Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–1st / 2nd (NEW) EXAMINATION – WINTER 2015

Subject Code: 2110005   **Date: 02/01/2016**
Subject Name: Elements of Electrical Engineering
Time: 10:30am to 01:00pm   **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 – select only one option out of four (MCQ)**   **MARKS**
   (a)   **07**
   1.   Which of the following material has nearly zero temperature co-efficient of resistance ?
            [a] Carbon   [b] copper   [c] porcelain   [d] manganin
   2.   The unit of absolute permittivity of a medium is
            [a] farad/coulomb   [b] newton-m [c] farad/m   [d] joule/coulomb
   3.   The unit of resistivity is
            [a] Ohm / m   [b] Ohm-m   [c] mho/m   [d] mho-m
   4.   Time constant of an R-C ckt. may be defined as
            [a] time during which capacitor voltage rises to 0.632 of its initial value
            [b] time during which charging current falls to 0.37 of its initial max. value
            [c] time during which capacitor voltage falls to 0.632 of its final steady value
            [d] time during which charging current rises to 0.37 of its initial max. value
   5.   The unit of reluctance is
            [a] AT / Wb   [b] Wb / AT   [c] 1/Henry   [d] either [b] or [c]
   6.   Wh efficiency of lead-acid cell is _____ Ah efficiency.
            [a] greater than   [b] smaller than   [c] equal to   [d] none of this
   7.   The value of form factor is
            [a] 11.1   [b] 1.11   [c] 1.414   [d] 14.14

   (b)   **07**
   1.   The value of power factor is zero for
            [a] purely inductive ckt.   [b] purely resistive ckt.
            [c] purely capacitive ckt.   [d] either [a] or [c]
   2.   For a series resonance condition of AC circuit impedance is
            [a] minimum   [b] maximum   [c] zero   [d] infinity
   3.   The filament used in incandescent lamp is made of
            [a] copper   [b] alluminium   [c] nichrome   [d] tongston
   4.   The value of crest factor is
            [a] 11.1   [b] 1.11   [c] 1.414   [d] 14.14
   5.   For a parallel resonance condition of a AC circuit current is
            [a] minimum   [b] maximum   [c] zero   [d] infinity
   6.   For unity power factor load of 3-phase ckt.,if we measure the power by 2-wattmeter method then readings of wattmeters are
            [a] one wattmeter shows zero reading   [b] equal & +ve sign
            [c] equal & opposite sign   [d] both shows zero reading
   7.   The power factor of R-C series Ac ckt. is
            [a] unity   [b] lagging   [c] leading   [d] zero

Q.2 **(a)** State and explain ohm's law & its limitations. **03**

(b) Define & explain temperature co-efficient of resistance. **04**

(c) Derive the equations to translate a passive electric circuits from delta network to star network configuration with diagram. **07**

Q.3 **(a)** Find out the equation for energy stored in capacitor. **03**

(b) Analyze the series and parallel connection of capacitor. **04**

(c) State and explain faraday's laws of electromagnetic induction. Prove the equations of self and mutual inductances for different methods. **07**

Q.4 **(a)** State the points of differences in magnetic and electric circuits. **03**

(b) Analyze magnetic and electric circuits by similarities. **04**

(c) Analyze the phenomena of R-L-C series AC circuit with the help of equations & graph. **07**

Q.5 **(a)** Define the following for AC circuits : **03**
[1] Form factor
[2] Amplitude factor
[3] Power factor

(b) An inductive circuit draws 10 A & 1 KW from 200 V,50 Hz ac supply. Find **04**
[1] Z & X_L
[2] power factor
[3] apparent power
[4] reactive power

(c) Prove the condition of resonance for R-L-C parallel AC circuit. Also analyze the phenomena with the help of graph. **07**

Q.6 **(a)** Explain in brief the following for 3-phase AC circuit : **03**
[1] Line voltage
[2] Phase voltage
[3] Phase sequence

(b) For a balanced delta connected load supplied at 3-phase , 240 V ac supply , the two wattmeter readings are : (3210) & (-1710) W. Find out total power factor & current. **04**

(c) Prove the equation for measurement of Electrical power in 3-phase circuit by two wattmeter method for balanced load with phasor diagram. **07**

Q.7 **(a)** Explain in brief the following. **03**
[1] A-h & W-h capacity of a battery
[2] ELCB
[3] Illumination

(b) Discuss the Lead acid battery with charging & discharging equations.. **04**

(c) What is Grounding & earthing ? Analyze concept of protection with a device-MCB used at our residence. **07**

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