Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–I & II(NEW) EXAMINATION – WINTER 2022

Subject Code:2110005 Date:13-03-2023

Subject Name:Elements of Electrical Engineering

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Question No. 1 is compulsory. Attempt any four out of remaining Six questions.**
1. **Make suitable assumptions wherever necessary.**
2. **Figures to the right indicate full marks.**
3. **Simple and non-programmable scientific calculators are allowed.**

Q.1 Choose the correct option from the given options **Mark**

(a) **07**

1. The three resistors of resistance values 5Ω, 10 Ω, and 15 Ω are connected in parallel, what should be its equivalent resistance
(a)Less than 5Ω (b) between 5Ω and 10Ω(c) between 10Ω and 15Ω(d) greater than 15 Ω

2. Kirchhoff's voltage law is concerned with
(a)IR drops (b) battery e. m. fs(c) junction voltages(d) both (a) &(b)

3. The resistance of each arm of delta connected network 6 Ω. The resistance of each arm of its equivalent star connected network is
(a) 6 Ω (b) 18 Ω (c) 2 Ω (d) 3 Ω

4. A capacitor that stores a charge of 0.5 C at 10V has capacitance of____farad.
(a) 5 (b) 0.05 (c) 20Ω (d) 0

5. The SI unit of electric field intensity is
(a)N/m (b) V/m (c) N/C (d) either (b) or (c)

6. According to Faraday's law of electromagnetic induction, an e. m .f. is induced in a conductor whenever it
(a)lies in a magnetic field (b)cuts magnetic flux (c) moves parallel to the direction of the magnetic field(d) lies parallel to the magnetic flux

7. A coil of 1000 turns is wound on a core. A current of 1A flowing through the coil creates a core flux of 1 mWb. The energy stored in the magnetic field is
(a) 0.25 J(b)0.5J (c)1J (d)2J

(b) **07**

1. The power factor of series R-L-C circuit under resonance condition is
(a) 0.8 lagging(b) unity (c)zero (d)0.8 leading

2. An AC current given by i=14.14 sin(wt +π/6) has an r. m. s. value of____A
(a) 7.07(b)1.96 (c)10 (d)14.14

3. The voltage applied across an R-L series circuit is equal to
(a)arithmetic sum of V_R and V_L (b) algebraic sum of V_R and V_L (c) phasor sum of V_R and V_L (d) sum of squares of V_R and V_L

4. The minimum number of wattmeter(s) required to measure 3-phase, 3- wire balanced or unbalanced power is
(a)4 (b)2 (c)3 (d)1

5. The rating of the battery is
(a)Ah (b)kWh (c)W (d)hp

6. Fuse provides protection against
(a)over load (b) short circuit (c)both (a)&(b) (d)lightning

7. Which of the following provides safety to human against electric shock
(a)RELAY (b)FUSE (c)MCB (d)earthing

Q.2 **(a)** Write the statements of Kirchhoff's law **03**

(b) Give difference between dependent and independent sources. **04**

(c) Find the current through the 2Ω resistor shown in figure 1 by using loop analysis. **07**

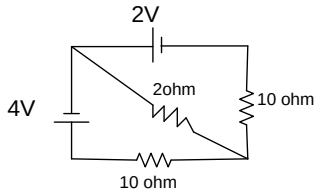

Figure 1

Q.3 **(a)** Write the laws of electrostatics **03**

(b) Derive the expression of energy stored in capacitor. **04**

(c) Explain the statically and dynamically induced e. m. f. **07**

Q.4 **(a)** State Fleming's and Lenz's laws **03**

(b) Explain hysteresis loop. **04**

(c) Find the charges on capacitor C_1, C_2 and C_3 shown in figure 2. **07**

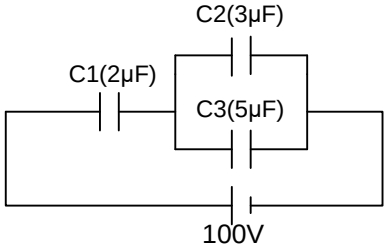

Figure 2

Q.5 **(a)** Explain form factor and peal factor for a sinusoidal waveform. **03**

(b) Explain real power, reactive power and apparent power in ac circuit. **04**

(c) A pure resistance of 50 ohms is in series with a pure capacitance of 100 microfarads. The series combination is connected across 100-V, 50Hz supply. Determine(a)the impedance(2)current(3)power factor(4)phase angle(5) voltage across the resistor(6)voltage across the capacitor. **07**

Q.6 **(a)** What is the difference between balanced and unbalanced three phase load. **03**

(b) Write short note on CFL and LED lamps. **04**

(c) The power in a 3-phase circuit is measured by two wattcmeters. If the total power is 100KW and power factor is 0.66leading. What will be the reading of each wattmeter? **07**

Q.7 **(a)** State the safety precautions to be taken in home to prevent electric shock. **03**

(b) Explain plate earthing with figure. **04**

(c) Explain ELCB in details. **07**

****