Total number of printed pages: **5** **D/2nd/DEE203**

2021

FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING

Full Marks: 60

Time: 2 hours

The figures in the margin indicate full marks for the questions.

A. Multiple Choice Questions 1 x 20=20

1. Which of the following is a semiconductor?
   a. Copper
   b. Platinum
   c. Germanium
   d. Iron
2. The number of valance electrons in silicon are
   a. 1
   b. 2
   c. 3
   d. 4
3. Which of the following is a pentavalent impurity?
   a. Aluminum
   b. Arsenic
   c. Boron
   d. Cadmium
4. Bipolar Junction Transistor has how many terminals?
   a. 1
   b. 2
   c. 3
   d. 4

5. Which layer of BJT is heavily doped?
    a. Emitter
    b. Base
    c. Collector
    d. Both a and c.
6. In the output characteristics of a Bipolar Junction Transistor, the output current I_c is zero in _____
    a. active region
    b. saturation region
    c. cutoff region
    d. both b and c.
7. The purpose of using a capacitor in a voltage regulator circuit is to
    a. rectify the ac voltage.
    b. filter the ripples.
    c. regulate the output voltage.
    d. step down the input voltage.
8. The SI units of potential difference, electric current, electric power and energy are
    a. Volt, ampere, joule and watt respectively
    b. Volt, ampere, watt-hr and joule/sec respectively
    c. Volt, ampere, joule/sec and joule respectively
    d. None of the above
9. A junction where two or more than two network elements meet is known as a
    a. node
    b. branch
    c. loop
    d. mesh
10. The period of a wave is
    a. the same as frequency
    b. time required to complete one cycle
    c. expressed in ampere

d. none of the above

11. The peak value of a sine wave is 200V. It's average value is

    a. 127.4 V

    b. 141.4 V

    c. 282.8 V

    d. 200 V

12. In the complex number (4+j7), 4 is called the _____ component.

    a. real

    b. imaginary

    c. in-phase

    d. quadrature

13. For a frequency of 200Hz, the time-period will be

    a. 0.055 s

    b. 0.005 s

    c. 0.0005 s

    d. 0.5 s

14. $\mathbf{V_{th}}$ is found across the _____ terminals of the network

    a. Input

    b. Output

    c. Neither input nor output

    d. either input nor output

15. Least current will flow through

    a. 18 ohm resistor

    b. 5 ohm resistor

    c. 10 ohm resistor

    d. 25 ohm resistor

16. The algebraic sum of voltages around any closed path in a network is equal to

    a. Infinity

    b. 1

    c. 0

    d. Negative polarity

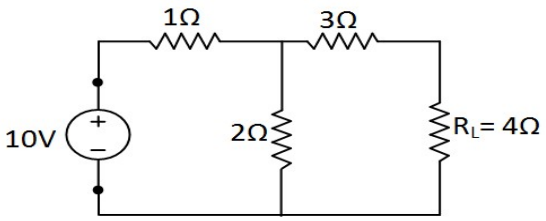
17. All _____ are loops but all _____ are not meshes
    a. loops, meshes
    b. meshes, loops
    c. branches, loops
    d. nodes, branches
18. An ideal voltage source has
    a. Infinite internal resistance
    b. 2 ohm internal resistance
    c. Zero internal resistance
    d. Very small internal resistance
19. Kirchhoff's voltage law is applied
    a. At a junction only
    b. Across a branch only
    c. In Thevenin's loop
    d. In a closed electric path
20 SI unit of resistance is
    a. Ω-m
    b. Ω-cm
    c. Ω^{-1}
    d. Ω

B. Very Short Question 2*6=12

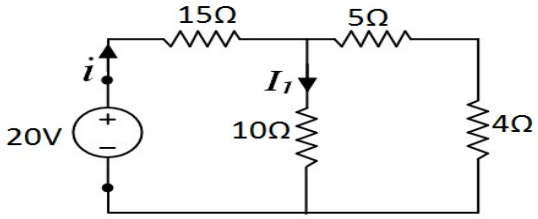
1. What do you mean by extrinsic and intrinsic semiconductor?
2. What will happen to PN junction diode when it is forward bias?
3. Two resistors 3Ω and 6Ω are connected in parallel and this combination is connected with 22V DC supply. Estimate the total power loss in this circuit.
4. An ideal voltage source of 18V is in series with a 10Ω resistor. Obtain it's current source equivalent.
5. An AC voltage wave is represented by 'v **= 120 Sin (314.**t**)'.** Find the maximum value and frequency**.**
6. A sinusoidal AC current wave makes 120 cycles per minute. What is its frequency?

C Short Question 4*7=28

1. How a Bipolar Junction Transistor is operated in CB or CE configuration? Explain with a diagram. Also, draw the output characteristics for the particular configuration.
2. Describe the working of a half wave rectifier using suitable diagrams? What do you mean by ripple factor of a rectifier?
3. What is the function of filter circuit in a voltage regulator? Explain with a diagram.
4. Calculate $\mathbf{V_{th}}$ for the given circuit**.** $\mathbf{R_L = 4\Omega}$ is given as the load resistance.



5. In the circuit shown below, calculate circuit current '***i***' and branch current '$\boldsymbol{I_1}$'**.**



6. Given, **A= (4-j2)** and **B= (1-j5)**. Perform the operation A.B and represent the result in polar form.
7. Define the following terms associated with sinusoidal AC quantities –

   Amplitude, frequency, time period and average value