Course Code: 20EE0210 **R20**

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(Approved by AICTE, New Delhi & Affiliated to JNTUA, Ananthapuramu)
(Accredited by NBA for Civil, EEE, Mech., ECE & CSE
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Puttur -517583, Chittoor District, A.P. (India

QUESTION BANK (DESCRIPTIVE)

Subject with Code:ELECTRICAL MACHINES-II (20EE0210) **Course & Branch:** B.Tech -EEE
Year & Semester :II - B. Tech. & II-Semester **Regulation:**R20

UNIT –I
SINGLE PHASE TRANSFORMERS

1		Explain the construction and working principle of 1Ø transformer?	[L3][CO1]	**[12M]**
2	**a)**	Explain the classification of transformers	[L1][CO1]	**[6M]**
	b)	What are the main components of transformer?	[L2][CO1]	**[6M]**
3		Explain the types of transformer with neat sketch	[L2][CO1]	**[12M]**
4		Derive the E.M.F equation of single phase transformer?	[L4][CO1]	**[12M]**
5	**a)**	Explain the No-load phasor diagram of single phase transformer	[L3] [CO1]	**[6M]**
	b)	Explain operation of single phase transformer on load with phasor diagram	[L4] [CO1]	**[6M]**
6	**a)**	Explain the equivalent circuit of single phase transformer.	[L2][CO1]	**[6M]**
	b)	A single phase transformer has 500 primary and 1200 secondary turns. Net cross sectional area of the core is 80cm^2. if the primary winding is connected to 50hz supply at 500V, calculate the value of maximum flux density on core and the emf induced in the secondary.	[L3][CO1]	**[6M]**
7	**a)**	What are the losses in a transformer?	[L1][CO1]	**[6M]**
	b)	State the condition for maximum efficiency of a Transformer?	[L2][CO1]	**[6M]**
8	**a)**	Explain the term voltage regulation in a transformer?	[L2][CO1]	**[6M]**
	b)	List out the applications of transformer and Why the rating of transformer is given in KVA?	[L2][CO1]	**[6M]**
9		A 2000/200V transformer has a primary resistance and reactance of 2 ohm and 4 ohm respectively. The corresponding secondary values are 0.025 and 0.04 ohm. Determine (i) Equivalent resistance and reactance primary referred to secondary. (ii)Total resistance and reactance referred to secondary.(iii) Equivalent resistance and reactance secondary referred to primary.(iii)Total resistance and reactance referred to secondary.	[L4][CO1]	**[12M]**
10		A 40 KVA transformer has an iron loss of 450 W and full load copper loss of 850W. If the power factor of the load is 0.8 lagging. Calculate (i) full load efficiency (ii) the load at which maximum efficiency occurs and (iii) the maximum efficiency.	[L3][CO1]	**[12M]**

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UNIT –II
TESTING OF TRANSFORMERS

1		Explain the OC and SC test of single phase transformer in detail	[L4][CO2]	**[12M]**
2		Obtain the approximate equivalent circuit of a given 200/2000V,single phase 25KVA transformer having the following test results OC test: 200V, 6A, 350W on LV side SC test: 70 V, 15A, 600W on HV side	[L4][CO2]	**[12M]**
3	**a)**	Explain sumpner's test in detail	[L3][CO2]	**[6M]**
	b)	List out the application of three phase transformer	[L1][CO2]	**[6M]**
4		Explain the parallel operation of single phase transformer	[L4][CO2]	**[12M]**
5		Two single phase transformers with equal turns have impedance of (0.5+j3) ohm and (0.6+j10) ohm with respect to the secondary. If they operate in parallel determine how they will share the total load of 100KW at PF 0.8 lagging.	[L3][CO2]	**[12M]**
6		Explain auto transformer in detail with neat diagram	[L3][CO2]	**[12M]**
7	**a)**	What are the applications of auto-transformer?	[L2][CO2]	**[6M]**
	b)	List the advantages and disadvantage of auto-transformer	[L1][CO2]	**[6M]**
8	**a)**	Explain the delta-star connection of transformer in detail	[L3][CO2]	**[6M]**
	b)	List the advantages of delta-star connection of transformer	[L2][CO2]	**[6M]**
9	**a)**	Explain star-star connection of transformer with neat diagram	[L3][CO2]	**[6M]**
	b)	Explain delta-delta connection of transformer with neat sketch	[L4][CO2]	**[6M]**
10		A short circuit test when performed on the HV side of a 10KVA,2000/400V single phase transformer. Gave the following data 60v,4A,100W. If the LV side is delivering full load current at 0.8pf lag and at 400V. find the voltage applied to HV side.	[L4][CO2]	**[12M]**

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UNIT –III

THREE-PHASE INDUCTION MOTORS

1		Describe the constructional details of squirrel cage and wound rotor induction machines	[L4][CO3]	**[12M]**
2	**a)**	Explain the operating principle of 3 phase Induction motor	[L3][CO3]	**[6M]**
	b)	List out the applications of 3 phase induction motor	[L2][CO3]	**[6M]**
3		A 4 pole, 3-phase induction motor operates from a supply whose frequency is 50Hz. Calculate. i) The speed at which the magnetic field of the stator is rotating. ii) the speed of the rotor when the slip is 0.04 iii) the frequency of the rotor currents when the slip is 0.03 iv) the frequency of the rotor currents at standstill. v) speed of the rotor when the slip is unity .	[L4][CO3]	**[12M]**
4	**a)**	Explain the production of rotating magnetic field in 3 phase induction motor	[L2][CO3]	**[6M]**
	b)	Explain the term slip of the induction machine	[L1][CO3]	**[6M]**
5	**a)**	Draw the Equivalent circuit of a 3 phase induction motor.	[L1][CO3]	**[6M]**
	b)	Compare squirrel cage induction motor and slip ring induction motor.	[L2][CO3]	**[6M]**
6	**a)**	A three phase squirrel cage induction motor connected to 60HZ line, possesses the synchronous speed of 900 r/min. the motor absorbs 40KW and the stator copper and iron loss amount to 5KW and 1KW respectively, calculate torque developed by the motor.	[L3][CO3]	**[6M]**
	b)	Explain the rotor current and power factor at standstill and under running conditions.	[L4][CO3]	**[6M]**
7	**a)**	Explain rotor current frequency of the induction motor	[L3][CO3]	**[6M]**
	b)	Explain the phasor diagram of 3 phase induction motor	[L3][CO3]	**[6M]**
8	**a)**	A 4 pole induction motor is excited by a 3 phase 60hz source. If the full load speed is 1140 r/min. calculate slip	[L2][CO3]	**[6M]**
	b)	Explain the power flow diagram of induction machine	[L3][CO4]	**[6M]**
9		A 3 phase induction motor having a synchronous speed of 1200r/min draws 80KW from a 3 phase feeder. The copper loss and iron loss in the stator amount to 5KW. If the motor runs at 1152 r/min, calculate: a) the active power transmitted to the rotor. b) the rotor I^2R loss. c) the mechanical power developed. d) the mechanical power delivered to the load, knowing windage and frictional loss are equal to 2 KW. e) the efficiency of the motor.	[L4][CO4]	**[12M]**
10		A three phase induction motor is wound for 4 poles and is supplied from 50 HZ System. Calculate (a) synchronous speed (b) speed of the motor when slip is 4% and (c) Rotor current frequency when the motor runs at 600 rpm.	[L3][CO4]	**[12M]**

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UNIT –IV

THREE PHASE INDUCTION MOTOR CHARACTERISTICS

1		Derive the expressions for starting torque, running torque and maximum torque equations.	[L4][CO5]	**[12M]**
2	**a)**	Explain Torque-Slip Characteristics of Induction machine	[L3][CO5]	**[[6M]**
	b)	Explain Torque-Speed Characteristics of Induction machine	[L3][CO5]	**[6M]**
3	**a)**	Explain the Load characteristics of induction machines in detail	[L3][CO5]	**[6M]**
	b)	Draw the Equivalent Circuit of 3 phase induction machine	[L1][CO5]	**[6M]**
4		The power input to the rotor is of 440V, 50hz, 6 poles, 3 phase induction motor is 80KW. The electromotive force is observed to make 100 complete alterations per minute. Calculate (i) slip (ii) rotor speed (iii) rotor copper loss per phase.	[L4][CO5]	**[12M]**
5	**a)**	Explain the term Crawling and Cogging in induction machine	[L3][CO5]	**[6M]**
	b)	A 3 phase induction motor is driving full load torque which is independent of speed. If line voltage drops to 90% of the rated value. Find the increase in motor copper losses.	[L3][CO5]	**[6M]**
6	**a)**	Explain the procedure to draw the circle diagram	[L4][CO5]	**[6M]**
	b)	What are the methods available for speed control of 3Ø induction machine	[L4][CO5]	**[6M]**
7		A three phase 400V induction motor gave the following test readings: No load: 400V.1250 W,9A short circuit: 150V,4KW,38A Draw the circle diagram. If the normal rating is 14.9KW. Find full load value of the current, pf and slip from the circle diagram.	[L4][CO5]	**[12M]**
8		Explain no Load and blocked rotor tests of 3Ø induction machine	[L4][CO5]	**[12M]**
9	**a)**	Explain the rotor rheostat speed control of 3Ø induction motor in detail.	[L3][CO5]	**[6M]**
	b)	Explain the method of emf injunction in the rotor circuit for speed control of three phase induction motor.	[L3][CO5]	**[6M]**
10		A 20hp (14,92KW) 400V 950RPM 3 PHASED 50HZ 6 pole cage motor with 400v applied takes 6 times full load current at standstill and develops 1.8 times full load running torques. The full load current is 30A. (a) What voltage must be applied to produce full load torque at starting? (b) What current will this voltage produce? (c) If the voltage is obtained by auto transformer what will be the line current. (d) If starting current is limited to full load current by an auto transformer what will be the starting torque as a percentage of full load torque.	[L4][CO5]	**[12M]**

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UNIT –V

SINGLE PHASE INDUCTION MOTOR

1		Explain the double field revolving theory of 1Ø induction motor	[L4][CO6]	**[12M]**
2	**a)**	Explain the operating principle of 1Ø induction motor	[L3][CO6]	**[6M]**
	b)	Draw the equivalent circuit of single-phase Induction motor	[L1][CO6]	**[6M]**
3	**a)**	Explain why the single phase induction motor is not self-starting	[L2][CO6]	**[6M]**
	b)	What are the types of single-phase Induction Motors?	[L1][CO6]	**[6M]**
4		Explain the construction and operating principle of split phase induction motor.	[L4][CO6]	**[12M]**
5		Explain the construction and operating principle of shaded pole Induction Motor.	[L4][CO6]	**[12M]**
6		In a 4-pole, 50 Hz single-phase Induction motor, the power absorbed by the forward and backward field rotor equivalent resistances are 200 W and 21W respectively at a motor speed of 1440 rpm. The total mechanical loss is 20W. Compute the shaft torque at the above speed.	[L4][CO6]	**[12M]**
7		Explain the construction and operating principle of capacitor start induction run motors in detail.	[L4][CO6]	**[12M]**
8	**a)**	List out the applications of single-phase induction motor.	[L2][CO6]	**[6M]**
	b)	List out the advantage and disadvantage of single-phase induction motor.	[L3][CO6]	**[6M]**
9		Explain the construction and operating principle of capacitor start and capacitor run motor in detail.	[L4][CO6]	**[12M]**
10	**a)**	List out the application of capacitor start induction motors	[L2][CO6]	**[6M]**
	b)	A 250 W, 230V, 50Hz capacitor start motor has the following constants for the main and auxiliary windings: main winding, Z_m=(4.5+j3.7) ohm. Auxiliary winding Z_a=(9.5+j3.5) ohm. Determine the value of the staring capacitor that will place the main and auxiliary winding currents in quadrature at starting.	[L2][CO6]	**[6M]**

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