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

DEPARTMENT OF
ELECTRONICS AND INSTRUMENTATION ENGINEERING

QUESTION BANK

IV SEMESTER

EI3461 – ELECTRICAL MACHINES

Regulation – 2023

Academic Year 2025 – 26 (EVEN)

Prepared by

Dr.R.ARIVALAHAN,

Professor / EIE

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

Department of Electronics and Instrumentation Engineering

SUBJECT: EI3461 – ELECTRICAL MACHINES

SEM / YEAR: IV/ II

UNIT I D.C. MACHINES				
D.C. Machines: – Principle of operation and construction of motor and generator –EMF and torque equation – Various excitation schemes – Characteristics of Motor and Generator – Starting, Speed control and braking of D.C. Motor.				
PART –A				
Q.No	**Questions**	**BT Level**	**Competence**	**COs**
1.	State Faraday's law of Electromagnetic induction and Lenz law.	BTL 2	Understand	CO1
2.	Mention the following functions in DC Machine (i) Commutator (ii) Brushes (iii) Yoke (iv) Field coils.	BTL 2	Understand	CO1
3.	What are the main constructional element of a DC Machine?	BTL 1	Remember	CO1
4.	What is meant by excitation of dc machine? What are the different methods for the excitation of DC Machine?	BTL 2	Understand	CO1
5.	What are the necessary conditions for the generators to be self excited?	BTL 1	Remember	CO1
6.	Mention any 2-popular methods for the speed control of DC Shunt motor.	BTL 1	Remember	CO1
7.	What is meant by motor ? How the Faraday's Left hand rule is used explain it.	BTL 1	Remember	CO1
8.	Define critical resistance of a dc generator?	BTL 2	Understand	CO1
9.	List the different method of speed control of DC Shunt motor?	BTL 2	Understand	CO1
10.	In speed control of DC Shunt Motor how the armature control method is distinguished with field control method.	BTL 2	Understand	CO1
11.	What are the different techniques used for the speed control of DC Series Motor?	BTL 2	Understand	CO1
12.	Write the formulae for voltage equation of a DC Motor.	BTL 2	Understand	CO1
13.	What is meant by armature reaction?	BTL 2	Understand	CO1
14.	Write the formulae for generated emf of a Generator.	BTL 1	Remember	CO1
15.	State two applications of DC shunt motor and series motor.	BTL 1	Remember	CO1

16.	What is the significance of back emf Motor?	BTL 2	Understand	CO1
17.	List the different variable and constant losses in electrical machine.	BTL 2	Understand	CO1
18.	What is the basic principle of a DC Generator? How the Faraday's Right Hand rule is implemented explain it.	BTL 2	Understand	CO1
19.	Draw the mechanical characteristics of DC Series and DC Shunt Motor.	BTL 2	Understand	CO1
20.	Define the terms : (i) Electric Motor (ii) Generator.	BTL 2	Understand	CO1
21.	Write the EMF Equation for DC Generator.	BTL 1	Remember	CO1
22.	What is back emf of a motor ?	BTL 1	Remember	CO1
23.	Define the terms (i) Commutator (ii) Brushes.	BTL 1	Remember	CO1
24.	Mention any 4-applications of DC Series Motor.	BTL 1	Remember	CO1
	PART – B			
1.	With a neat sketch, explain the construction and working of DC Motor and explain each parts. (16)	BTL 4	Analyse	CO1
2.	What is meant by DC Generator ? Explain the theory and principle of operation and working of DC Generator. (16)	BLT3	Apply	CO1
3.	Obtain the mathematical expression for the Generated EMF or EMF Equation of a Generator. (16)	BLT3	Apply	CO1
4.	Calculate the emf generated by 4-pole wave wound generator having 65 slots with 12 conductors per slot when driven at 1200 rpm. The flux per pole is 0.02 Weber. (16)	BLT3	Apply	CO1
5.	How the DC Generator can be classified and also explain the following characteristics (i)No Load Saturation characteristics (ii) Internal or Total Characteristics (iii) External Characteristics. (16)	BTL 4	Analyse	CO1
6.	Explain the following methods for speed control of DC Motor (i) Armature Control Method (ii) Field Control Method. (16)	BTL 4	Analyse	CO1
7.	A 250 V Shunt motor takes the total current of 20 A. The shunt field and armature resistances of 200 ohm and 0.3 ohm respectively. Determine (i) Value of back emf (ii) Gross mechanical power in armature. (16)	BLT3	Apply	CO1
8.	Explain the different techniques for the speed control of DC Series Motor. (16)	BTL 4	Analyse	CO1
9.	Explain the following characteristics (i) Speed versus Torque (ii) Torque versus Current (iii) Speed versus Current for the following motors DC Series, Shunt and Compound Motor. (16)	BTL 4	Analyse	CO1

10.	The armature of a 6-pole, 600 rpm lap wound generator has 90 slots. If each coil has 4-turns. Calculate the flux per pole required to generate emf of 288 Volts. (16)	BLT3	Apply	CO1
11.	With neat schematic, explain the following methods for speed control of DC shunt motor (i) Armature Control Method (ii) Field Control Method. (16)	BLT3	Apply	CO1
12.	Explain with neat diagram, the working of a (i) 3-Point starter (ii) 4-point Starter. (16)	BTL 4	Analyse	CO1
13.	Describe the various types breaking in a DC motor. (16)	BTL 4	Analyse	CO1
14.	**(i)** Derive the emf equation of DC generator. (10) **(ii)** List the application of various DC Motor. (6)	BLT3	Apply	CO1
15.	**(i)** Derive the torque equation of a DC motor. (8) **(ii)** Sketch the characteristics of a DC shunt generator. (8)	BLT3	Apply	CO1
16.	Explain with a neat sketch the principle of operation of a dc motor. (16)	BTL 4	Analyse	CO1
17.	Discuss in detail about the N-I_a, T-I_a and N-T characteristics for a DC series motor, DC shunt motor and DC compound motor. (16)	BTL 4	Analyse	CO1

UNIT II TRANSFORMERS

Principle, Construction and Types of Transformer - EMF equation – Equivalent Circuit-Phasor diagrams - Regulation and efficiency of a transformer-Introduction to three phase transformer Connection, Auto transformer.

PART – A

Q.No.	Questions	BT Level	Competence	COs
1.	What is meant by a transformer? How the Faraday's law of Electromagnetic induction is applicable.	BTL1	Remember	CO2
2.	What are the main parts of a transformer? Explain the following elements (i) Primary winding (ii) Secondary winding (iii) Laminated iron core.	BTL1	Remember	CO2
3.	What is the purpose of laminating the core in a transformer?	BTL1	Remember	CO2
4.	Write the emf equation of the transformer. Define the term (i) Voltage Transformation Ratio. How it is applicable for Step up and Step down Transformer.	BTL1	Remember	CO2
5.	Distinguish the following types of transformer (i) Core type transformer (ii) Shell type transformer.	BTL2	Understand	CO2
6.	Explain the following parts in transformer (i) Magnetic part (ii) Electrical part (iii) Insulating part (iv) Cooling part.	BTL1	Remember	CO2

7.	How the step up transformer is distinguished with step down transformer ?	BTL1	Remember	CO2
8.	Explain the term of transformer under no load condition with phasor diagram and output equation	BTL1	Remember	CO2
9.	What is meant by leakage flux?	BTL1	Remember	CO2
10.	Draw the equivalent circuit of a transformer and also write final output equation.	BTL2	Understand	CO2
11.	When the load current of a transformer increases how does the input current increases to meet with the new condition?	BTL2	Understand	CO2
12.	Write the formulae for Regulation of a transformer and explain it.	BTL1	Remember	CO2
13.	Define the term (i) Efficiency (ii) All Day Efficiency of a transformer.	BTL1	Remember	CO2
14.	What is meant by auto transformer?	BTL1	Remember	CO2
15.	In auto transformer how the step up and step down transformer can be obtained and also explain through turn ratio.	BTL2	Understand	CO2
16.	Write the different losses occurs in transformer (i) Core or Iron Loss (ii) Copper Loss.	BTL2	Understand	CO2
17.	Write the formulae for (i) Regulation (ii) Maximum Efficiency of the transformer	BTL1	Remember	CO2
18.	What are the advantages and applications of auto transformer ?	BTL1	Remember	CO2
19.	How does the change in frequency affect the change in temperature?	BTL2	Understand	CO2
20.	Mention the properties of oil used in the transformer?	BTL1	Remember	CO2
21.	Mention the difference between core and shell type transformers.	BTL2	Understand	CO2
22.	Define efficiency of the transformer.	BTL1	Remember	CO2
23.	What is meant by auto transformer ?	BTL1	Remember	CO2
24.	Mention the different types of three phase transformer.	BTL1	Remember	CO2
	PART – B			
1.	Draw the circuit diagram for single phase transformer and also explain the principle, construction, working of it. (16)	BTL3	Apply	CO2
2.	Obtain the mathematical EMF Equation of a transformer and explain each terms. (16)	BLT4	Analyse	CO2
3.	Draw the circuit diagram of transformer and also obtain the equivalent circuit and mathematical expression for a transformer. (16)	BTL3	Apply	CO2
4.	Explain the transformer phasor diagram under (i) No Load Condition (ii) On Load Condition. (16)	BLT4	Analyse	CO2

5.	What are the losses in a transformer? Derive the condition for maximum efficiency? (16)	BLT4	Analyse	CO2
6.	Explain with the help of circuit diagram how are (i) efficiency and (ii) regulation of single phase transformer predetermined by conducting open circuit and short circuit test? (16)	BLT4	Analyse	CO2
7.	What is meant by auto transformer? Explain the principle, construction, working of a auto transformer. And also explain (i) Step up auto transformer (ii) Step down auto transformer. (16)	BLT4	Analyse	CO2
8.	Draw the approximate equivalent circuit of single phase transformer and identify the various parameters? (16)	BTL3	Apply	CO2
9.	Describe the tests to determine and explain how the regulation of the transformer is determined form the diagram. (16)			
10.	A single phase 2200/250V, 50Hz transformer has a net core area of 36 cm^2 and a maximum flux density of 6 Wb/m^2. Calculate the number of turns of primary and secondary. (16)	BTL3	Apply	CO2
11.	Explain the following types of Three Phase Transformers (i) Star-Star Connection (ii) Delta- Delta Connection (iii) Star-Delta Connection (iv) Delta- Star Connection (iv) Open Delta Transformers . (16)	BLT4	Analyse	CO2
12.	Mention the following types of 3-phase transformers (i) Core type Three Phase Transformer (ii) Shell type Three Phase Transformers. (16)	BLT4	Analyse	CO2
13.	Explain the following terms in Single phase Transformer (i) Regulation (ii) Losses (iii) Efficiency (iv) All day Efficiency. (16)	BLT4	Analyse	CO2
14.	**(i)** Derive the EMF Equation for transformer. **(ii)** Differentiate Core and Shell type transformer. (16)	BLT4	Analyse	CO2
15.	Draw the Equivalent circuit for single phase transformer and explain it. (16)	BTL3	Apply	CO2
16.	Explain transformer under (i) No Load Condition (ii) On Load Condition . (16)	BLT4	Analyse	CO2
17.	What is meant by transformer ? How the transformers can be classified ? (16)	BLT4	Analyse	CO2

UNIT III - SYNCHRONOUS MACHINES				
Principle of Operation, types - EMF Equation and Phasor diagrams – Synchronous motor- Starting Methods, Torque equation- V Curves, inverted V curves.				
PART – A				
Q.No.	**Questions**	**BT Level**	**Competence**	**COs**
1.	Which type of synchronous generators are used in hydroelectric plants and why?	BTL2	Understand	CO3
2.	What are the principal advantages of rotating field type construction in alternators?	BTL1	Remember	CO3
3.	Classify the different types of alternators.	BTL1	Remember	CO3
4.	Name the types of alternators based on their rotor construction.	BTL1	Remember	CO3
5.	Give the advantages of salient pole type construction used for Synchronous machines.	BTL1	Remember	CO3
6.	What is meant by synchronous impedance of an alternator?	BTL1	Remember	CO3
7.	Define the distribution factor of alternator.	BTL1	Remember	CO3
8.	Write the essential elements for generating EMF in alternators.	BTL1	Remember	CO3
9.	What is meant by synchronization?	BTL1	Remember	CO3
10.	What is hunting in a synchronous machine? Explain.	BTL1	Remember	CO3
11.	Define synchronous speed.	BTL1	Remember	CO3
12.	Write the purpose of damper winding.	BTL2	Understand	CO3
13.	State the effect of changing excitation of constant load on a synchronous motor.	BTL2	Understand	CO3
14.	What is synchronous condenser?	BTL1	Remember	CO3
15.	What is a synchronous capacitor?	BTL1	Remember	CO3
16.	Give the various torques associated with synchronous motors.	BTL2	Understand	CO3
17.	Why a synchronous motor is not a self-starting machine? Analyze.	BTL2	Understand	CO3
18.	List the methods of starting a synchronous motor.	BTL1	Remember	CO3
19.	Alternators rated in kVA and not in kW. Justify	BTL2	Understand	CO3
20.	Draw the 'V-curves' of the synchronous motor.	BTL2	Understand	CO3
21.	Write the applications of synchronous motor.	BTL1	Remember	CO3
22.	List the inherent disadvantages of synchronous motor.	BTL1	Remember	CO3
23.	Give some merits and demerits of synchronous motor	BTL1	Remember	CO3
24.	In what way synchronous motor is different from other motors?	BTL2	Understand	CO3

1.	Draw and explain the construction and working details of Three phase Synchronous alternator. (16)	BTL4	Analyse	CO3
2.	Draw and explain the principles operation of an alternator. List the advantages of rotating magnetic field. (16)	BTL4	Analyse	CO3
3.	**(i)** What are the reasons for the variation in terminal voltage, when the alternator in on load? Explain each Reason**. (10)**	BTL3	Apply	CO3
	(ii) Describe briefly the effect of various load power factor of an alternator. (6)			
4.	With the help of phasor diagrams, discuss the behaviour of synchronous motor with the constant field excitation and variable load. (16)	BLT3	Apply	CO3
5.	Draw and explain the principle of operation of a synchronous motor. (16)	BLT3	Apply	CO3
6.	Draw and explain the vector diagram, when the alternator is loaded with (1) Resistive (2) Inductive and (3) Capacitive. (16)	BLT3	Apply	CO3
7.	**(i)** Draw the Equivalent Circuit of a Synchronous Motor. (10)	BTL4	Analyse	CO3
	(ii) Derive the equation for Power Developed by a Synchronous Motor. (6)			
8.	With the help of phasor diagrams, discuss the behaviour of synchronous motor with the different field excitation. (16)	BTL3	Apply	CO3
9.	Discuss about the Different Torques of a Synchronous Motor. (16)	BTL3	Apply	CO3
10.	**(i)** Derive an expression for the power developed in an synchronous motor**.** **(**10)	BTL3	Apply	CO3
	(ii) Discuss 'V' and inverted 'V' curve of a synchronous motor**.** (6)			
11.	Describe the Effect of Excitation on Armature Current and Power Factor. (16)	BTL4	Analyse	CO3
12.	What is meant by alternator? How the alternators can be classified? (16)	BTL3	Apply	CO3
13.	Write the comparison between the synchronous motor and Induction motor. (16)	BTL3	Apply	CO3
14.	Derive the torque equation of a synchronous motor**.** (16)	BTL4	Analyse	CO3

15.	Explain the different methods for starting methods of a synchronous motor. (16)	BTL4	Analyse	CO3
16.	Derive the (i) EMF Equation (ii) Voltage Regulation of an alternator. (16)	BTL3	Apply	CO3
17.	Explain the following types of rotors in alternator: (i) Salient Pole Type (ii) Non-salient Pole Type. (16)	BTL3	Apply	CO3

UNIT IV - THREE PHASE INDUCTION MOTORS

Construction – Production of rotating magnetic field- Principle of operation, Torque slip characteristics - Starting methods and Speed control of induction motors.

PART-A

Q.No	Questions	BT Level	Competence	COs
1.	Classify the different type of rotors employed in an induction motor.	BLT2	Understand	CO4
2.	Compare squirrel cage rotor and slip ring rotor.	BLT2	Understand	CO4
3.	Give the advantages and disadvantages of three phase induction motor.	BTL1	Remember	BTL1
4.	Give the advantages of skewing of cage rotor conductors.	BTL1	Remember	CO4
5.	The air gap between stator core and rotor of an induction motor is made very small. Analyze	BLT2	Understand	CO4
6.	Define the term slip of a 3-phase induction motor.	BTL1	Remember	CO4
7.	Write the importance of slip in a three phase induction motor.	BTL1	Remember	CO4
8.	Two three-phase inductions when connected across a 400 V, 50 Hz supply runs at 1440 r.p.m. and 940 r.p.m. respectively. Determine which of the two motors is running at higher slip.	BLT2	Understand	CO4
9.	Draw the slip-torque characteristics of a three phase induction motor.	BLT2	Understand	CO4
10.	State condition at which starting torque developed in a 3 phase induction motor is maximum.	BTL1	Remember	CO4
11.	Prove that 3 phase flux results in a rotating magnetic field using a phasor diagram.	BLT2	Understand	CO4
12.	Name the test conducted for obtaining the equivalent circuit parameters of 3phase induction motor.	BTL1	Remember	CO4
13.	A three phase slip ring induction motor gives a reading of 60 V across slip rings when at rest with normal voltage applied.	BLT2	Understand	CO4

	The rotor is star connected and has an impedance of (0.8+j6) Ω per phase. Estimate the rotor current when the machine is at standstill with the slip rings joined to a star connected starter with a phase impedance of (4+j3) Ω.			
14.	Write the various starters used for starting a 3 phase Induction motor.	BTL1	Remember	CO4
15.	Rotor resistance starting is preferred to reduced voltage starting of a rotor induction motor. Justify.	BLT2	Understand	CO4
16.	List the methods available to control the speed of an induction motor.	BLT2	Understand	CO4
17.	What is the speed of rotor field in space?	BTL1	Remember	CO4
18.	Estimate the synchronous speed of an induction motor running at 2900 r.p.m. with 50 Hz supply?	BLT2	Understand	CO4
19.	A three phase 4 pole, 440 V, 50Hz induction motor runs with a slip of 4%. Calculate the rotor speed and frequency of the rotor current.	BLT2	Understand	CO4
20.	Why an induction motor will never run at its synchronous speed?	BLT2	Understand	CO4
21.	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.	BLT2	Understand	CO4
22.	What are the two fundamental characteristics of a rotating magnetic field?	BTL1	Remember	CO4
23.	Under what condition, the slip in an induction motor is(a) Negative (b) Greater than one.	BLT2	Understand	CO4
24.	What is meant by synchronous watts?	BTL1	Remember	CO4
	PART – B			
1.	Describe in detail, the construction and working principle of three phase induction motor. (16)	BTL3	Apply	CO4
2.	With neat diagram discuss the production of rotating magnetic field of three phase induction motor. (16)	BTL3	Apply	CO4
3.	Discuss about about the Frequency of Rotor Current. (8)	BTL4	Analyse	CO4
	A 12-pole, 3-phase alternator driven at a speed of 500 r.p.m. supplies power to an 8-pole, 3-phase induction motor. If the slip of the motor, at full-load is 3%, calculate the full-load speed of the motor. (8)			

4.	**(i)**	Derive the Relation Between Torque and Rotor Power Factor, if rotor is assumed non-inductive and inductive. (8)	BLT3	Analyse	CO4
	(ii)	Derive the equation for torque under running conditions in a 3-phase induction motor. (8)			
5.	Derive the equation for torque under starting conditions in a 3-phase induction motor and condition for maximum torque. (16)		BTL3	Apply	CO4
6.	**(i)**	Explain the relation between the Torque and slip with necessary diagram. (8)	BTL4	Analyse	CO4
	(ii)	Derive the relationship betwee (1) Full load torque and maximum torque (2) Starting torque and maximum torque. (8)			
7.	Explain the working of autotransformer starter of a 3 phase induction motor with a neat diagram. (16)		BTL4	Analyse	CO4
8.	Discus about Torque Developed by an Induction Motor and Derive an equation for Torque, Mechanical Power and Rotor Output. (16)		BTL3	Apply	CO4
9.	Explain the working of star-Delta starter of a 3 phase induction motor with a neat diagram. (16)		BTL4	Analyse	CO4
10.	Discuss in detail the various methods of speed control of induction motor. (16)		BLT3	Analyse	CO4
11.	**(i)**	Explain the working of DOL of a 3 phase induction motor with a neat diagram. (10)	BTL3	Apply	CO4
	(ii)	Discuss about the Torque and speed characteristics. (6)			
12.	Design the step by step test procedure to obtain the equivalent circuit parameters of a three phase induction motor and draw the equivalent circuit. (16)		BTL4	Analyse	CO4
13.	Obtain the equivalent circuit for three phase induction motor and also obtain the expression. (16)		BTL3	Apply	CO4
14.	Explain the principle operation of three phase induction motor with suitable diagram. (16)		BTL4	Analyse	CO4
15.	Explain the difference between squirrel cage induction motor and slip ring induction motor with suitable diagram. (16)		BTL4	Analyse	CO4
16.	Explain the working of Rotor résistance of a 3 phase induction motor with a neat diagram. (16)		BTL4	Analyse	CO4
17.	Explain the following terms : (i) Synchronous Speed (ii) Slip (iii) Frequency of rotor current. (16)		BTL4	Analyse	CO4

UNIT V - SINGLE PHASE INDUCTION MOTORS AND SPECIAL MACHINES

Types of single-phase induction motors –Double field revolving theory- Capacitor start motors – Shaded pole motor – Repulsion type motor – Universal motor –Hysteresis motor - Switched reluctance motor – Brushless D.C motor-Stepper motor-Permanent magnet synchronous motor.

PART – A

Q.No	Questions	BT Level	Competence	COs
1.	Classify the types of single Phase induction motor.	BTL1	Remember	CO5
2.	Why a single phase induction motor is not self starting?	BLT2	Understand	CO5
3.	State principle that the double revolving field theory make use of.	BLT2	Understand	CO5
4.	Differentiate between "capacitor start" and Capacitor start capacitor run" Single Phase Induction Motor.	BLT2	Understand	CO5
5.	State any two application of Universal motor.	BTL2	Understand	CO5
6.	Draw the speed –torque characteristics of a shaded pole motor.	BTL2	Understand	CO5
7.	How is single phase spilt in a induction motor?	BTL2	Understand	CO5
8.	Mention the applications of shaded pole motor.	BTL1	Remember	CO5
9.	Is it possible to change the direction of rotation of a shaded pole type induction motor? Justify your answer.	BLT2	Understand	CO5
10.	Write the use of shading coil in the shaded pole motor.	BTL1	Remember	CO5
11.	Write the principle behind repulsion motor.	BTL1	Remember	CO5
12.	How can an universal motor be reversed?	BTL1	Remember	CO5
13.	What is hysteresis motor?	BLT2	Understand	CO5
14.	Write the principle of operation of reluctance motors?	BTL1	Remember	CO5
15.	Mention the application of switched reluctance motor.	BTL1	Remember	CO5
16.	Give the advantages of brushless DC motor.	BTL1	Remember	CO5
17.	Compare PMBL DC motor and switched reluctance motor.	BLT2	Understand	CO5
18.	How universal motor is different from DC motor?	BLT2	Understand	CO5
19.	What is a Stepper motor?	BTL1	Remember	CO5
20.	What is the step angle of a four phase stepper motor with 12 stator teeth and 3 rotor teeth.	BLT2	Understand	CO5
21.	What is permanent magnet synchronous motor?	BTL1	Remember	CO5
22.	Give two advantages and two applications of stepper motor.	BTL1	Remember	CO5

23.	Give two advantages and two applications of permanent magnet synchronous motor	BTL1	Remember	CO5
24.	Name the two windings of a single-phase induction motor.	BTL1	Remember	CO5
	PART B			
1.	Explain double-field revolving theory of a single phase induction motor. (16)	BTL4	Analyse	CO5
2.	How to make Single-phase Induction Motor Self-starting. Explain (i) Split phase machine (ii) capacitor start machine. (16)	BTL3	Apply	CO5
3.	Describe the construction, working principle and applications of shaded-pole single phase induction motor with neat diagrams. (16)	BTL3	Apply	CO5
4.	Explain the construction, working principle, characteristics and applications of Universal motor with relevant diagrams. (16)	BTL4	Analyse	CO5
5.	With a neat diagram describe the working principle of Brushless DC motor. (16)	BTL3	Apply	CO5
6.	Describe the construction and principle of working of switched reluctance motor with neat diagrams and mention its applications. (16)	BTL3	Apply	CO5
7.	Describe the construction, working principle and applications of repulsion motor with neat diagrams. (16)	BTL3	Apply	CO5
8.	Describe the construction, working principle and applications of AC series motor with neat diagrams. (16)	BTL3	Apply	CO5
9.	In a 6 pole, single phase induction motor, the gross power absorbed by the forward and backward fields are 160W and 20 w respectively, if the motor speed is 950 rpm amd the no-load frictional loss is 75 W, find the shaft torque. (16)	BTL4	Analyse	CO5
10.	**(i)** Compare the single induction motor and three phase induction motor. (8)	BTL4	Analyse	CO5
	(ii) Discuss the differences between capacitor-start and capacitor-start capacitor-run induction motors. Why is the auxiliary winding of a capacitor-start motor disconnected after the motor has picked up speed? (8)			
11.	**(i)** A 250 W, 230 V, 50 Hz single phase Capacitor Start induction motor has the following constants for the main	BTL4	Analyse	CO5

		and auxiliary windings. Main Winding, Zm = (4.5+j3.7) Ω, Auxiliary winding, Za = (9.5+j3.5) Ω. Estimate the value of the capacitor that will place the main and auxiliary winding currents in quadrature at starting. (8)			
	(ii)	Discuss about the cross field theory. (8)			
12.	**(i)**	Determine the stepping angle for a (i) three phase twenty pole permanent magnet stepper motor (ii) three stack twelve tooth variable reluctance stepper motor. (8)	BTL4	Analyse	CO5
	(ii)	A variable reluctance stepper motor has 4 poles with 10 teeth in each, Determine the stepping angle if the rotor has 60 teeth. (8)			
13.	Design the step by step the no-load and blocked rotor test procedure to obtain the equivalent circuit parameters of a single phase induction motor. (16)		BTL4	Analyse	CO5
14.	Explain with neat sketch the construction and principle of operation of various types of Stepper Motor. (16)		BTL3	Apply	CO5
15.	Discus about the hysteresis motor. (16)		BTL3	Apply	CO5
16.	Write short notes on the working principle of permanent magnet synchronous with diagram. (16)		BTL3	Apply	CO5
17.	Explain with neat sketch the construction and principle of operation of variable reluctance Stepper Motor. (16)		BTL4	Analyse	CO5