

**Acharya Institute of Technology**

Bengaluru 560107

Department of Electrical & Electronics Engineering

INTERNAL ASSESMENT -III [2018-19 Odd Semester]

Subject with Code: Basic Electrical Engineering (18ELE13) Semester: I Max Marks: 30**Date: 29/12/2018****Time: 90 min** *Note: All questions carry Equal Marks*

Qn.No	Question	CO addressed
1	Show that the armature torque developed in a DC motor is $T_a = 0.159 (PZ/A)\phi I_a$.	CO1
OR		
2.	With usual notations, derive an expression for EMF equation of an alternator.	CO1
3a.	Draw and illustrate the characteristics of DC shunt and DC series motor.	CO3
3b.	Give the applications of DC Motors.	
OR		
4a.	Compare between salient pole type and non-salient type rotors of synchronous generator.	CO3
4b.	Compare between squirrel cage and slip ring rotors of induction motor.	
5.	Show that a rotating magnetic field is produced when a 3- ϕ balanced supply is given to the stator winding of a 3- ϕ induction motor.	CO2
OR		
6.	Explain the necessity of starter for 3- ϕ induction motor. With a neat sketch explain the star- delta starter for a 3- ϕ induction motor.	CO2
7a.	A 4 pole, 220V, lap connected DC shunt motor has 36 slots, each slot containing 16 conductors. It draws a current of 40A from supply. The field and armature resistances are 110Ω and 0.1Ω respectively. The motor develops an output power of 6kW. The flux per pole is 40mWb. Calculate i) Speed ii) torque developed by the armature iii) Shaft Torque.	CO4
7b.	A 4-pole, 3-phase alternator driven at 1800rpm has 42 slots with 4 conductors/slot. Average flux/pole is 0.36Wb, sinusoidally distributed. Assume $k_p = 0.956$ and $k_d = 0.952$. Find the line voltage on no-load if connected in i) star and ii) delta.	
OR		
8a.	Find the useful flux/pole of a 250V, 6 pole shunt motor having a two circuit connected armature winding with 220 conductors. The armature resistance is 0.2Ω and the armature current is 13.3A at the speed of 908 rpm.	CO4



8b.	A 6 pole, 3 phase, 50Hz alternator has 12 slots/pole and 4 conductors/slot. The winding is 5/6 full pitched. A flux of 25mWb is sinusoidally distributed along the air gap. Determine the line emf if the alternator is star connected.	
9a.	A 3 phase, 6 pole, 50Hz induction motor has a slip of 1% at no-load and 3% at full load. Calculate i) Synchronous speed ii) No-load speed iii) Full load speed iv) Frequency of rotor current at standstill v) Frequency of rotor current at full load.	CO4
9b.	A 4 pole, 400 volts shunt motor has 720 wave connected conductors on its armature. Full load armature current is 50 Amperes. Flux per pole is 0.03 Weber, armature resistance is 0.2Ω and the brush contact drop is 1 volt per brush. Calculate the full load speed of the motor.	
OR		
10a.	A 3 phase induction motor is wound for 4 poles and is supplied from 50 Hz system. Calculate (i) the synchronous speed (ii) the speed of the motor when slip is 4 % and (iii) the rotor current frequency when the motor runs at 1440 rpm.	CO4
10b.	A 440 volts d.c. shunt motor takes an armature current of 20A and runs at 500rpm. The armature resistance is 0.6Ω . If the flux is reduced by 30% and the torque is increased by 40%, calculate the new values of armature current and speed.	