GUJARAT TECHNOLOGICAL UNIVERSITY BE - SEMESTER-V • EXAMINATION – SUMMER • 2015

Subject Code:150904Date:07/05/2015Subject Name: Element of Electrical DesignTime:02.30pm-05.00pmTime:02.30pm-05.00pmTotal Marks: 7Instructions:Total Marks: 7		Date:07/05/2015	
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1. 2. 3.	Attempt all questions. Make suitable assumptions wherever necessary. Figures to the right indicate full marks.		
(a) (b)	Give comparison of simplex Lap and simplex wave winding. Design a mush winding for 3-phase 4-pole,24 slots armature. Also show winding diagram for phase R only.	07 07	
(a)	The power input to the rotor of 415V,3-phase slip-ring induction motor is 39KW. The total full load rotor copper losses are 1200W. The rotor resistance per phase is 0.8 Ω . Assume maximum starting current is not to exceed 1.2 times full load current. Workout the resistance steps of a 4 section rotor resistance starter.	07	
(b)	Explain grading of starting resistance for DC shunt motor starters. OR	07	
(b)	How field regulator work in DC shunt motors and DC shunt generators?	07	
(a) (b)	Give steps for designing Horse –shoe type Electromagnet. Determine the air gap length of a DC machine from following data. Gross core length =0.10m, No. of ducts =1, width of duct =10mm, slot pitch =24mm, slot width =12mm, carter's coefficient for slots & ducts =0.3 , Gap flux density at pole center=0.65T, Field MMF per pole =3800A, MMF required for iron parts of magnetic circuit =600A	07 07	
	bject bject ne:02 truction 1. 2. 3. (a) (b) (a) (b) (b) (a) (b) (a) (b)	 bject Code:150904 Date:07/05/2013 bject Name: Element of Electrical Design me:02.30pm-05.00pm Total Marks: 7 tructions: Attempt all questions. Make suitable assumptions wherever necessary. Figures to the right indicate full marks. (a) Give comparison of simplex Lap and simplex wave winding. (b) Design a mush winding for 3-phase 4-pole,24 slots armature. Also show winding diagram for phase R only. (a) The power input to the rotor of 415V,3-phase slip-ring induction motor is 39KW.The total full load rotor copper losses are 1200W. The rotor resistance per phase is 0.8 Ω. Assume maximum starting current is not to exceed 1.2 times full load current. Workout the resistance steps of a 4 section rotor resistance starter. (b) Explain grading of starting resistance for DC shunt motor starters. OR (b) How field regulator work in DC shunt motors and DC shunt generators? (a) Give steps for designing Horse –shoe type Electromagnet. (b) Determine the air gap length of a DC machine from following data. Gross core length =0.10m, No. of ducts =1, width of duct =10mm, slot pitch =24mm, slot width =12mm carter's coefficient for slots & ducts =0.3, Gap flux density at pole center=0.65T, Field MMF per pole =3800A, MMF required for iron parts of magnetic circuit =600A 	

OR

Q.3	(a) (b)	Write steps for designing single phase small transformer. Design a 10KVA, 230/50 V, 50Hz single phase arc welding transformer [Assume K=0.6, B _m =1.3T,Ki=0.9, δ =2.5 A/mm ² , K _w =0.4, H _w /W _w =3 δ_p =2.5 A/mm ² , δ_s =2.7 A/mm ²]	07 07
Q.4	(a)	The domestic load in residential building is used in the following manner. Fluorescent lamps 55 Watt each, 4 nos., 6 Hrs/day Fans 70 Watt each, 4 nos., 8 Hrs/day Refrigerator of 300 watt, 12 Hrs/day	07

Heater of 1000Watt, 2 Hrs/day

Television of 150 Watt, 8 Hrs/day

Calculate (a) connected load and

(b) Daily Load factor.

(b) A plunger type magnet exerts a pull of 200 Kg through 25mm gap, the reluctance of the iron portions of the circuit being such that only 75 percent of total mmf of the coil is available is available to send the flux across the gap. Calculate the pull of the magnet when tha gap is reduced to 12.5 mm and the total mmf is reduced by 10 percent, given that the mmf to overcome the reluctance of iron portion of the magnetic circuit in the second instance is twice as great in the first instance.

- Q.4 Give steps for designing variable choke coil for single phase & three phase with 14 diagram.
- Q.5 (a) Which are the types of wiring system? Explain any three of them in brief. 07
 - (b) Explain load assessment and permissible voltage drop for electric installations. 07

OR

- Q.5 (a) Derive an expression of reluctance of an air gap in DC machine. Explain clearly 07 the effects of
 - (1) Slotting and
 - (2) Ventilating ducts
 - (b) Discuss design of electromagnet coils & derive equation for temperature rise of 07 coil.
