.	BTL 1	Remember	CO3
2.	What are the advantages of salient pole type construction used for synchronous machines?	BTL 2	Understand	CO3
3.	Why is the field system of an alternator made as a rotor?	BTL 3	Apply	CO3
4.	Differentiate single layer and double layer winding.	BTL 4	Analyze	CO3
5.	Summarize winding factors of an alternator.	BTL 5	Evaluate	CO3
6.	Explain the role of damper winding in synchronous generator.	BTL 5	Evaluate	CO3
7.	Describe about pitch factor.	BTL 3	Apply	CO3
8.	What is the necessity of chording in the armature winding of a synchronous machine?	BTL 4	Analyze	CO3
9.	Distinguish between the ‘Synchronous reactance’ and the ‘Potier reactance’ of a synchronous generator.	BTL 6	Create	CO3
10.	Tell, what is meant by armature reaction in an alternator?	BTL 1	Remember	CO3
11.	Express what is meant by alternator on infinite bus-bars?	BTL 2	Understand	CO3
12.	Demonstrate the conditions to be satisfied for parallel operation of alternators.	BTL 3	Apply	CO3
13.	Write the equation for frequency of emf induced in an alternator.	BTL 6	Create	CO3
14.	Summarize the essential elements for generating emf in alternators.	BTL 2	Understand	CO3
15.	What is synchronizing power of an alternator?	BTL 1	Remember	CO3
16.	Explain the causes of voltage drop in an alternator when loaded.	BTL 4	Analyze	CO3
17.	Define voltage regulation.	BTL 1	Remember	CO3
18.	List the various methods to determine the voltage regulation.	BTL 1	Remember	CO3
19.	Why the concept of Two reaction theory is applied only to salient pole	BTL 2	Understand	CO3
20.	Distinguish between transient and sub-transient	BTL 1	Remember	CO3

	reactance's.				
21.	List the effect of harmonic components in induced emf.		BTL 6	Create	CO3
22.	Explain armature leakage reactance.		BTL 4	Analyze	CO3
23.	Demonstrate voltage equation of alternator.		BTL 3	Apply	CO3
24.	Explain synchronizing current.		BTL 5	Evaluate	CO3
PART-B					
1.	Define armature reaction and explain the effect of armature reaction on different power factor loads of synchronous generators.	(16)	BTL1	Remember	CO3
2.	Derive the EMF equation of a 3-phase synchronous machine.	(16)	BTL1	Remember	CO3
3.	Describe how the direct and quadrature-axis reactance's of a salient-pole synchronous machine can be estimated by means of slip test.	(16)	BTL1	Remember	CO3
4.	Explain phasor diagram of one phase of a synchronous generator and describe the features of synchronous impedance.	(16)	BTL3	Apply	CO3
5.	A 3-phase, 50 Hz, star-connected alternator with 2-layer winding is running at 600 rpm. It has 12 turns/coil, 4 slots/pole/phase and a coil-pitch of 10 slots. If the flux/pole is 0.035 Wb sinusoidally distributed, find the phase and line emf's induced. Assume that the total turns/phase are series connected.	(16)	BTL3	Apply	CO3
6.	Describe the parallel operation of three phase alternators with help of a neat diagram.	(16)	BTL4	Analyze	CO3
7.	Define the terms synchronous reactance and voltage regulation of alternator. Explain synchronous impedance method for determining regulation of an alternator.	(16)	BTL3	Apply	CO3
8.	Predict the full load voltage regulation of a 3-phase star connected, 1000kVA, 11,000V alternator has rated current of 52.5A. The ac resistance of the winding per phase is 0.45Ω. The test results are given below: OC Test: field current = 12.5A, voltage between lines = 422V SC Test: field current = 12.5A, line current = 52.5A For 0.8 pf lagging and 0.8 pf leading.	(16)	BTL3	Apply	CO3
9.	Sketch and explain the open-circuit and short-circuit characteristics of synchronous machines and explain its parameters in details.	(16)	BTL4	Analyze	CO3
10.	Describe the principle and construction of slow	(16)	BTL5	Evaluate	CO3

	speed operation generator with neat diagram.				
11.	Describe the potier and zero power factor method of determining the regulation of an alternator.	(16)	BTL1	Remember	CO3
12.	(i)What is meant by Synchronizing? List the conditions for paralleling alternator with infinite busbars.(8) (ii)Point out the assumptions made in the potier method and explain the effect of these assumptions on the accuracy of the voltage regulation.(8)	(16)	BTL2	Understand	CO3
13.	Summarize the two-reaction theory of salient pole alternator.	(16)	BTL2	Understand	CO3
14.	Generalize the EMF & MMF methods of determining the regulation of an alternator.	(16)	BTL4	Analyze	CO3
15.	Summarize the discussion on capability curve with its boundaries of synchronous machine.	(16)	BTL3	Apply	CO3
16.	Explain in detail about method of synchronization of alternators.	(16)	BTL5	Evaluate	CO3
17.	Formulate clearly the A S A method of determining the regulation of an alternator.	(16)	BTL4	Analyze	CO3

UNIT-IV - SYNCHRONOUS MOTOR

Principle of operation – Torque equation – Operation on infinite bus bars - V and Inverted V curves – Power input and power developed equations – Starting methods – Current loci for constant power input, constant excitation and constant power developed - Hunting – natural frequency of oscillations – damper windings - synchronous condenser.

PART-A

Q. No	Questions	BT Level	Competence	CO
1.	List the main parts of synchronous motor.	BTL1	Remembering	CO4
2.	Show the two fundamental characteristics of a rotating magnetic field.	BTL2	Understanding	CO4
3.	Point out why synchronous motor is not a self-starting motor.	BTL1	Remembering	CO4
4.	Why a 3-phase synchronous motor will always run at synchronous speed?	BTL2	Understanding	CO4
5.	Discuss how can we change the operating speed of synchronous motor.	BTL3	Applying	CO4
6.	Write down the significance of V and inverted V curves.	BTL3	Applying	CO4
7.	Discuss about ‘Torque angle’.	BTL1	Remembering	CO4
8.	Develop voltage equation of synchronous motor.	BTL5	Evaluating	CO4
9.	Illustrate the typical torque angle characteristics of synchronous machine.	BTL2	Understanding	CO4

10.	Name the various torques associated with a synchronous motor.		BTL4	Analyzing	CO4
11.	Name the starting methods of synchronous motor.		BTL1	Remembering	CO4
12.	How does a change of excitation affect its power factor?		BTL4	Analyzing	CO4
13.	A 3-phase synchronous motor driving a constant load torque draws power from infinite bus at leading power factor. How power angle and power factor will change if the excitation is increased?		BTL2	Understanding	CO4
14.	Invent what happens when the load on the synchronous motor is changed.		BTL4	Analyzing	CO4
15.	What is hunting?		BTL3	Applying	CO4
16.	Express the causes of hunting.		BTL1	Remembering	CO4
17.	Explain the methods of reducing the space harmonics in a machine.		BTL1	Remembering	CO4
18.	What for damper windings are provided in a synchronous machine?		BTL6	Creating	CO4
19.	How the synchronous motor can be used as synchronous condenser.		BTL6	Creating	CO4
20.	List the inherent disadvantages of synchronous motor.		BTL5	Evaluating	CO4
21.	Explain the condition for excitation when motor develops maximum power.		BTL1	Remembering	CO4
22.	List the methods to start synchronous motor.		BTL2	Understanding	CO4
23.	Write down the emf equation for synchronous motor.		BTL3	Applying	CO4
24.	Express the phasor diagram between E_{ph} and V_{ph} at no load.		BTL4	Analyzing	CO4
PART-B					
1.	Explain briefly the features and principle of operation of three-phase synchronous motor.	(16)	BTL1	Remembering	CO4
2.	Deduce the expression for power delivered by a synchronous motor in terms of load angle (α).	(16)	BTL2	Understanding	CO4
3.	(i) Show that the synchronous motor is a variable power factor motor.(8) (ii) List the advantages of salient pole in synchronous motor.(8)	(16)	BTL3	Applying	CO4
4.	Draw the deuce into simplified equivalent circuit of synchronous motor.	(16)	BTL2	Understanding	CO4
5.	Examine the effect of loading in synchronous motor at various Power.	(16)	BTL1	Remembering	CO4
6.	(i) Derive the mechanical power developed per phase of a synchronous motor.(8) (ii) Derive the expression for maximum torque developed perphase of synchronous motor.(8)	(16)	BTL3 BTL3	Applying Applying	CO4 CO4

7.	What are ‘constant excitation circles and constant power circle’ for a synchronous motor? How are they derived?	(16)	BTL4	Analyzing	CO4
8.	Explain in detail the V curve and inverted V curve of a synchronous motor.	(16)	BTL1	Remembering	CO4
9.	Explain in detail the method of starting of synchronous motor.	(16)	BTL2	Understanding	CO4
10.	A 5kW, three-phase Y-connected 50 Hz, 440V, cylindrical rotor synchronous motor operates at rated condition with 0.8 pf leading. The motor efficiency excluding field and stator losses is 95% and Xs=2.5Ω. Calculate: (i) Mechanical power developed (4) (ii) Armature Current (4) (iii) Back emf (4) (iv) Power angle (2) (v) Maximum or pull-out torque of the motor. (2)	(16)	BTL1	Remembering	CO4
11.	A 6600V, 3 phase, star connected synchronous motor draws a full load current of 80A at 0.8pf leading. The armature resistance is 2.2Ω and reactance of 22Ω per phase. If the stray losses of the machine are 3200W. find Emf induced output power Efficiency of the machine.(6+6+4)	(16)	BTL4	Analyzing	CO4
12.	Generalize the effect of changing field current excitation at constant load.	(16)	BTL3	Applying	CO4
13.	Examine in detail the effect of varying excitation on armature current and power factor of synchronous motor.	(16)	BTL5	Evaluating	CO4
14.	Formulate the power flow equations for a synchronous motor.	(16)	BTL6	Creating	CO4
15.	Illustrate the phenomenon of hunting and the use of damper winding with the help of dynamic equations.	(16)	BTL1	Remembering	CO4
16.	With phasor diagram illustrate how synchronous motor can be used as a synchronous condenser.	(16)	BTL2	Understanding	CO4
17.	Explain in detail about importance of synchronization with infinite bus bar. what is the condition for synchronous motor to operate for power factor improvement.	(16)	BTL3	Applying	CO4
18.	Explain the effect of varying field current and load change on a synchronous motor.	(16)	BTL6	Creating	CO4

UNIT-V - SINGLE PHASE INDUCTION MOTORS AND SPECIAL MACHINES

Constructional details of single phase induction motor – Double field revolving theory and operation – Equivalent circuit – No load and blocked rotor test –Performance analysis – Starting methods of single-phase induction motors –Capacitor-start capacitor run Induction motor - Shaded pole induction motor - Linear induction motor – Repulsion motor - Hysteresis motor - AC series motor - Servo motors - Stepper motors - introduction to magnetic levitation systems - DC Linear Motor - Linear Synchronous Motor.

PART-A

Q. No	Questions	BT Level	Competence	CO
1.	Summarize why single-phase induction motor is not self-starting. What are the various methods available for making a single-phase motor self-starting?	BTL1	Remembering	CO5
2.	Discuss the double revolving field theory.	BTL2	Understanding	CO5
3.	Distinguish the terms rotating and pulsating magnetic fields.	BTL1	Remembering	CO5
4.	Identify the inherent characteristics of plain 1-phase induction motor.	BTL2	Understanding	CO5
5.	Show the no load vector diagram for single phase induction motor.	BTL3	Applying	CO5
6.	Develop the Speed torque characteristics of single-phase induction motor.	BTL3	Applying	CO5
7.	Name the two windings of a single-phase induction motor.	BTL1	Remembering	CO5
8.	Examine why centrifugal switches are provided in many 1-phase induction motors	BTL5	Evaluating	CO5
9.	Design the capacitor rating required for an induction motor	BTL2	Understanding	CO5
10.	Illustrate why capacitor-start induction motors are advantageous.	BTL4	Analyzing	CO5
11.	Explain how the direction of a capacitor-start motor can be reversed.	BTL1	Remembering	CO5
12.	Summarize the advantages of capacitor start induction motor over split-phase induction motor.	BTL4	Analyzing	CO5
13.	What is the role of ‘magnetic bridges’ in the operation of a shaded pole induction motor?	BTL2	Understanding	CO5
14.	State the limitations of shaded pole motors.	BTL4	Analyzing	CO5
15.	Predict the type of motor that is used for ceiling fan.	BTL3	Applying	CO5
16.	Specify the use of single-phase induction motor.	BTL1	Remembering	CO5
17.	What is the principle of operation of a linear induction motor.	BTL1	Remembering	CO5
18.	What is the necessity of having laminated yoke in an ac series motor?	BTL6	Creating	CO5

19.	Discuss the working principle of repulsion motor.		BTL6	Creating	CO5
20.	What is the principle of reluctance motor?		BTL5	Evaluating	CO5
21.	Examine magnetic-levitation.		BTL1	Remembering	CO5
22.	List applications of DC linear motor.		BTL2	Understanding	CO5
23.	What are the advantages of linear synchronous motor.		BTL3	Applying	CO5
24.	How does a servo motor works.		BTL4	Analyzing	CO5
PART-B					
1.	Give the classification of single-phase motors. Explain any two types of single-phase induction motors.	(16)	BTL1	Remembering	CO5
2.	Using double field revolving theory, compose why a single phase induction motor is not self-starting. Also obtain the equivalent circuit of single-phase induction motor with necessary equations.	(16)	BTL2	Understanding	CO5
3.	Illustrate the operation of single-phase induction motor with double field revolving theory.	(16)	BTL3	Applying	CO5
4.	Describe the no-load test and blocked rotor test for obtaining the equivalent circuit parameters of a single-phase induction motor.	(16)	BTL2	Understanding	CO5
5.	Describe the no-load test and blocked rotor test for obtaining the equivalent circuit parameters of a single-phase induction motor. R1m = 2.4 Ω, X1m = 3.2 Ω R2' = 4.7 Ω, X2' = 2.8 Ω\and Xm= 90 Ω. Examine (i) Input current (4) (ii) Power Factor (3) (iii) Developed power (3) (iv) Output power (3) (v) Efficiency for a slip of 0.04. (3)	(16)	BTL1	Remembering	CO5
6.	List in detail the operation of capacitor start and run induction motor.	(16)	BTL3	Applying	CO5
7.	Explain with suitable diagram the working principle of split-phase induction motor.	(16)	BTL4	Analyzing	CO5
8.	Explain the working of linear induction motor and also write its applications.	(16)	BTL1	Remembering	CO5
9.	Demonstrate briefly about the Repulsion motor.	(16)	BTL2	Understanding	CO5
10.	Discuss the construction, operation and characteristics of servo motor.	(16)	BTL1	Remembering	CO5
11.	Explain the construction, operation and characteristics of linear induction motor.	(16)	BTL4	Analyzing	CO5
12.	Write down the construction, operation and characteristics of AC series motor.	(16)	BTL3	Applying	CO5
13.	Describe what kind of modifications have to be done on a DC series motor to make it to work	(16)	BTL5	Evaluating	CO5

	with single phase AC supply. State the applications of AC series motors.				
14.	Formulate the constructional details, principle of operation and the application of Hysteresis motor.	(16)	BTL6	Creating	CO5
15.	Demonstrate the construction and working principle of the following special Machines: (i) Stepper motors. (ii) Shaded pole induction motor. (8+8)	(16)	BTL1	Remembering	CO5
16.	Explain the theory of brushless DC Machines.	(16)	BTL2	Understanding	CO5
17.	Develop in detail about applications of stepper, AC linear Induction, stepper and AC series motor.	(16)	BTL3	Applying	CO5
18.	Generalize about Magnetic Levitation Systems.	(16)	BTL5	Evaluating	CO5

Course Outcome: Upon the successful completion of the course, students will have the:
Ability to understand the construction and working principle of Three phase Induction Motor.
Acquire knowledge about the starting and speed control of induction motors.
Ability to understand the construction and working principle of Synchronous generator.
Ability to understand the construction and working principle of Synchronous Motor.
To gain knowledge about the basic principles and working of Single-phase induction motors and Special Electrical Machines.