Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

Diploma Engineering - SEMESTER – II • EXAMINATION – WINTER 2012

Subject code: 320009 **Date: 18/01/2013**

Subject Name: Electrical Circuit

Time: 10.30 am - 01.00 pm **Total Marks: 70**

Instructions:

1. **Attempt any five questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **English version is considered to be Authentic.**

Q.1	(a)		State & explain Kirchoff's laws.	**07**
	(b)	(i)	Three resistances of 40 ohm, 60 ohm & 80 ohm are connected in delta. Find their equivalent resistances in star connection.	**04**
		(ii)	Define : flux density, permeance, magneto-motive force	**03**
Q.2	(a)		An iron ring has a mean diameter of 15cm, cross sectional area of $1.7cm^2$ has radial air gap of 0.5mm in it. It is uniformly wound with 1500 turns of insulated wire and a current of 1A produces of flux of 0.1 milli weber across air gap. Calculate relative permeability of iron, assuming zero magnetic lekage.	**07**
	(b)		Derive the equation for co-efficient of coupling between two coils having inductances L_1 and L_2.	**07**
			OR	
	(b)		Explain hysteresis loop and hysteresis loss.	**07**
Q.3	(a)		Derive equation for energy stored in capacitor.	**07**
	(b)		State advantages of 3-phases system over single phase system and explain phase sequence.	**07**
			OR	
Q.3	(a)		Derive equation for charging a capacitor.	**07**
	(b)		Establish relationship between line and phase values of current and voltage in 3-phase star connection. Also derive equation of power.	**07**
Q.4	(a)		Derive the expression for RMS value in terms of maximum value of sinusoidal A.C.	**07**
	(b)	(i)	Explain phase difference of A. C. voltage.	**03**
		(ii)	2, 4 & 6 micro farad capacitors are connected in series across 220 V supply. Find (a) net capacitance (b) charge on each capacitor.	**04**
			OR	
Q. 4	(a)		From the equation e=141.4 sin 628t, find the following: (i) maximum value of voltage (ii) Average value (iii) frequency (iv) RMS value (v) form factor	**07**
	(b)		(i) Define the following (a) Cycle (b) Frequency (c) Amplitude	**03**
			(ii) State comparison between statically induced emf and dynamically induced emf.	**04**

Q.5	(a)	Explain R-L series circuit with vector diagram, obtain equation of current and derive formula for average power consumed.	**07**
	(b)	Circuits A & B are connected in parallel and supply of 200V, 50Hz is given. Ciruit A is choke coil which is made up of 5 ohm resistance and 2 ohm reactance. In circuit B, 6 ohm resistance is connected in series with a capacitor of 8 ohm reactance. Find (i) total conductance (ii) total susceptance (iii) admittance (iv) total current (v) power factor of whole circuit	**07**

OR

Q.5	(a)	Prove that in a purely inductive circuit, current lags behind voltage by 90^0.	**07**
	(b)	A 100V, 750W lamp is to be connected in series with the capacitor across to 230V, 50Hz supply. Calculate value of capacitor required	**07**

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