

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE SEMESTER– 1st/2nd (NEW SYLLABUS) EXAMINATION – SUMMER 2015

Subject Code: 2110005

Date:16/06/2015

Subject Name: Elements of Electrical Engineering

Time: 10.30am-01.00pm

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

MARKS

(a) Objective Question – select only one option out of four (MCQ)

07

1. The material used for fuse should have
[a] low melting point & high conductivity
[b] low melting point & low conductivity
[c] high melting point & high conductivity
[d] high melting point & low conductivity
2. Earthing is necessary to
[a] avoid risk of fire due to earth leakage
[b] avoid electric shock to human body
[c] both [a] & [b]
[d] either [a] or [b]
3. MCB provides protection against
[a] short ckt.
[b] overload
[c] earth fault
[d] all of the above
4. The choke in tube light wiring provides
[a] high current
[b] high resistance
[c] high impulse voltage
[d] low reactance
5. Which type of capacitor is used generally in fan?
[a] ceramic
[b] Electrolytic
[c] mica
[d] none of above
6. The meter used at our premises measure
[a] voltage
[b] current
[c] power
[d] energy
7. The frequency of DC supply is
[a] 50 Hz
[b] 1 Hz
[c] 0 Hz
[d] none of above

OR

(a) Answer the given MCQ.

- (1) Measuring range of ammeter can be extended by using
 (a) high value of series resistance (b) low value of shunt resistance
 (c) low value of series resistance (d) high value of shunt resistance
- (2) Full name of MCB is
 (a) Miniature circuit breaker (b) Minimum circuit breaker
 (c) Maximum circuit breaker (d) None of the above
- (3) Voltmeter always connected is _____ in a circuit.
 (a) Parallel (b) series (c) Both (a) & (b) (d) None of the above
- (4) Unit of magneto motive force (mmf) is
 (a) Weber (b) AT (c) Voltage (d) Tesla
- (5) Average value of a.c. voltage = _____ \times V_m
 (a) 1.414 (b) 0.707 (c) 0.637 (d) 1.5
- (6) Unit of potential difference is
 (a) voltamp (b) watt (c) ampere (d) voltage
- (7) Value of form factor(Kf) is
 (a) 0.707 (b) 1.414 (c) 0.637 (d) 1.11

(b) Objective Question – select only one option out of four (MCQ)

1. The unit of conductivity is
 [a] Siemens / m
 [b] Siemens-m
 [c] mho
 [d] mho-m
2. If relative permittivity is 5 , then it's absolute permittivity is
 [a] $5 / \epsilon_0$
 [b] $5 \epsilon_0$
 [c] $\epsilon_0 / 5$
 [d] 8.854×10^{-12}
3. The unit of permeance is
 [a] AT / Wb
 [b] Wb / AT
 [c] Henry
 [d] either [b] or [c]
4. Q-factor of a coil means
 [a] Higher voltage magnification
 [b] Higher selectivity of the tuning coil
 [c] either [a] or [b]
 [d] both [a] and [b]
5. For a series resonance condition of a AC circuit current is
 [a] minimum
 [b] maximum
 [c] zero
 [d] infinity
6. For zero power factor load of 3-phase ckt.,if we measure the power by 2-wattmeter method then readings of wattmeters are
 [a] one wattmeter shows zero reading

- [b] equal & +ve sign
 [c] equal & opposite sign
 [d] both shows zero reading
7. The gas used in sodium vapour lamp is
 [a] argon
 [b] nitrogen
 [c] neon
 [d] methane
- Q.2** (a) State and explain kirchoff's voltage and current laws. **03**
 (b) Analyze Series and parallel circuit having resistors only as elements and state the results.. **04**
 (c) Derive the equations to translate a passive electric circuits from star network to delta network configuration with diagram. **07**
- Q.3** (a) State and explain coulomb's law of Electrostatics. **03**
 (b) A capacitor of $0.1 \mu\text{F}$ is charged from a 100 V battery through a series resistance of 1000Ω . Find **04**
 [1] Time constant
 [2] Charge received during this time
 [3] Initial rate of charging
 [4] the rate of charging when the charge is 63.2 % of final charge.
 (c) Analyze the series and parallel connection of capacitor and prove the equations. Also find out the equation for energy stored in capacitor. **07**
- Q.4** (a) State and explain faraday's laws of electromagnetic Induction. **03**
 (b) If a coil of 150 turns is linked with a flux of 0.01 Wb , when carrying a current of 10 A . Calculate **04**
 [1] the inductance of the coil
 [2] the induced e.m.f , if this current is uniformly reversed in 0.01 second .
 (c) Analyze magnetic and electric circuits by similarities and differences **07**
- Q.5** (a) Define the following for AC circuits : **03**
 [1] R.M.S. value
 [2] Average value
 [3] Power factor
 (b) A resistance of 20Ω , an inductance of 0.2 H and a capacitance of $100 \mu\text{F}$ are connected in series across 220 V , 50 Hz supply. Find **04**
 [1] Impedance
 [2] Voltage across R,L & C
 [3] Power factor & angle of lag
 [4] Active & apparent power
 (c) Prove the condition of resonance for R-L-C series AC circuit. Also analyze the phenomena with the help of graph. **07**
- Q.6** (a) Explain in brief the following for 3-phase AC circuit : **03**
 [1] Phase sequence
 [2] Line voltage
 [3] Phase voltage
 (b) A Δ -connected balanced 3-phase load is supplied from 400 V , 3-phase mains. The line current is 20 A & the power taken by load is 10 MW . Find **04**
 [1] Impedance in each branch

[2] Power factor of the load

[3] Line current & power consumed, if same load is connected in star.

- (c) Prove the equation for measurement of Electrical power in 3-phase circuit by two wattmeter method. Also draw phasor diagram. **07**
- Q.7** (a) Explain in brief the following. **03**
[1] A-h & W-h capacity of a battery
[2] Rating of MCB
[3] Lumens
- (b) Discuss the types of cables used for residential and commercial wiring. **04**
- (c) What do you mean by earthing ? Analyze earthing concept with the help of a device-ELCB (Earth leakage circuit breaker) used at our residence **07**
