



## BRAINWARE UNIVERSITY

### Term End Examination 2019 - 20

**Programme – Bachelor of Technology in Computer Science & Engineering/ Bachelor of Technology in Electronics & Communication Engineering**

**Course Name - Basic Electrical Engineering**

**Course Code – ESC(CSE)101/ ESC(ECE)101**

(Semester – 1)

Time allotted: 2.5 Hours

Full Marks: 60

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

#### Group –A

(Multiple Choice Type Question)

20 x 1 = 20

1. *Choose the correct alternative from the following (Answer any Twenty)*
  - (i) What is the unit of admittance?
    - a. ohm
    - b. mho
    - c. henry
    - d. farad
  - (ii) The unit of electrical energy is / are
    - a. Joules
    - b. Watt - sec
    - c. Kilowatt - hour
    - d. All of these
  - (iii) Which among the following is true about ohm's law?
    - a.  $I \propto V$
    - b.  $I = V/R$
    - c.  $V = IR$
    - d. All of these
  - (iv) Kirchhoff's laws are useful in determining——
    - a. Current flowing in a circuit
    - b. EMFs and Voltage drops in a circuit
    - c. Power in a circuit
    - d. All the above
  - (v) Identify the passive elements
    - a. Voltage source
    - b. Current source
    - c. Transistor
    - d. Inductor
  - (vi) Superposition Theorem is valid for
    - a. Non linear bilateral network
    - b. linear bilateral network
    - c. Non linear unilateral network
    - d. linear unilateral network

- (vii) A good electric conductor is one that has
- Low conductance
  - Is always made of cu wire
  - Produces minimum voltage drop
  - Has few free electrons
- (viii) A practical voltage source consists of an ideal voltage source in
- Series with an internal resistance
  - Parallel with an internal resistance
  - Both a and b
  - None of these
- (ix) Thevenin's theorem can not be applied in the circuit consisting of
- resistor
  - Linear impedance
  - Non linear impedance
  - None of these
- (x) DC average current of a half wave rectifier output is \_\_\_\_\_(Where  $I_m$  is the maximum peak current of input)
- $2I_m/\pi$
  - $I_m/\pi$
  - $I_m/2\pi$
  - $1.414I_m/\pi$
- (xi) Which device can be used in a chopper circuit?
- BJT
  - MOSFET
  - GTO
  - All of the mentioned
- (xii) The values of duty cycle ( $\alpha$ ) lies between
- $0 < \alpha < 1$
  - $0 > \alpha > -1$
  - $0 \leq \alpha \leq 1$
  - $1 < \alpha < 100$
- (xiii) The load voltage of a chopper can be controlled by varying the
- duty cycle
  - firing angle
  - reactor position
  - extinction angle
- (xiv) The average value of the output voltage in a step - down dc chopper is given by
- $V_0 = V_s$
  - $V_0 = D V_s$
  - $V_0 = V_s / D$
  - $V_0 = V_s / (1 - D)$
- (xv) The power- factor at resonance in R-L-C circuit is
- Zero.
  - Unity.
  - 0.5 lagging.
  - 0.5 leading
- (xvi) Ohm is unit of all of the following except
- inductive reactance
  - capacitive reactance
  - resistance
  - capacitance

- (xvii) The r.m.s. value of half wave rectified sine wave is 200 V. the r.m.s. value of full wave rectified ac. will be
- |          |          |
|----------|----------|
| a. 282.8 | b. 141.4 |
| c. 111   | d. 100   |
- (xviii) In a circuit containing R, L and C, power loss can take place in
- |           |              |
|-----------|--------------|
| a. C only | b. L only    |
| c. R only | d. all above |
- (xix) In a series R-L-C- circuit at the resonant frequency the
- |                         |                                |
|-------------------------|--------------------------------|
| a. current is maximum   | b. current is minimum          |
| c. impedance is maximum | d. voltage across c is minimum |
- (xx) The unit of inductive reactance is
- |          |          |
|----------|----------|
| a. ohm   | b. mho   |
| c. farad | d. henry |
- (xxi) In a 5 kV / 400V, 75 kVA single phase transformer, the current flowing in the primary winding of transformer is 10A. What will be the current flowing in the secondary winding?
- |         |         |
|---------|---------|
| a. 100A | b. 120A |
| c. 125A | d. 130A |
- (xxii) A transformer has
- |                |                      |
|----------------|----------------------|
| a. two winding | b. one winding       |
| c. no winding  | d. none of the these |
- (xxiii) A transformer has voltage rating of 110/220 volt. It is
- |                        |                          |
|------------------------|--------------------------|
| a. step-up transformer | b. step-down transformer |
| c. both a and b        | d. none of these         |
- (xxiv) Which one of the following is fixed loss
- |                 |                  |
|-----------------|------------------|
| a. core loss    | b. copper loss   |
| c. both a and b | d. none of these |
- (xxv) When a reverse bias is applied to a diode, it will
- |   |                                |
|---|--------------------------------|
| a. Raise the potential barrier                      | b. Lower the potential barrier |
| c. Increases the majority-carrier a current greatly | d. None of these               |

**Group – B**

(Short Answer Type Questions)

4 x 5 = 20

Answer any *four* from the following

2. Explain the working principle of transformer. 5
3. A 250 V, 50Hz voltage is applied across a pure choke of 0.014H. Determine 5
  - a) current through the circuit
  - b) power absorbed by the circuit
  - c) give the expression for the voltage and current.
  - d) draw the phasor diagram
4. State and explain Thevenin's Theorem. 5
5. Define linear circuit, active circuit and unilateral circuit 5
6. 'A three phase Induction motor is self starting'-why? 5
7. Obtain the relation between the slip and the frequency of the rotor induced emf. 5

**Group – C**

(Long Answer Type Questions)

2 x 10 = 20

Answer any *two* from the following

8. (a) What are the different types of losses in transformer? 3
- (b) Derive the condition for which efficiency of a transformer is maximum? 7
9. In a 50 KVA, 1-phase 3300/230 V, transformer, the iron losses and full-load copper losses were found to be as 500 watt and 650 watts respectively. Find the following 10
  - (i) efficiency at half load and 0.6 power factor lagging
  - (ii) determine maximum efficiency and corresponding load.
10. (a) Explain the two wattmeter method to determine the power in three phase systems. 5
- (b) In a two wattmeter method of measurement of three phase power, the reading of wattmeters are 3kW and 1kW respectively. Calculate the power and power factor for balanced circuit. 5
11. What are the types of three phase induction motors as per their rotor construction? Compare between them. 5+5  
Briefly explain the principle of operation of a three phase induction motor.