# GUJARAT TECHNOLOGICAL UNIVERSITY
## BE - SEMESTER– 1st / 2nd EXAMINATION (NEW SYLLABUS) – SUMMER 2016

**Subject Code: 2110005**                                        **Date: 08/06/2016**
**Subject Name: Elements of Electrical Engineering**
**Time: 2.30 to 5.00 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 Questions.**                                        **Mark**

  **(a)**                                                                     **07**
  1. The unit of current is_____.
     (a) Volt/sec (b) coulomb/sec (c) amp/sec (d) none of these
  2. Coulomb's second law is called as _____ law.
     (a) Inverse square (b) charge (c) induction
  3. If the length of conductor is doubled and its cross sectional area is reduced to 50% then its resistance will be_____.
     (a) Same (b) doubled (c) increased by 4 times (d) reduced to 1/4th
  4. A conductor carries 10A in a direction perpendicular to a magnetic field of density 0.3T. If the length of conductor is 10 cm the force on the conductor F=_____.
     (a) 3 N (b) 0.3 N (c) 30 N
  5. Amount of light produced by a lamp or the amount of heat produced by an iron is proportional to the _____.
     (a) Square of RMS value (b) RMS value (c) square of average value (d) average value.
  6. The three phase voltages are displaced by _____ radians from each other.
     (a) $\pi/2$ (b) $\pi/3$ (c) $2\pi/3$ (d) $\pi$
  7. Define Lumens.
  **(b)**                                                                     **07**
  1. The resistance of a thin conductor is _____ as compared to that of a thick conductor.
     (a) Same (b) lower (c) higher
  2. The value of relative permittivity for Air is _____.
  3. A magnetic circuit has mean length of 20 cm and cross sectional area of 1 cm$^2$ if the flux density is 2T then $\Phi$=_____.
     (a) $2*10^{-4}$ mWb (b) $2*10^{-4}$ Wb (c) $2*10^{-2}$ Wb (d) none of these
  4. Define RMS value.
  5. Draw the phasor diagram of R-C series circuit.
  6. For a balanced delta load the_____ of all their line currents is zero.
     (a) Product (b) difference (c) sum (d) division
  7. Define A-H efficiency.

**Q.2**   **(a)** Explain the effect of temperature on different metals.         **03**
          **(b)** Explain Current and Voltage divider rule.                     **04**
          **(c)** Derive expression for delta to star conversion of resistive network.   **07**

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| **Q.3** | **(a)** | Derive the expression for the equivalent capacitance of capacitors connected in parallel. | **03** |
| | **(b)** | The equivalent capacitance of two capacitors when connected in series is 0.03 μF & when connected in parallel is 0.16 μF. Find the capacitance of both the capacitors. | **04** |
| | **(c)** | Three capacitors having capacitances of 10 μF, 20 μF and 40 μF are connected in series to a 400 V d.c. source. Find (i) Total capacitance (ii) Total charge in circuit (iii) Total energy stored. | **07** |
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| **Q.4** | **(a)** | Explain Magnetic Hysteresis phenomena using hysteresis loop. | **03** |
| | **(b)** | State similarities between magnetic circuit and electrical circuit. | **04** |
| | **(c)** | Define co-efficient of coupling. Derive the relation between self and mutual inductance. | **07** |
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| **Q.5** | **(a)** | Three currents are represented by $i_1 = 10\sin wt$, $i_2 = 20\sin(wt-\pi/6)$ ,$i_3 = 30\sin(wt+\pi/4)$ . Find magnitude and phase angle of resultant current of their addition. | **03** |
| | **(b)** | An inductive coil draws 10 A current and consume 1 KW power from a 200V, 50Hz, Ac supply determine (1) the impedance in Cartesian and polar form (2) power factor (3) reactive and apparent power. | **04** |
| | **(c)** | Prove the condition of resonance for series R-L-C AC circuit. Also analyze the phenomena with the help of graph. | **07** |
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| **Q.6** | **(a)** | Give advantages of Two Wattmeter Method. | **03** |
| | **(b)** | For a balanced delta connected load supplied at 3-phase, 400 V ac supply, the two wattmeter readings are: 7.8kW and −2.55kW. Find out load power factor & line current. | **04** |
| | **(c)** | Establish relation between line voltage & phase voltage and current relation in 3-phase star connection. Draw phasor diagram. | **07** |
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| **Q.7** | **(a)** | Classify various types of Lighting scheme and explain any two. | **03** |
| | **(b)** | State types of Fuse and explain any one. | **04** |
| | **(c)** | Explain construction of cable in detail. | **07** |

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