

Seat No.: _____

Enrollment No. _____

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) π | |
| | 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 Φ =_____. (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 |

- 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 $0.03 \mu\text{F}$ & when connected in parallel is $0.16 \mu\text{F}$. Find the capacitance of both the capacitors. **04**
- (c) Three capacitors having capacitances of $10 \mu\text{F}$, $20 \mu\text{F}$ and $40 \mu\text{F}$ 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**
- 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**
- Q.5** (a) Three currents are represented by $i_1 = 10\sin\omega t$, $i_2 = 20\sin(\omega t - \pi/6)$, $i_3 = 30\sin(\omega t + \pi/4)$. 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**
- 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**
- 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**
