Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER – VI (NEW).EXAMINATION – WINTER 2016

Subject Code: 2160911 Date: 26/10/2016

Subject Name: Computer Aided Analysis and Design for Electrical Engg.

Time: 02:30 PM to 05:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Describe standard ratings of electrical machines and ventilation scheme in static machine.	**07**
	(b)	Explain various objective parameters for optimization in an electrical machine and selection of optimal design.	**07**
Q.2	**(a)**	Explain FEM technique and elemental coefficient matrix.	**07**
	(b)	Write the Flowchart for computer-aided optimal design of DC machine.	**07**
		OR	
	(b)	Explain Global coefficient matrix, skin and proximity effect in conductors.	**07**
Q.3	**(a)**	Describe the design procedure for inductive chokes	**07**
	(b)	Write Flowchart and program for No. of turns, size of Copper and final dimensions of HV winding of 1 phase shell type power transformer.(KVA= 125, HV= 3300, LV= 440, f = 50, pf = 0.85, axspc = 20.875, ala = 14.5688, T1= 270, bw= 120, Lmt2= 1.367, I1 = 37.88 Input data, tst1= 1.6 Assumptions)	**07**
		OR	
Q.3	**(a)**	Design a suitable 8 section starter for a 14.92 kW, 250V,1000rpm DC shunt motor from the following data: Maximum starting torque= Full load torque Armature circuit resistance=0.4 ohm Full load efficiency=0.85.	**07**
	(b)	Write Flowchart and program for Windings copper Losses, total losses, Efficiency, Reactances and % Regulation of 1 phase shell type power transformer. (ac12 = 0.012 Specification, pcu1= 709.4, pcu2 = 767.9, KVA = 125, Pi = 646.1, pf = 0.85, Lmt1= 1.3673, Lmt2 = 1.3673, I1 = 37.9, T1 = 270, f = 50, Et = 12.2984, rsp2 = 81, axL1 = 51, axL2 = 41 Input Data)	**07**
Q.4	**(a)**	Calculate the dimensions of Magnetic frame consisting of Core, window and Yoke. Calculate Flux densities in those parts and Iron losses of a 800 KVA, 6600/ 440 V, 50 Hz, 3 Phase, Delta/Star, Core Type, ON cooled Power Transformer. limit temp-rise to 50 deg-C.(Data - k = 0.6, ki = 0.92, K = 0.6, Bm = 1.5, cdav = 2.6, L/ D= 2.8, WpKgC = 1.6, WpKgY = 1.009).	**07**
	(b)	Write Flowchart and program for design of Shunt field and series field windings of DC machine.(ti = 10, dcu = 1.6, cdse = 2.2 Assumptions V = 600, P = 6, Wp = 219, Lp = 285, df = 47.1, ATO = 6635, Hfc =171. 86, ATf = 7806, Ia = 836.33 Input Data)	**07**

OR

Q.4 **(a)** Calculate for design of Commutator and brushes of 500KW, 600V lap wound DC machine.(Data - DcbD = 0.66, D = 800, N = 700, Z = 672, P = 6, Ia = 836.33, cdb = 6 A/cm^2, Tb = 10, Wb = 20, Hb = 32, Vb = 2V, Brush Friction Coefft = 0.2 and Brush pressure on Commutator = 13000 N/m^2) **07**

(b) Write Flowchart and program for design of Commutator and brushes of DC machine.(DcbD = 0.66, D = 800, N = 700, Z = 672, P = 6, Ia = 836.33 Input data cdb = 6, Tb = 10, Wb = 20, Hb = 32, Vb = 2, Assumptions) **07**

Q.5 **(a)** Calculate Amp-Turns and No load current of a 800 KVA, 6600/ 440 V, 50 Hz, 3 Phase, Delta/Star, Core Type, ON cooled Power Transformer. limit temp-rise to 50 deg-C.(Data - Bm = 1.5, atC = 150, By = 1.3043, atY = 109.6, L = 0.59, W = 1.1, Et = 10.57, Pi = 1.4725) **07**

(b) Calculate No. of turns, size of Copper and final dimensions of LV winding of a 800 KVA, 6600/ 440 V, 50 Hz, 3 Phase, Delta/Star, Core Type, ON cooled Power Transformer. limit temp-rise to 50 deg-C.(Data - T2 = 24, L = 0.59, I2 = 1049.7, d = 0.23, T2r = 2, stP = 12, NstA = 3, stT = 3, Oil duct between Core and LV coil 1 = 5mm, Ins. cylinder between core and LV coil 1 = 3 mm and Oil duct between Insulating Cylider and LV coil2 = 5mm) **07**

OR

Q.5 **(a)** Calculate Armature main dimensions and flux/pole of 500KW, 600V lap wound DC machine.(Data - No. of ventilating ducts (nv) = 4, Width of ventilating ducts (bv) = 10mm, Pole arc /Pole pitch (PAbPP) = 0.7, Pole Arc = Arme Core Length (L), Slots/pole (SpP) = 14, Iron factor (ki) = 0.9, Volage drop on FL = 3% Value of Specific magnetic loading (Bav) = 0.66 T and Specific electric loading (q) = 36500 ac/m, P = 6, N = 700) **07**

(b) Write Flowchart and program for design of Inter-pole/Compensating winding and Overall performance of DC machine.(L = 300, Zs = 8, pitC = 4.9368, Tb = 10, D = 800, Dc = 528, Lg = 4.8439, Hp = 254, hca = 15, Hw = 3, HL =1, InsHs = 3.2, wca = 1.9, Ws = 11, Lfr = 621.711, Ia = 836.33, ATf= 7806, P = 6, KW = 500, Pcua = 10858, Pse = 565.1, BCL = 1673, Psh = 1468, Pi = 5408, BFL = 1449, Wc = 443.5, Wt = 99.2, Wcua = 154, Wccom = 1345, Wcsh = 303.6, Wcse = 49.5, Wmp = 123.6, Wyoke = 138.3 Input data, cdip1 = 2.3 Assumption) **07**

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