Reg. No.

MANIPAL INSTITUTE OF TECHNOLOGY PAL A Constituent Institution of Manipal University

III SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

MAKEUP EXAMINATIONS, DEC 2016 - JAN 2017

SUBJECT: ELECTRICAL MACHINERY- I [ELE 2103]

	REVISED CREDIT SYSTEM	
Time	e: 3 Hours Date: 02 January 2017 (9 am to 12 noon) Max. Marks	s: 50
Instructions to Candidates:		
	 Answer ALL the questions. 	
	 Missing data may be suitably assumed. 	
1A.	A 2.2 kVA, 440/220 V, 50 Hz, has the following parameters referred to the primary side: $R_{eq1} = 3 \Omega$, $X_{eq1} = 4 \Omega$, $R_{01} = 2.5 k\Omega$ and $X_{01} = 2 k\Omega$. The transformer is operating at full load with a power factor of 0.707 lagging. Determine the efficiency & voltage regulation of the transformer.	06
1B.	Sketch the connection diagram and phasor diagram of three single phase transformers connected as a delta – star three phase bank.	04
2A.	A 500 kVA, 1ph, 13.8/4.16 kV, 60 Hz transformer has a primary resistance of R1 = 0.8 ohms and secondary resistance of R2 = 0.04 ohms. The iron loss is 3,000 watts. Calculate the all-day efficiency of the transformer when the transformer's daily load is 3 hours @ full load, 5 hours @ $3/4$ load and 7 hours @ $1/4$ load and remaining time on no load. Given connected load operates at unity power factor.	06
2B.	Explain with connection diagram how transformers can be used for (i) 3 phase to 2 phase (ii) 3 phase to 6 phase conversion.	04
3A.	A three phase, 400 V, 50 Hz, 6 pole, slip ring induction motor has a star connected rotor. It has an induced emf of 60 volts on open circuit between the slip rings at stand still when the rated voltage is supplied to the stator. The resistance and stand still reactance of rotor per phase are 0.5 Ω and 5 Ω respectively. Determine the mechanical power & torque generated when running at 4 % slip.	06
3B.	List the losses in an Induction motors. Briefly explain the power flow in an induction motor starting from stator input to useful shaft output.	04
4A.	A 3φ , 6 pole, 415 V, 50 Hz, induction motor develops 30 hp including 2 hp mechanical losses at a speed of 950 rpm. The power factor is 0.88 lagging. Stator losses are 2 KW. Find (i) slip (ii) efficiency (iii) line current.	06
4B.	Explain briefly on any two types of single phase induction motors?	04
5A.	Explain with sketches the commutation process in DC Machines. What are the factors affecting commutation?	05
5B.	Sketch and explain the open circuit characteristics of a separately excited DC generator. What are the conditions for building up of voltage in a self-excited DC generator?	05