Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. - SEMESTER – I-II (NEW) • EXAMINATION – WINTER • 2014

Subject Code: 2110005 **Date: 07-01-2015**

Subject Name: Elements of Electrical Engineering

Time: 10:00 am - 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

(a) **Answer the given MCQ.** **07**

1. The electrical force or pressure that causes the electrons to move in a particular direction is called as the _____.

(A) Magneto motive force (B) Electromotive force
(C) Electrostatic force (D) Electromagnetic force

2. The charge on each electron is _____ coulomb.
(A) 1.9 × 10-19 (B) 1.6 × 10-19 (C) 1.9 × 10-16 (D) 1.6× 10-16

3. The unit of resistivity is _____

(A) Ω/m (B) Ω-m (C) m/ Ω (D) Ω-m -1

4. Coulomb's second law is called as _____ law.
(A) Inverse square (B) Charge (C) Induction

5. The magnetic lines of force are known as lines of _____
(A) magnetic flux (B) Electromagnetism (C) Magnetic field

6. Magnetic flux density is measured in _____
(A) wb (B) m^2/wb (C) wb/m^2 (D) Tesla/m^2

7. The correct relation between the three permeability's is _____
(A) $\mu_r=\mu_0\ \mu$ (B) $\mu_0=\mu\ \mu_r$ (C) $\mu=\mu_0\ \mu_r$ (D) $\mu_r=\mu/\ \mu_0$

OR

(a) **Answer the given MCQ.** **07**

1. Multimeter can be used to measure
(a) current (b) voltage (c) resistance (d) all of the above

2. Measuring range of voltmeter can be extended by using
(a) high shunt resistance (b) high series resistance (c) low shunt resistance (d)low series resistance

3. Full name of ELCB is
(a) Earth leakage circuit breaker (b) Earth less circuit breaker
(c) Earth loser circuit breaker (d) Earth leakage circuit broker

4. Ammeter always connected is _____ in a circuit.
(a) Parallel (b) series (c) both (a) & (b) (d) none of the above

5. Which of the following insulation is used in cables?
(a) Rubber (b) Paper (c) Porcelain (d) any of the above

6. Blinking of a fluorescent tube may be due to
(a) low circuit voltage (b) low ballast rating (c) low temperature (d) any of the above

7. The LED is usually made of materials like
(a) GaAs (b) C and Si (c) GeAs (d) None of the above

(b) **Answer the given MCQ.** **07**

1. An alternating quantity is defined as the one which changes its _____ as well as _____ with respect to time.

(A) Value, direction (B) Phase, polarity (C) Value, phase

2. The ac voltage generators are called as _____
(A) Alternator (B) Induction generators (C) alternating generator

3. The maximum value of an ac quantity is called as its _____
(A) Amplitude (B) Peak to peak value (C) Rms value

4. Rms value is also called as _____ of ac current
(A) Light producing component (B) heat producing component
(C) Useful component (D) Useless componen

5. Peak value of sinusoidal waveform is equal to _____

(A) 0.637 ×Vaverage (B) 0.637 Vrms (C) 0.707 Vrms (D) 1.414 Vrms

6. Filament material used in fluorescent tube is made up of _____

(A) Nicron (B) copper (C) tungsten (D) aluminum

7. . Complete the following formula:
1 radian =_____degrees

(A) $\pi/180$ (B) $180/\pi$ (C) $\pi/360$ (D) $360/\pi$

Q-2 **(a)** State and explain Kirchhoff's laws. **3**

(b) Derive and obtain the expression for temperature co efficient of resistance. **4**
$\alpha_2=1/(1/\alpha_1+(t_2-t_1))$

(c) The resistance of a coil embedded in a large transformer is 12 Ω at 25°C after the transforme **7**
has been in operation for several hours, the resister of the coil found
to be 13.4Ω. Find the Temperature the transformer core. Take $\alpha_{20} = 0.00393^{\circ}C^{-1}$

Q-3 **(a)** Compare series and parallel resonance. **3**

(b) Compare the following term with respect to ac waveform. **4**
(1)Power factor (2) Average value (3) R.M.S value (4) Form factor

(c) A Series RLC circuit consists of resistance of 500 Ω, inductance of 50mHand a capacitance **7**
Of 20pF.
Find
(1) the resonant frequency
(2) The Q factor of the circuit of resonance
(3) The half power frequency

Q-4 **(a)** State Colum's law of electrostatics **3**

(b) Give similarities and dissimilarities between electrical circuit and magnetic circuit. **4**

(C) Obtain the relation L=(L1L2-M2) / (L1+L2+2M) for equivalent inductance when two **7**
inductors are connected in parallel such that the mutual induced emf opposes the self induced emf.

Q-5 **(a)** Explain magnetic hysteresis. **3**

(b) State and explain Faraday's law of electromagnetic induction **4**

(c) Find resistance between terminals AB of network shown in figure. 1 using star-delta **7**
transformation

Q-6 **(a)** Explain how ac sinusoidal emf is generated? **3**

(b) Derive equation for energy stored in capacitor. **4**

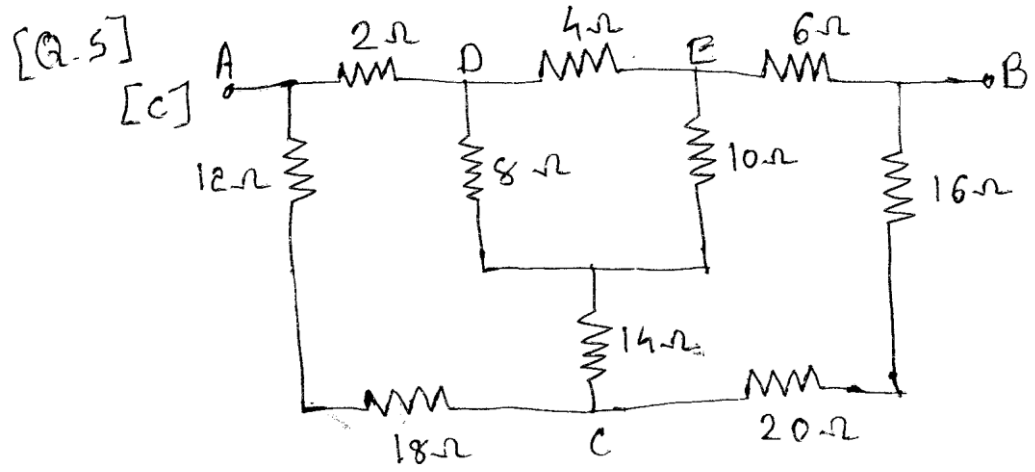
(c) Explain in brief power measurement using two wattmeter method in 3-phase system with star **7**
connected load?

Q-7 **(a)** List the different types of illumination scheme **3**

(b) Define cable and explain its construction with neat sketch diagram **4**

(c) List the different types of lamp and explain florescent lamps with wiring diagram. **7**

[Q.5] [C]



[fig. 1]

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