KONERU LAKSHMAIAH EDUCATION FOUNDATION
(Deemed to be University, Estd. u/s. 3 of UGC Act 1956)

B.Tech - Odd Sem : End Semester Exam
Academic Year:2020-2021

19EE2103 - ELECTRICAL MACHINES

Set No: 4

Time:		**Max.Marks: 100**					
S.NO	Answer All Questions	Choice	Options	Marks	CO	CO BTL	COI BTL
1.	With the help of neat diagram obtain the expression for the energy stored in a magnetic system for a simple attracted armature type relay. Explain the operation of the system.	choice Q-2		10Marks	CO1	2	1
2.	An 8 pole DC generator has per pole flux of 40mWb and winding is connected in lap with 960 conductors. Calculate the generated EMF on open circuit when it runs at 400 rpm. If the armature is wave wound at what speed must the machine be driven to generate the same voltage.			10Marks	CO1	2	2
3.	Answer all questions	choice Q-4		15Marks	CO1	2	2
3.A.	Describe the principle of energy conversion. From a consideration of the various energies involved, develop the model of an electro mechanical conversion device.			5Marks	CO1	2	1
3.B.	The armature of 6 pole dc generator has a wave winding containing 664 conductors. Compute the generator emf when flux per pole is 0.06 Weber and the speed is 250 rpm. At what speed must be the armature an emf of 250 V if the flux per pole is reduced to 0.058 Weber.			10Marks	CO1	2	2
4.	Answer all questions			15Marks	CO1	2	2
4.A.	Explain the constructional features of DC Generator with the help of a neat sketch.			5Marks	CO1	2	1
4.B.	A long-shunt compound generator delivers a load current of 50 A at 500 V and has armature, series field and shunt field resistances of 0.05 Ω, 0.03 Ω and 25 Ω respectively. Analyze the generated voltage and the armature current. Allow 1 V per brush for contact drop.			10Marks	CO1	2	2
5.	A 6-pole lap wound DC generator supplies a current of 300A. It has 1000 armature conductors. When delivering full load, the brushes are given an actual lead of 100. Calculate the demagnetizing amp-turns/pole. The field winding is shunt connected and takes 10A. Find the number of extra shunt field turns necessary to neutralize this demagnetization.	choice Q-6		10Marks	CO2	3	1
6.	Derive the expression for torque developed in the armature of a DC motor.			10Marks	CO2	3	2
7.	Answer all questions	choice Q-8		15Marks	CO2	3	3
7.A.	Identify a generator to maintain constant dc voltage at the consumer’s terminals and justify the reason.			5Marks	CO2	3	1

7.B.	A 440 V DC shunt motor takes a current of 3 A. at no-load. The armature resistance including brushes is 0.3Ω and the field current is 1 A. Compute the output and efficiency when the input current is 20 A.			10Marks	CO2	3	3
8.	Answer all questions			15Marks	CO2	3	3
8.A.	With a neat diagram explain the phenomenon of armature reaction in a dc machine. Discuss its effects and mention the methods to reduced the effect of armature reaction			5Marks	CO2	3	1
8.B.	The Hopkinson test on two similar dc shunt machines gave the following results: Line voltage: 220V; Line current excluding filed current: 40A; Armature current of motoring machine: 200A; field currents are 6 A and 7 A. Calculate the efficiency of each of the machine at the given load conduction. The armature resistance of each machine is 0.05ohm.			10Marks	CO2	3	3
9.	Describe constructional details of a three phase alternator along with principle of operation of an alternator.	choice Q-10		10Marks	CO3	4	1
10.	Explain the phenomenon of armature reaction when an alternator is delivering a load current at (a) purely lagging pf (b) unity pf (c) purely leading pf.			10Marks	CO3	4	2
11.	Answer all questions	choice Q-12		15Marks	CO3	4	4
11.A.	Explain the procedure how to find regulation of an alternator by using EMF Method.			5Marks	CO3	4	3
11.B.	Two alternators working parallel supplying the following loads (1) lighting load of 500KW (2) 1000 KW at 0.9 power factor lagging (3) 500 KW at 0.9 power factor leading (4) 800 KW at o.8 power factor lagging. One machine is supplying 1500 KW at 0.95 power factor lagging. Calculate the load on the other machine.			10Marks	CO3	4	4
12.	Answer all questions			15Marks	CO3	4	4
12.A.	Mention the need for parallel operation of alternators. State the conditions to be satisfied before connecting an alternator to the infinite bus bars and explain bright and dark lamp method.			5Marks	CO3	4	3
12.B.	A 3 phase star connected 10MVA , 6600 V,50 Hz alternator has gave OCC and SC tests data as follows: If (A) 25 50 75 100 125 150 V OC (Line voltage) 2400 4800 6100 7100 7600 7900 A field current of 75 A is found necessary to circulate full load current on short circuit test. Calculate voltage regulation at full load 0.8 pf lagging by EMF method. Armature resistance per phase = 0.15 ohm.			10Marks	CO3	4	4
13.	Make use of Faraday's law, derive the EMF equation of a single phase transformer.	choice Q-14		10Marks	CO4	4	3
14.	Explain how power is supplied to the two individual single phase furnaces from the three phase supply system.			10Marks	CO4	4	3
15.	Answer all questions	choice Q-16		15Marks	CO4	4	4

15.A.	Show that the maximum efficiency in a transformer occurs when its variable loss is equal to constant loss.			5Marks	CO4	4	3
15.B.	The instrument obtained from open and short circuit tests on 10 KVA, 450/120 V, 50Hz transformer is: O.C.Test: V1 = 120 V, I1 = 4.2 A, W1 = 80 W. (H.V. side open) S.C. Test: Vsc = 9.65 V, Isc = 22.2 A, Wsc = 120 W. (L.V. side Short circuited). Analyze the equivalent circuit parameters when referred to primary side. Efficiency at full load with 0.8 lagging power factor.			10Marks	CO4	4	4
16.	Answer all questions			15Marks	CO4	4	4
16.A.	6. Compare two winding transformer and auto transformer			5Marks	CO4	4	2
16.B.	The iron loss in a transformer core at normal flux density was measured at frequency of 30 Hz and 50 Hz, the results being 30 W and 54 W respectively. Compute hysteresis loss and eddy current loss at 50 Hz.			10Marks	CO4	4	4

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