Q.P. Code: 16EE211 **R16**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year I Semester Regular & Supplementary Examinations Nov/Dec 2018

ELECTRICAL MACHINES – I

(EEE)

Time: 3 hours Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1	**a**	With the help of energy balance theory, Explain the concept of co-energy and mechanical energy.	7M
	b	What are the significance of energy and co-energy in energy conservation system?	5M
		OR	
2	**a**	Deduce the expression for force in a doubly – excited system with the help of neat sketch.	7M
	b	The magnetic flux density on the surface of an iron face is 1.8 T which is a typical saturation level value for ferromagnetic material. Find the force density on the iron face.	5M

UNIT-II

3	**a**	An 8 pole lap wound armature rotate at 350 rpm is required to generate 260V. The useful flux per pole is about 0.05wb. If the armature has 120 slots, calculate number of conductors per slot and hence determine the actual value of flux required to generate the same voltage for wave wound.	7M
	b	Explain armature reaction and its effects in DC generators with neat sketches.	5M
		OR	
4	**a**	Derive an expression for the demagnetizing and cross magnetizing ampere-turns in DC generator.	7M
	b	Explain the reasons for failure of build-up of EMF in self excited generators with remedies.	5M

UNIT-III

5	**a**	Draw and explain load characteristics of dc compound generator.	7M
	b	DC generators are running in parallel, each having an armature resistance of 6 ohms. Running the same speed and excited to give equal induced EMF's generators share load equally at a terminal voltage of 500 Volts. The total load is 100 KW if the field current of one generator is raised by 5 Amps and the speed remains constant, Calculate (i) New Terminal Voltage (ii) Output of each machine	5M
		OR	
6	**a**	Explain parallel operation of DC series generators in detail with neat sketches.	7M
	b	A separately excited generator with constant excitation is connected to a constant load. When the speed is 1000 rpm, it delivers 120A at 500V. At what speed will the current be reduced to 60A? Armature resistance is 0.1 ohm, Contact drop/brush is 1V. Armature reaction may be ignored.	5M

UNIT-IV

7	**a**	What are the methods of speed control of DC shunt motor? Briefly explain them with help of neat diagram.	7M
	b	Explain the principle of operation ward-leonard system of speed control of dc machine.	5M
		OR	
8	**a**	Why starter is needed for starting DC motors? Explain 3-point starter with neat sketch.	7M
	b	A 220V DC shunt motor with a constant main field drives a load, the torque of which varies as the square of the speed. When running at 600 rpm it takes 30A. Find the speed at which it will run and the current it will draw if a 20Ω resistor is connected in series with armature. Neglect motor losses.	5M

UNIT-V

9	**a**	Explain Hopkinson's test on DC motor. Also state the advantages and disadvantages of it.	7M
	b	A 230V DC shunt motor is taking 5A when running light. The armature resistance is 0.2Ω and field circuit resistance is 115Ω. For an input current of 72A. Calculate the shaft output and efficiency. Also calculate the armature current at which the efficiency is maximum.	5M

OR

10	**a**	Explain Constant and Variable losses. Draw the graph of losses v/s load.	7M
	b	A 200V DC motor takes 25A while running at a speed of 1000 rpm during brake test. If the spring balances read 5 Kg and 25 Kg, find the output and efficiency. Diameter of the brake drum is given as 40 cm.	5M

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