CODE No.: 19BT30201 SVEC-19

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(An Autonomous Institution, Affiliated to JNTUA, Ananthapuramu)

II B.Tech I Semester (SVEC-19) Regular Examinations February – 2021

ELECTRICAL MACHINES-I

[Electrical and Electronics Engineering]

Time: 3 hours **Max. Marks: 60**

Answer One Question from each Unit
All questions carry equal marks

UNIT-I

1.	a)	Explain the constructional features of a DC machine with the help of neat sketch.	6 Marks	L1	CO1	PO1
	b)	An 8 pole, DC shunt generator with 770 wave connected armature conductors and running at 500 r.p.m supplied a load of 12.5Ω resistance at a terminal voltage of 250V. Armature resistance is 0.24Ω and field resistance is 250Ω. Find armature current and induced EMF. Also find the flux per pole.	6 Marks	L3	CO1	PO4
		(OR)				
2.	a)	Derive the EMF equation of a DC generator.	6 Marks	L2	CO1	PO1
	b)	A compound generator delivers a load current of 50A at 500V. The resistances are R_a=0.05Ω, R_{se}= 0.064Ω and R_{ah}= 250Ω. The brush contact drop is 1 volt/brush. Find the induced EMF and Armature current when the machine connected as: i) long shunt. ii) short shunt.	6 Marks	L3	CO1	PO2

UNIT-II

3.	a)	What is armature reaction? Describe the effects of armature reaction on the operation of DC machine and how the armature reaction is minimized.	6 Marks	L4	CO1	PO1
	b)	A 4 pole lap wound generator having 480 armature conductors. Supplies a current of 150A. If the brushes are given a lead of 10^0. Calculate demagnetizing amperes turns/pole and cross magnetising ampere turns/pole.	6 Marks	L3	CO1	PO1
		(OR)				
4.	a)	What is commutation? Explain the methods of improving commutation.	6 Marks	L4	CO1	PO3
	b)	What are the conditions for voltage build up of a dc shunt generator?	6 Marks	L2	CO2	PO2

UNIT-III

5.	a)	Explain the Speed-Current, Torque-Current and Speed-Torque characteristics of a DC shunt and series motors.	6 Marks	L1	CO3	PO3
	b)	A 250V shunt motor has an R_a =0.2 Ω and R_{sh} = 250 Ω. The motor draws 25A runs at 1000 r.p.m. Calculate the speed when the line current is 50A, if armature reaction weakens the field by 3%. Determine the torque in both cases.	6 Marks	L3	CO3	PO2
		(OR)				
6.	a)	Derive torque equation of a DC motor from first principles.	6 Marks	L1	CO3	PO1
	b)	A 4 pole series motor has 944 wave connected armature conductors. At a certain load flux per pole is 34.6mwb and the total mechanical torque developed is 209N-m. Calculate the line current taken by the motor and speed at which it will run with an applied voltage of 500V. Total armature resistance is 3Ω.	6 Marks	L3	CO3	PO2

UNIT-IV

7.	a)	Draw the phasor diagram of loads for single phase transformer.	6 Marks	L2	CO4	PO2
	b)	Derive the EMF equation of a single phase transformer.	6 Marks	L1	CO4	PO1

(OR)

8.	a)	Explain clearly how to perform the OC test on single phase transformer. Write the formulae.	6 Marks	L3	CO4	PO4
	b)	A 15KVA, 2200/220V, 50Hz transformer gave the following results. OC test (L.V side): V =220V, I=2.742A, P=185W. SC test (H.V side): V =112V, I=6.3A, P=197W. Compute the efficiency at full load 0.8 p.f lead.	6 Marks	L3	CO4	PO2

UNIT-V

9.	a)	Give the merits and demerits of star delta connected three phase transformers. Explain the function.	6 Marks	L2	CO4	PO1
	b)	Explain about the Scott connection with neat sketch.	6 Marks	L3	CO4	PO2

(OR)

10.	a)	Give the merits and demerits of delta connected three phase transformers. Explain the function.	6 Marks	L2	CO4	PO1
	b)	Illustrate the various types of three phase transformers connections.	6 Marks	L1	CO4	PO1