Ref No. : Ex/ET/EE/T/216/2018(S)

Bachelor of Electronics and Telecommunication Engineering, 2nd Year 1st Semester Supplementary Examination, 2018

SUBJECT: ELECTRICAL MACHINES

Time: Three Hours

Full Marks: 100 (50 each part)

Use a separate Answer-Script for each part

Question No.	PART - I	Marks
	Answer question no. 1 and any two from the rest	
1.	**Correct and/or justify the following statements (any six)**	**6x3 = 18**
(a)	For 40 Hz supply the maximum possible speed of an induction motor is 3000 r.p.m.	
(b)	Transformer oil in a transformer is used as insulation medium only.	
(c)	Open circuit test is done in the Low Voltage side of a transformer.	
(d)	If the rotor rotates against the direction of the rotating magnetic field, then the slip will be more than that of the normal operation.	
(e)	The losses in an auto-transformer remain same to that of the two winding transformer from which the former is reconfigured.	
(f)	An induction motor takes same magnetizing current than a transformer of similar rating.	
(g)	A wound rotor induction motor should have similar winding in the rotor as in the stator.	
2. i)	Show how maximum efficiency condition of a single phase transformer can be determined by short circuit and open circuit test. Show all the derivations.	**8+8 = 16**
ii)	A single phase 50 kVA, 250/500V two winding transformer has an efficiency of 95% at full load, unity power factor. If it is reconfigured as a 500/750 V auto-transformer, determine its efficiency at its new rated load and unity power factor.	
3. i)	How m.m.f is balanced under loading condition in a single phase transformer?	**4+6+6=16**
ii)	Draw and explain the exact equivalent circuit of a single phase transformer.	

[Turn over

Time: Three Hours Full Marks: 100 (50 each part)

Use a separate Answer-Script for each part

Question No.	PART - I	Marks
iii)	A single phase transformer has a ratio of 1:4, and is connected to a purely resistive load which is taking a current of 4A from the secondary. The magnetizing current drawn is also 1A. Determine the primary current if all the losses and leakage reactances are neglected. Draw the necessary phasor diagram.	
4. i)	Show that the slip at maximum toque and the slip at maximum power are different in a three phase induction motor.	8+8=16
ii)	50 hp, 6 pole, 50 Hz slip-ring induction motor runs at 960 rpm on full load with a rotor current of 40 A. allowing 300 W for the copper loss in the short circuiting gear and 1200 W for mechanical losses, find the resistance r_2 per phase of the 3 phase rotor winding.	
5.	Write short notes on any two	8+8=16
i)	Rotating Magnetic field	
ii)	Rotor Construction of SQIM and WRIM	
iii)	No-load test and Blocked-rotor test	

Ref. No.: Ex/ET/EE/T/216/2018(S)

B.E. ETCE SECOND YEAR FIRST SEMESTER SUPPLEMENTARY EXAM - 2018

ELECTRICAL MACHINES

Time : Three hours | **Full Marks 100 (50 for this part)**

Part – II

Use Separate Answer scripts for each Group.

No. of questions		Answer any *three* (3×16) questions *Two* (02) marks reserved for neat and well organized answers and answer scripts.	Marks
1.	(a)	How the open circuit characteristics of a shunt generator can be determined experimentally? What is the effect of speed variation on this characteristic?	5+3
	(b)	How the DC machines are classified according to the method of excitation? Draw the equivalent circuit diagram in each case.	8
2.	(a)	A DC shunt generator is not generating proper voltage even in no load condition. What can be the reasons? How can they be rectified?	8
	(b)	A 220V DC shunt motor has an armature resistance of 0.25 Ω and a field resistance of 220Ω. At no-load the motor draws a source current of 5.0 A while running at 1200 rpm. If the line current at full-load is 40.0A, what is the full-load speed?	8
3.	(a)	How can the parameters of the synchronous machine equivalent circuit be determined experimentally? Draw proper circuit schematic.	8
	(b)	Discuss briefly the methods of speed control of DC series motor?	8
4.	(a)	Explain the function of damper bars in synchronous machines. Where are these bars placed?	8
	(b)	Using proper phasor diagrams, show that power factor of a synchronous motor can be controlled by controlling the excitation for given terminal voltage and power.	8
5.	(a)	What are the measures taken to reduce/nullify the effect of armature reaction in DC machines?	8
	(b)	A 3-ph synchronous generator connected to 11kV grid, is delivering 10MW and 10MVAr. It has a synchronous reactance of 4Ω. Calculate (i) power and torque angle (ii) generated emf.	8