Bachelor of Electrical Engineering (Evening) Examination, 2018

(2ndYear, 1stSemester, Supplementary)

ELECTRICAL MACHINES - I

Time: Three Hours **Full Marks:** 100

(50 marks for each part)
Use a separate Answer-Script for each Part

PART - I

Answer *any three* questions from the rest.

Two marks are for neatness and well organised answer.

1. a) Describe the construction of a single phase core type transformer with a neat sketch and explain how it differs from shell type. 8

   b) Write an account of the various methods of cooling of transformers relative to their ratings. 8

2. a) Draw the equivalent circuit of a single phase transformer. 8

   b) Explain with circuit diagrams, the open circuit and short circuit tests to be carried out in the laboratory for the determination of the parameters of a single phase transformer. 8

3. a) Draw and explain phasor diagram of a single phase transformer under load at leading power factor condition. Hence explain the regulation of a transformer on leading power factor load. 8

   b) Discuss briefly the essential and desirable conditions to be fulfilled for operating two single phase transformers in parallel. 8

[Turn over

3. a) What is autotransformer? Give its constructional features. Discuss the relative merits and demerits of an autotransformer. 8

   b) Derive an expression for saving in copper in an autotransformer over a two winding transformer of equal rating. 8

4. a) What are Power transformer and Distribution transformer? Discuss in brief. 8

   b) A 150 kVA transformer is loaded as follows: 8
   Load increases from zero to 100 kVA in 3 hours from 7 AM to 10 AM, stays at 100 kVA from 10 AM to 6 PM and then the transformer is disconnected till next day. Assuming the load to be resistive and core loss equal to full load copper loss of 1 kW, determine the all-day efficiency and the ordinary efficiency of the transformer.

5. a) Draw and explain phasor diagram of a single phase transformer under load at leading power factor condition. Hence explain the regulation of a transformer on leading power factor load. 8

   b) Discuss briefly the essential and desirable conditions to be fulfilled for operating two single phase transformers in parallel. 8

Ref No. :Ex/ EE/5/T/212/2018(S)

Bachelor of Electrical Engineering (Evening) 2ND Year 1ST Semester Supplementary Examination,2018

SUBJECT: ELECTRICAL MACHINES - I

Time: Three Hours

Full Marks: 100 (50 each part)

Use a separate Answer-Script for each part.

Question No.	PART - II	Marks
	Answer Question No.1 and any two from the rest.	
1.		
i)	Lap connected D.C. machines require equalizer connection-Justify or correct.	**6x3**
ii)	Due to armature reaction the magnetic neutral axis is shifted opposite to the direction of rotation for a D.C. generator-Justify or correct.	
iii)	D.C. series motor canot be operated under loaded condition-Justify or correct.	
iv)	For low current and high voltage D.C. machines, wave connection is preferred-Justify or correct.	
v)	D.C. shunt generator has superior voltage regulation than the separately exited D.C. generator-Explain.	
vi)	Swinburnes method of testing of D.C. machines cannot be performed on D.C. series motor-Justify or correct.	
2.		
(i)	What are the effects of armature reaction in D.C. machines and what are the methods for reducing the effects of armature reaction ?	**8**
(ii)	Explain linear commutation process in D.C. machine and what are the roles of interpole in the commutation process in D.C. machine?	**8**
3.		
(i)	Derive the expression of torque in D.C. motor.	**8**
(ii)	A 220 V shunt motor on no—load runs at 1000 rpm and takes 10 A. The total armature and shunt field resistances are respectively 0.05 ohm and 110 ohms. Calculate the speed when loaded and taking a current of 40 A, if armature reaction weakens the field by 4%.	**8**

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(i) Derive the speed-current characteristic of a D.C. shunt motor. Why D.C. series motor is preferred in traction drive? **8**

(ii) A shunt machine, connected to 240 V mains has an armature resistance of 0.04 ohm and resistance of the field winding is 150hms. Find the ratio of the speed as generator to the speed as a motor, the line current in each case being 8A. **8**

5. Write short notes on any two of the following: **8X2**

(i) Parallel operation of D.C. compound generators.

(ii) Swinburnes method of testing of D.C. machines.

(iii) Speed control of D.C. series motors.