Course Code: 20EE0254 **R20**

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
Siddharth Nagar, Narayanavanam Road – 517583
QUESTION BANK (DESCRIPTIVE)

Subject with Code: Electrical Technology (20EE0254) **Course & Branch**: B.Tech - ECE

Regulation: R20 **Year & Sem:** I-B.Tech & II-Sem

UNIT –I
D.C GENERATORS

1	Explain the constructional details of a D.C generator	[L2] [CO1]	**[12M]**
2	Explain the basic principle of operation of a DC Generator with a simple loop generator?	[L2] [CO1]	**[12M]**
3	a)Derive expression for generated EMF of a D.C generator.	[L3][CO1]	**[6M]**
	b) A 4-pole, long shunt, lap wound generator supplies 25kw at a terminal voltage of 500 V. The armature resistance is 0:03, series field resistance is 0:04 and shunt field resistance is 200. The brush drop may be taken as 1 V. Determine the EMF generated.	[L2] [CO1]	**[6M]**
4	a)What are the causes for the failure of self-excitation?	[L1][CO1]	**[6M]**
	b) Distinguish between Lap and Wave windings?	[L3][CO1]	**[6M]**
5	a)A six pole, lap wound armature has 840 conductors and flux per pole of 0.018 wb. Calculate the EMF generated, when the machine in running at 600 rpm.	[L2][CO2]	**[6M]**
	b) The armature of a 4 pole, lap-wound DC shunt generator has 120 slots with 4 conductors per slot.The flux per pole is 0.05 wb. The generator runs at speed 1500 rpm. Find the generated voltage?	[L4][CO2]	**[6M]**
6	a) A Short shunt compound generator delivers a load current of 30 A at 220 V and has armature, series–field and shunt–field resistances of 0.05 Ω, 0.03 Ω and 200 Ω respectively. Calculate the induced EMF and the armature current. Allow 1.0 V per brush for contact drop.	[L4][CO2]	**[6M]**
	b)Explain how voltage builds up in D.C shunt generator.	[L4][CO2]	**[6M]**
7	a)Describe the different types of generator.	[L2][CO1]	**[7M]**
	b)Write different applications of dc generators?	[L5][CO1]	**[5M]**
8	Explain the characteristics of D.C generator..	[L2][CO1]	**[12M]**
9	a)A 4 pole generator having wave wound armature has 48 slots with 20 conductors in each slot. What will be the voltage generated in the machine when driven at 1500 rpm. Assuming flux per pole to be 7mwb?	[L3][CO1]	**[6M]**
	b)What are the various characteristics of compound generators?	[L1][CO2]	**[6M]**
10	a)What is the purpose of yoke?	[L1][CO1]	**[3M]**
	b)Write the purpose of the commutator?	[L1][CO1]	**[3M]**
	c)What is meant by armature reaction?	[L1][CO1]	**[2M]**
	d)What is the purpose of inter poles?	[L1][CO1]	**[2M]**
	e)What is the purpose of pole shoe?	[L1][CO1]	**[2M]**

Course Code: 20EE0254 **R20**

UNIT –II
D.C.MOTORS

1	a) Explain the working principle of D.C motor.	[L2][CO2]	**[6M]**
	b)State the voltage and power equation of D.C motor explaining each term.	[L3][CO2]	**[6M]**
2	a) Derive the expression for electromagnetic torque.	[L1][CO1]	**[6M]**
	b)List out the applications of a DC motor.	[L3][CO2]	**[6M]**
3	Explain the characteristics of D.C motor.	[L2][CO2]	**[12M]**
4	a) A 250V, 4 pole D.C shunt motor has two circuit armature winding with 500 conductors. The armature circuit resistance is 0.25 ohms, field resistance is 125 ohm and the flux per pole is 0.02Wb.Find the speed and torque developed if the motor draws 14A from the mains?	[L3][CO2]	**[6M]**
	b) A 4 pole, 500 V DC shunt motor has 720 wave connected conductor on its armature. The full load armature current is 60 A & the flux per pole is 0.03 web, the armature resistance including brush contact is 0.2 Ω. Calculate the full load speed of the motor.	[L2][CO3]	**[6M]**
5	a) Explain the method used to control the speed of a dc shunt motor above the rated speed.	[L2][CO3]	**[12M]**
	b) A 250 V motor has an armature circuit resistance of 0.5 ohms. If the full load armature current is 25A. Find the back EMF induced in the armature.?	[L2][CO1]	**[6M]**
6	What are the different types of DC motors Explain in detail.	[L2][CO1]	**[12M]**
7	a) Explain various methods of speed control of D.C shunt motor.	[L2][CO2]	**[7M]**
	b) A 20HP DC motor has 89.3% efficiency at rated power. what are the total loss.	[L2][CO2]	**[5M]**
8	Explain swinburne's test for finding the efficiency of D.C machine.	[L1][CO3]	**[12M]**
9	Explain various losses and Efficiency of a D.C. machine.	[L2][CO3]	**[12M]**
10	Explain the armature voltage and field flux control methods for the Speed control of a DC Motor.	[L2][CO2]	**[12M]**

Course Code: 20EE0254 **R20**

UNIT –III
SINGLE PHASE TRANSFORMERS

1	Draw the constructional diagram of a single –phase transformer and explain all the parts.	[L2][CO4]	**[12M]**
2	a)Explain the Working principle of single –phase transformer.	[L2][CO4]	**[6M]**
	b) A230/110V, 1 KVA, single –phase transformer is connected to 230V, A.C Supply. Calculate (i) Primary current (ii)Secondary current	[L4][CO4]	**[6M]**
3	a) Derive an EMF equation of a single-phase transformer.	[L3][CO4]	**[6M]**
	b) A single-phase transformer has 400 turns on primary winding 1000 turns on secondary winding. If it is operating at 50Hz supply with a maximum flux of 0.045Wb.Find (i) Primary &Secondary induced EMF (ii) EMF induced per turn.	[L4][CO4]	**[6M]**
4	a) With relevant phasor diagrams, explain the operation of a practical single phase transformer under no load condition.	[L2][CO4]	**[6M]**
	b) Compare Core type &Shell type transformer.	[L3][CO4]	**[6M]**
5	With relevant phasor diagrams, explain the operation of a practical single phase transformer Operating on lagging and leading power factor condition.	[L4][CO4]	**[12M]**
6	a)Write the short notes on Voltage Regulation & Efficiency.	[L5][CO4]	**[6M]**
	b) A 10KVA ,2200/400 transformer has $R_1 = 5\Omega$, $X_1 = 12\Omega$, $R_2 = 0.2\Omega$, $X_2 = 0.48\Omega$ .Determine the equivalent impedance of the transformer referred to i) Primary ii) Secondary.	[L4][CO4]	**[6M]**
7	a) A single-phase 600/230V,50Hz transformer has a core area of 400$cm^2$and a maximum flux density of 1.18Wb/m^2.Calculate the number of turns in Primary& Secondary windings.	[L4][CO4]	**[6M]**
	b) Explain about Various losses occurs in a transformer.	[L1][CO4]	**[6M]**
8	A 5KVA, 500/250V, 50Hz, single –phase transformer gave the following results: From O.C Test: 500V, 1A, 50W (H.V Side is opened) From S.C Test: 25V, 10A, 60W (L.V Side is shorted) Determine: (i)The Efficiency on Full-load, 0.8 lagging P.F. (ii)The Voltage Regulation on Full-load 0.8 lagging P.F. (iii) The Efficiency on 60% of Full-load, 0.8 lagging P.F. (iv) The Voltage Regulation on Full-load,0.6 leading P.F.	[L4][CO7]	**[12M]**
9	What is the Procedure for conducting O.C. test and S.C on a single-phase transformer, explain with neat diagram.	[L1][CO7]	**[12M]**
10	a)In a 25KVA ,2000/200V ,transformer has Iron and copper losses are 350W and 400W respectively. Calculate the efficiency at unity power factor (i) at full load (ii) at half Load.	[L3][CO7]	**[6M]**
	b) Develop the Equivalent circuit of a single phase transformer referred to secondary.	[L4][CO4]	**[6M]**

Course Code: 20EE0254 **R20**

UNIT –IV
3-PHASE INDUCTION MOTORS

1	a) List the differences between squirrel cage and wound rotor?	[L4][CO5]	**[6M]**
	b)A 3 phase 4 pole 50 Hz induction motor runs at 1460 r.p.m. find its (i) synchronous speed(ii) slip speed (iii) percentage slip.	[L4][CO5]	**[6M]**
2	a) Draw the torque-slip characteristics of a 3-phase induction motor.	[L3][CO5]	**[6M]**
	b)A 12 pole 3 φ alternator driver at speed of 500 r.p.m. supplies power to an 8 pole 3 φ induction motor. If the slip of motor is 0.03p.u, calculate the speed.	[L4][CO5]	**[6M]**
3	a) Explain construction features of wound rotor machine?	[L2][CO5]	**[6M]**
	b)A 3-φ 4 pole induction motor is supplied from 3-φ 50Hz ac supply. Find (i) synchronous speed (ii) rotor speed when slip is 4% (iii) the rotor frequency when runs at 600r.p.m.	[L3][CO5]	**[6M]**
4	a) Explain construction features of cage rotor machine?	[L2][CO5]	**[6M]**
	b)A 12 pole 3-φ alternator is coupled to an engine running at 500r.p.m. If supplied a 3φ induction motor having full speed of 1440r.p.m. Find the %age slip, frequency of rotor current and no of poles of rotor?	[L4][CO5]	**[6M]**
5	Explain the principle of operation of 3-phase induction motor with neat sketch?	[L2][CO5]	**[12M]**
6	Explain with neat diagram the construction of cage and wound rotor and list the differences between them?	[L2][CO5]	**[12M]**
7	Derive a general expression for the torque developed in a 3-phase induction motor?.	[L3][CO5]	**[12M]**
8	a) Define the following (i)Slip, (ii)Slip speed	[L1][CO5]	**[6M]**
	b)Derive rotor frequency and rotor induced emf of a 3-phase induction motor.	[L3][CO5]	**[6M]**
9	a) Derive the relation between rotor starting torque and maximum torque.	[L3][CO5]	**[6M]**
	b)A three phase induction motor is running at 1740 r.p.m. On a 60Hz supply. Calculate number of poles, the slip and the rotor frequency.	[L4][CO5]	**[6M]**
10	a)Derive relation between rotor full load torque and maximum torque.	[L3][CO5]	**[6M]**
	b) A 12 pole , 50Hz three phase induction motor has rotor resistance of 0.15ohm and standstill reactance of 0.25ohm.The rotor induced emf per phase at standstill is observed to be 32V. Calculate (i) Starting torque.	[L4][CO5]	**[6M]**

Course Code: 20EE0254 **R20**

UNIT –V
SYNCHRONOUS MACHINES

1	Explain the working principle of a Synchronous generator ?	[L2][CO6]	**[12M]**
2	Discuss the construction features of salient and round rotor machine.	[L3][CO6]	**[12M]**
3	Derive an EMF equation of an alternator.	[L4][CO6]	**[12M]**
4	For a 3-phase winding with 4-slots per pole per phase and with the coil span of 10 slots, evaluate the pitch and distribution factor.	[L5][CO6]	**[12M]**
5	A 200kVA, 415 V, 50 Hz, 3 Ø alternator has effective armature resistance of 0.01Ω and an armature leakage reactance of 0.05Ω. Compute the voltage induced in the armature winding when the alternator is delivering rated current at a load p.f of (i) 0.8 Lagging (ii) 0.8 leading.	[L3][CO6]	**[12M]**
6	Explain the synchronous impedance method for calculating the regulation of a three phase alternator.	[L2][CO6]	**[12M]**
7	A 3-phase, 50 Hz, star connected 2000 KVA, 2300V alternator has an effective resistance of 0.12Ω and gives a short circuit current of 600A for a certain field excitation. With the same excitation, the open circuit voltage was 900V. Calculate: i) The synchronous impedance and reactance ii) The full load regulation when the power factor is 0.8 lagging iii) The full load regulation when the power factor is 0.6 leading.	[L2][CO6]	**[12M]**
8	Sketch and explain the open circuit and short circuit characteristics of a synchronous machine how voltage regulation can be calculated by the use of their results.	[L5][CO6]	**[12M]**
9	Explain the theory of operation of synchronous machine.	[L2][CO6]	**[12M]**
10	Explain the working principle of a synchronous motor.	[L2][CO6]	**[12M]**

Prepared by:

S.MUNI SEKHAR, R.LAKSHMI, V.SIVA SUBRAMANYAM & P.JAHNAVI