

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-1/2 (NEW) EXAMINATION – WINTER 2017

Subject Code: 2110005

Date: 09/01/2018

Subject Name: Elements of Electrical Engineering

Time: 10:30 AM TO 01:00 PM

Total Marks: 70

Instructions:

- 1. Question No. 1 is compulsory. Attempt any four out of remaining Six questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.

Q.1 Objective Question (MCQ)		Mark
(a)		07
1.	A d.c Circuit usually hasas the load (a)inductance (b) resistance (c) capacitance	
2.	There are two charges of +1μC and +5μC.The ratio of the forces acting on them will be (a)1:1 (b)1:5(c)5:1 (d)1:25	
3.	A parallel plate air capacitor has a capacitance C. if air between the plates is exhausted completely, the new capacitance would become (a)Zero (b)C (c)Slightly more than C (d)Slightly less than C	
4.	Magnetic lines of the force (a) Intersect at infinity (b) Intersect within the magnet (c) Cannot intersect at all (d) None of the above	
5.	The unit of pole strength is (a)A/m ² (b)Am (c) Am ² (d)Wb/m ²	
6.	The fluorescent tube is filled with low pressure gas and drop of (a)argon, phosphorus (b)helium, mercury(c)argon, mercury	
7.	In HRC fuse, the fusing element is (a)copper (b)Aluminum (c)Silver (d)Gold	
(b)		07
1.	SI unit for luminous intensity is (a)lumens (b)lux (c)candela (d)lumen/meter	
2.	The peak value of sine wave is 100V. its average value is (a)63.7V (b)70.7V (c)141.4V (d)100V	
3.	The power consume by pure inductance connected to an a.c source is (a)Zero (b)Very high (c)Very low (d)infinite	
4.	If the coil has an inductance of 0.2H, its inductive reactance at 50 Hz frequency is (a)62.8 siemens (b)628 ohms (c)62.8 ohms (d)0.2 ohms	

5. As resistance of a circuit is increase, the Q factor is.....
(a)increase (b)decrease (c)remains the same (d) none of the above

6. In series RC circuit excited by a d.c voltage E, the initial current is
(a)0 (b) ∞ (c) E/R (d) E/X_c

7. The relation between B and H is
(a) $B=\mu H$ (b) $H=\mu B$ (c) $B=\mu^2 H$ (d) $H=\mu^2 B$

Q.2 (a) State and explain kirchhoff's voltage and current law. **03**

(b) The coil of a relay takes a current of 0.12A when it is as the room temperature of 15°C and connected across a 60 V supply. If the minimum operating current of the relay is 0.1A, calculate the temperature above which the relay will fail to operate when connected to the same supply. Take $\alpha_0=0.0043/^\circ\text{C}$ **04**

(C) Define delta network and star network and derive the formulae to convert a Delta network into its equivalent star network **07**

Q.3 (a) Derive the expression for the potential energy stored in an electric field. **03**

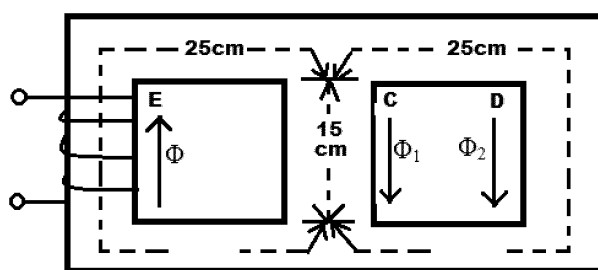
(b) Two capacitor of capacitances $8\mu\text{F}$ and $2\mu\text{F}$ are connected in series across a 100V dc supply. Now if the supply voltage is removed and the capacitors are then connected in parallel. What will be the final charge on each capacitor? **04**

(c) Explain charging phenomena of a capacitor with necessary derivation. **07**

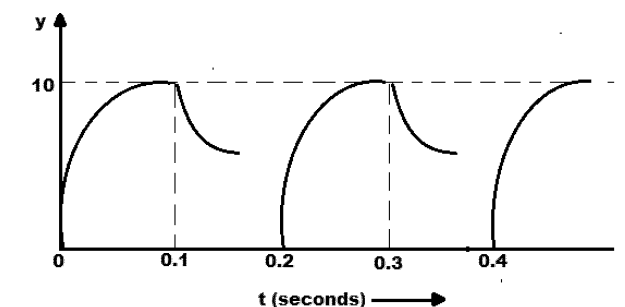
Q.4 (a) Give the comparison between Magnetic and Electric circuits. **03**

(b) What is meant by leakage and fringing? Define leakage coefficient. **04**

(c) A cast steel magnetic structure made for a bar of section $8\text{cm} \times 2\text{cm}$ is shown in below figure. Determine the current that the 500 turn-magnetising coil on the left limb should carry so that a flux of 2 mWb is produced in the right limb. Take $\mu_r = 600$ and neglect leakage. **07**



Q.5 (a) Calculate the RMS value of the function shown in below figure. If it is given that for $0 < t < 0.1$, $y=10(1-e^{-100t})$ and $0.1 < t < 0.2$, $y=10e^{-50(t-0.1)}$ **03**



(b) Deduce an expression for the average power in a single phase series R.L. circuit and there from explain the term power factor. **04**

- (c) Prove the condition of resonance for a case of a coil in parallel with a capacitor. Also analyze the phenomena with the help of graph.
- Q.6** (a) Three equal star connected inductor take 8 kW at a power factor 0.8 when connected across a 460V, 3-Ø, 3- wire supply. Find the circuit constant of the load per phase. **03**
- (b) Define the following term. **04**
- (a) R.M.S Value
- (b) Average value
- (c) Crest factor
- (c) (d) Q factor **07**
- Discuss the power measurement in 3-Ø circuits by using two wattmeter. Also mention the factors which affect the wattmeter reading.
- Q.7** (a) Enumerate the various factors to be considered while designing lighting schemes. **03**
- (b) What is plate earthing and how it is done? **04**
- (c) Discuss the working of a Lead Acid Battery. **07**
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