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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