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Ref No. : Ex/ET/EE/T/216/2017(S)

Bachelor of Electronics and Telecommunication Engineering, 2nd Year 1st Semester Supplementary Examination, 2017

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)	If the rotor rotates against the direction of the rotating magnetic field, then the slip will be negative.	
(b)	Transformer oil in a transformer is used as insulating medium only.	
(c)	Open circuit test is done in the Low Voltage side of a transformer.	
(d)	For a 60 Hz supple maximum rotor speed of a three phase induction motor will be 3500 r.p.m.	
(e)	The losses in an auto-transformer remain same to that of the two winding transformer from which the former is reconfigured.	
(f)	In an ideal transformer only the current-ratio is inverse turns-ratio.	
(g)	An induction motor takes more magnetizing current than a transformer of similar rating.	
2. i)	A single phase transformer has a maximum efficiency of 90% at full load and unity power factor. Calculate Efficiency at half load and at the same power factor.	**8+4+4**

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

Use a separate Answer-Script for each part

Question No.	PART - I	Marks
ii)	What is all day efficiency? Why it is important for a distribution transformer?	
iii)	What are the fixed losses in a transformer?	
3. i)	A transformer has two coils both rated for 240V. If these two coils are connected in parallel with opposite polarities and excited by a 110 V AC supply, what will happen?	4+6+6
ii)	Show how the losses of an auto-transformer configured from a two winding transformer remains same to that of the original two-winding transformer.	
iii)	A 50kVA, 11000/415V single phase transformer is connected as a step-up auto-transformer. What will be the kVA rating of the auto-transformer?	
4. i)	Show the power flow through a three phase induction motor.	3 + 5 +8
ii)	Derive the expression for the slip at maximum power.	
iii)	A 400V, 15kW, 4 pole , 50Hz star connected induction motor has a full load slip of 4%. Calculate the full load output torque of the machine.	
5.	Write short notes on : (a) Parallel operation of transformers (b) Rotating magnetic field	8 + 8

Form A: Paper-setting Blank

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B ETCE 2nd year 1st Sem. EXAMINATION, 20 17

(1st/2nd-Semester/~~Repeat~~/Supplementary/~~Spl. Supplementary/Old/Annual/Bi-Annual~~)

SUBJECT Electrical Machines
(Name in full)

PAPER .....

Full Marks 30/ 100
(~~15~~/50 marks for each part)

Time : ~~Two hours~~/Three hours/~~Four hours/Six hours~~

Use a separate Answer-Script for each part

No. of questions	~~Part I~~ / Part II Answer any three questions (3 x 16+2) 2 marks for neatness	Marks
Q1 i)	With neat diagram explain the operation of a DC motor. Hence deduce the expression for Torque developed in a DC motor.	8+8
ii)	In case of a series DC motor explain ~~in~~ voltage build up process. Explain critical field resistance.	
Q2 i)	Write in brief about a) Back E. M. F. in a D. C. machine. Why do we need starter during the starting of a DC Motor?	8+8
ii)	With neat diagram explain External Characteristics of a Shunt generator in details. What do you understand by break down point?	
Q3a)	Explain the terms Plugging. What is the difference between speed control and speed regulation.	6+10
b)	A motor rotating at 1750 rpm draws a current of 36 amp from a 120 volt source. The resistance of the armature circuit is 0.28 ohm and the field resistance is 75 ohms. Determine (a) the field current (b) armature current (c) counter – emf and (d) torque developed.	
Q4 a)	With neat diagram explain the operation of a three point starter.	8+8
b)	A 120 V , 2400 rpm shunt motor has an armature resistance of 0.4 ohms and a shunt field resistance of 160 ohms. The motor operates at its rated speed at full load and takes 15 A. The no-load current is 3 amps. When an external resistance of 3.6 ohms is inserted in the armature circuit with no change in output torque developed. Calculate the motor speed, power loss in the external resistance, and the efficiency of the motor. Calculate at no-load and full load.	
Q5	Write short notes on a) Regenerative Braking. b) Theory of Commutation in DC machine	8+8