Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– 1st / 2nd EXAMINATION – summer-2014

Subject Code: 2110005 Date: 20-06-2014

Subject Name: Elements of Electrical Engineering

Time:02:30 pm to 05:00 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 Question (MCQ)

(a) **07**

1. Fiber optic cable is used for_____.
a) Point to point transmission b) High power transmission
c) High voltage transmission d) High current transmission

2. A test lamp is used for _____.
a) Presence of voltage b) Testing earthing
c) Measurement of resistance d) Measurement of voltage.

3. _____is not an electrical element.
a) Tester b) Resistor c) Inductor d) Capacitor

4. Approximate life of incandescent lamp is _____ hours.
a) 100 b) 1000 c) 10000 d) 100000

5. Megger is used for _____measurement.
a) Insulation resistance b) low resistance c) medium resistance d) current

6. 6. The process of connecting metallic body part of all electrical apparatus to earth is known as _____.
a) Piping b) wiring c) earthing d) insulating.

7. Mercury vapour lamp is a type of _____ lamp.
a) Incandescent b) Resistance c) High intensity discharge d) High current discharge.

(b) **07**

1. 1. The value & unit of μ_0 is_____.
a) $4\pi \times 10^{-7}$ H/m b) $4\pi \times 10^{-7}$ F/m c) 8.854×10^{-12} F/m d) 8.854×10^{-12} H/m

2. _____law is used to find the direction of statically induced emf.
a) Lenz's b) Faraday's law c) Ohm's law d) Coulomb's law

3. Pure DC voltage has _____ frequency.
a) 50 Hz b) 50 KHz c) 5 Hz d) 0 Hz

4. Average instantaneous power is _____watts, when pure ac voltage is applied to pure inductive circuit.
a)VI b) VIcosø c) VIsinø d) 0

5. The value of –j is _____
a) √-1 b) 270 degree c) j^2 d) 1

6. An RLC series circuit is supplied by ac supply of 50 Hz, having R=10Ω, X_L=10Ω and X_C=100Ω. The power factor is _____.
a) 1 b) 0 c) leading d) lagging

7. In RLC series circuit, at resonance condition _____ is maximum.
a) Current b) Impedance c) Resistance d) Voltage.

Q.2 **(a)** State and explain Kirchhoff's laws. **07**
(b) Define Temperature co-efficient of resistance. Derive & obtain the expression $\alpha_2 = 1/(1/\alpha_1 + (t_2 - t_1))$ with usual notation. **07**

Q.3 **(a)** List out types of lamps and explain fluorescent lamp in detail. **07**
(b) Derive equation for energy stored in capacitor. **07**

Q.4 **(a)** Explain how ac sinusoidal emf is generated? Derive its equation of $e = E_m Sin\omega t$. **07**
(b) Explain Faradays law of electromagnetic induction. **07**

Q.5 **(a)** Prove that pure resistive circuit has unity power factor. Draw the wave forms of voltage, current and instantaneous power. **07**
(b) An ac supply voltage of 230 volts, 50 Hz is given to the circuit containing 10Ω and 20Ω in series. Find equivalent resistance, total current, and voltage drop across each resistance, active power, reactive power, power factor. **07**

Q.6 **(a)** Define co-efficient of coupling. Derive the relation between self and mutual inductance. **07**
(b) A coil has 1000 turns and carries a current of 5 Amp. The core has a length of 0.5 m and cross-sectional area of 80 cm^2, relative permeability is 1000. Calculate self inductance and self induced emf when current is switched off in 0.01 sec. **07**

Q.7 **(a)** Define term 'earthing'. State all the methods of earthing and explain any one of them. **07**
(b) Capacitors having capacitance of 10 µF, 20 µF and 30 µF are connected in series to a 400 V dc source. Find **07**
1) total capacitance of circuit
2) total charge stored in the circuit
3) total energy stored in the circuit.

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