Reg. No.

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL (A constituent unit of MAHE, Manipal)

## **IV SEMESTER B.TECH END SEMESTER EXAMINATIONS**

## **APRIL / MAY 2019**

## ENERGY CONVERSION TECHNOLOGIES [ELE 3285] (OPEN ELECTIVE – I)

**REVISED CREDIT SYSTEM** 

Time	e: 3 Hours	Date: 07.May.2019	Max. Marks: 50		
Instr	Instructions to students:				
	<ul> <li>Answer ALL the questions.</li> </ul>				
	<ul> <li>Missing data may be suitably</li> </ul>	assumed.			
1A.	Draw a neat diagram and explai	in the construction of an autotransformer.	(03)		
1B.	A 15 kVA, 2,200 / 110 V, 50 Hz, winding resistances of 2 $\Omega$ and $\Omega$	single-phase transformer has primary and 0.006 $\Omega$ respectively. Iron losses are 180 W.	secondary Determine:		
	a) rated copper loss in the prim	ary winding			
	b) rated copper loss in the seco	ndary winding			
	c) full-load efficiency if the load	power factor is 0.85 lagging	(04)		
1C.	a) Define voltage regulation of a	a transformer.			
	b) Write different applications	of transformers.	(03)		
2A.	With reference to construction and wound rotor constructions	al aspects and working, compare squirrel used for 3-phase induction motors.	cage rotor (03)		
2B.	A prime mover drives a 3-pha generator supplies power to a 3 at full-load is 6 %, calculate:	se, 12 pole synchronous generator at 500 -phase, 6 pole induction motor. If the slip of	rpm. This this motor		
	a) full-load speed				
	b) frequency of rotor currents a	it full-load			
	c) frequency of rotor currents a	t standstill condition	(03)		
2C.	Explain the constructional deta generator. Which generating sta	ails found in a 3-phase cylindrical rotor sy ation uses this generator and why?	nchronous <b>(04)</b>		

3A.	Classify and explain different types of power losses occurring in a 3-phase synchronous generator.	(03)	
3B.	What are damper windings? What are their functions in a 3-phase synchronous motor?		
3C.	An 11 kV industrial load is supplied 200 kW at 0.8 lagging power factor. A synchronous motor with an efficiency of 85 % is later added to supply a mechanical load of 50 kW. At the same time, it is used to raise the overall power factor of the industry to 0.9 lagging. Find the kVA capacity of the synchronous motor and the power factor at which it operates.	(05)	
4A.	Classify DC motors based on field windings & their relative connection to armature. Draw the schematic diagram of each motor.	(04)	
4B.	Why is a starter necessary for a DC motor? Discuss the protection schemes employed in a 3-point starter.	(03)	
4C.	A 500 V DC shunt motor produces an output of 30 kW at 85 % efficiency. Its armature resistance is 0.6 $\Omega$ and field resistance is 250 $\Omega$ . Determine:		
	a) armature current		
	b) back emf developed	(03)	
5A.	Discuss the constructional features, working and applications of a universal motor.	(04)	
5B.	Discuss the constructional features, working and applications of a linear induction motor.	(04)	
5C.	What are the applications of stepper motors?	(02)	