Bachelor of Electrical Engineering 2nd Year 1st Semester Supplementary Examination, 2017

SUBJECT: ELECTRICAL MACHINES - I   Page 1 of 2

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. 6 and any two from the rest.

1. Justify the following (any six) :   **6x3**

i) DC series generator should not be operated under no-load.

ii) Lap connected DC machine requires the equalizer connections whereas wave connected DC machine doesn't require it.

iii) No-load characteristics is the same for shunt and separately exited DC generator.

iv) Due to the armature reaction magnetic neutral is shifted in the direction of rotation in a DC motor.

v) For high-current and low-voltage DC machine lap connection is preferred whereas for low-current high-voltage DC machine wave connection is preferred.

                                                                9 + 6

vi) In Ward-Leonard method of DC machine speed control, both below and above the rated speed can achieved easily.

vii) Resistance commutation is also not linear one.

viii) In a DC machine always full pitch coil is not preferred.

2. i) What are the conditions to be fulfilled to build up voltage in a shunt connected DC generator?   **6+2+8**

ii) Why interpole winding is connected in series with the armature winding in a DC machine?

[Turn over

Question No.		**Marks**

iii) A 1500 kW, 550V, 16 pole generator runs at 150 r.p.m. What must be the useful flux per pole if there are 2500 conductors lap connected and full-load copper losses are 25kW ? Calculate the no load terminal voltage neglecting armature reaction and change in speed. The uniform air gap flux density is 0.9 Wb/m^2.

3. i) Derive the expression of torque in a DC machine. 5+3+8

ii) Why DC series motor is suitable for traction applications?

iii) A 220V DC shunt motor takes 22A at rated voltage and runs at 1000 rpm. It's field resistance is 100 Ω and armature resistance is 0.1 Ω. Compute the value of the additional resistance required to connected in the armature circuit to reduce the speed by 200 rpm in case of a fan load where the load torque is proportional to the square of the speed.

4. i) What are the remedies to get rid of the adverse effects of the armature reaction in a DC machine? 8 + 8

ii) A DC shunt machine connected to 110V mains has an armature resistance (including brushes) of 0.1 Ω and the resistance of the field circuit is 100 Ω. Find the ratio of the speed as generator to the speed as a motor, the line current in each case being 40A.

Write short notes on any two of the following : 8x2

5. i) Hopkinson's method of testing of DC machine

ii) Speed control of DC series motor

iii) External characteristics of different types of DC generators

Ref No: EX/EE/T/215/2017(S)

B. Elec. Engg. 2nd Year 1st Semester Supple Examination, 2017

SUBJECT: - ELECTRICAL MACHINES-I

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

Full Marks 100
(50 marks for each part)

Use a separate Answer-Script for each part

No. of Questions	PART II	Marks
Q6.	Answer Question no. 6 and any two Questions from the rest Two marks reserved for brief and to the point answer Write short notes on (any four): a) Conservator. b) Transformer oil. c) Breather. d) Oil Temperature indicator. e) CRGOS.	4X4
Q7.	a) Develop equivalent circuit of a single phase transformer. State the assumptions clearly. b) How the transformer equivalent circuit parameters are determined in the laboratory.	8 8
Q8.	a) Derive the expression for maximum efficiency of a transformer . b) In a 30 kVA , 1100 V/ 230 V , two winding transformer, the rated iron loss and copper loss are 400 W and 450 W respectively. Calculate: i) Max. efficiency of the transformer.	8 8

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Full Marks 100
(50 marks for each part)

Use a separate Answer-Script for each part

No. of Questions	PART II	Marks
Q9.	a) Derive an expression for voltage regulation of a transformer?	8
	b) A 5kVA ,230V/ 115V , 50 Hz, single phase transformer gave the following test results: Open circui test: 115V, 1.2 A, 50W Short circuit test : 10.2V ,21A, 80W Find the equivalent circuit parameters referred to H.V. side and calculate voltage regulation of the transformer at full load, 0.8 p.f. (lagging)	8
Q10.	Write short notes (any two) a) Inrush current of a transformer b) Parallel operation of two single phase transformers. c) Single phase Auto transformer	8X2