B.Tech/M.Tech(Integrated) DEGREE EXAMINATION, DECEMBER 2023

Third Semester

21BMC203J - ELECTRIC AND ELECTRONIC CIRCUITS

(For the candidates admitted during the academic year 2022-2023 onwards)

Note:

i. **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

ii. **Part - B** and **Part - C** should be answered in answer booklet.

Time: 3 Hours   **Max. Marks: 75**

PART - A (20 × 1 = 20 Marks)
Answer **all** Questions

		Marks	BL	CO

1. The algebraic sum of voltages around any closed path or loop in an electrical network is equal to   1   1   1
   (A) Unity   (B) Zero
   (C) Infinite   (D) Non zero

2. A mesh is a loop that contains _____ number of loops within it.   1   2   1
   (A) 0   (B) 1
   (C) 2   (D) many

3. Ohms law holds good only at   1   1   1
   (A) Constant temperature   (B) Constant voltage
   (C) Constant current   (D) Constant pressure

4. The number of nodes to be considered as reference nodes in nodal analysis is   1   2   1
   (A) 0   (B) 1
   (C) 2   (D) 3

5. Thevenin's voltage refers to   1   2   2
   (A) Short circuit voltage   (B) Open circuit voltage
   (C) Bias voltage   (D) Offset voltage

6. The complementary of Thevenin's theorem is   1   1   2
   (A) Superposition theorem   (B) Reciprocity theorem
   (C) Substitution theorem   (D) Norton's Theorem

7. The condition to deliver maximum power at the load terminals is that , Source impedance should be   1   1   2
   (A) Less than load impedance   (B) Greater than load impedance
   (C) Inverse of admittance   (D) Equal to load impedance

8. The dual of inductance is   1   1   2
   (A) Resistance   (B) Admittance
   (C) Capacitance   (D) Reactance

9. Superposition theorem is applicable only to .... networks   1   2   3
   (A) Linear   (B) Non-Linear
   (C) Both Linear and Non-Linear   (D) Asymmetric

10. Replace any branch in a network by another branch, except for no change in terminal voltage is related to   1   1   3
    (A) Substitution theorem   (B) Superposition theorem
    (C) Tellegen's theorem   (D) Millman's theorem

11. Reciprocity theorem holds good for networks which are   1   2   3
    (A) Linear   (B) Non-Linear
    (C) Bilateral   (D) Linear and bilateral

12. According to superposition theorem, While considering the effect of individual   1   1   3
    sources, other current sources are
    (A) Short circuited   (B) Undisturbed
    (C) Open circuited   (D) Considered ideal

13. If the positive terminal of the supply is connected to the anode of the diode, the   1   1   4
    biasing is termed as
    (A) Forward bias   (B) Reverse bias
    (C) Zero bias   (D) Conditional bias

14. Specify the temperature coefficient of resistance possessed by a semiconductor   1   2   4
    (A) Positive   (B) Negative
    (C) Zero   (D) unity

15. Zener diode is used mainly in   1   2   4
    (A) amplifiers   (B) Voltage regulator
    (C) Voltage attenuator   (D) Voltage multiplier

16. Which rectifier is constructed using 4 diodes?   1   2   5
    (A) Half wave rectifier   (B) Full wave rectifier
    (C) Bridge rectifier   (D) Both Half wave rectifier and Full
                                         wave rectifier

17. How many terminals does a transistor have?   1   1   5
    (A) 1   (B) 2
    (C) 3   (D) 4

18. In which region does a transistor operate during amplification?   1   2   5
    (A) Active   (B) Cutoff
    (C) Saturation   (D) Biasing

19. Which terminal acts as input to the transistor in CE mode?   1   3   5
    (A) Emitter   (B) Base
    (C) Collector   (D) Gate

20. Both junctions of a transistor are reverse biased during   1   4   5
    (A) Active mode   (B) saturation mode
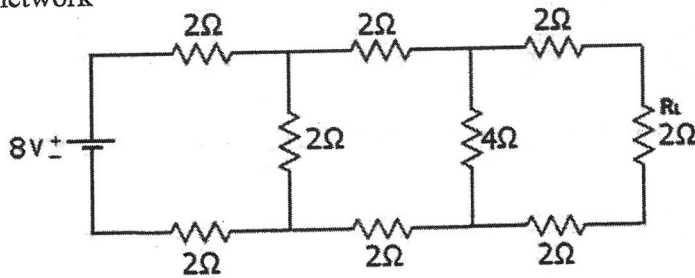   (C) cutoff mode   (D) Linear mode

PART - B (5 × 8 = 40 Marks)   Marks BL   CO
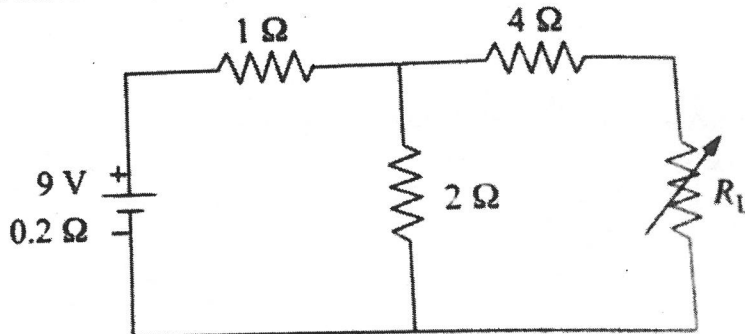Answer **all** Questions

21. (a) Using Norton's theorem, find current in branch "$R_L = 2\Omega$" in the given network   8   4   2

(OR)

(b) Find the value of R_L at which maximum power is transferred. The internal resistance of the voltage source is 0.2Ω. Find the value of maximum power.

22. (a) With a neat diagram, explain the operation of a PN junction diode under forward and reverse bias   8   2   4
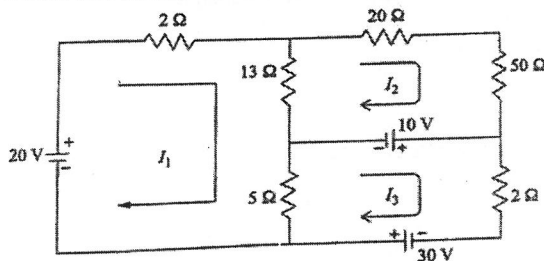
(OR)

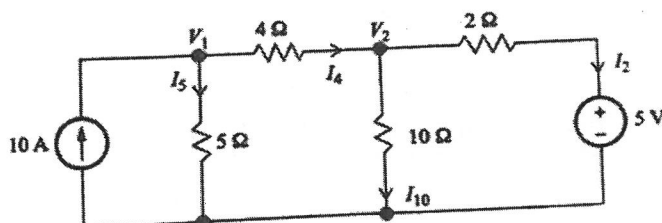(b) How are semiconductors classified? Explain them with a neat diagram

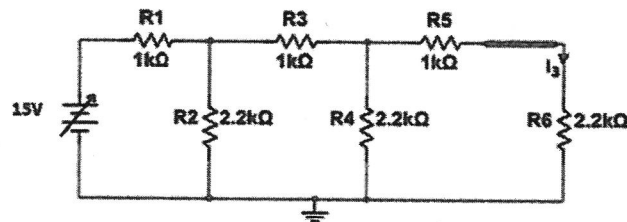23. (a) Write the mesh equations for the given network   8   3   1

(OR)

(b) Write node voltage equations and determine the currents 5Ω and 10Ω branch of the network
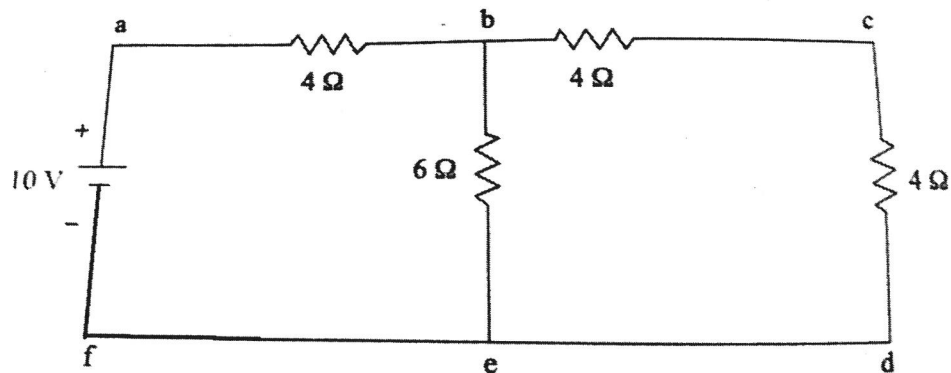
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24. (a) Verify reciprocity theorem for the given network   8   3   3

(OR)

(b) Can you replace the 4Ω resistor in the branch "cd" with any other electronic component with affecting the terminal voltages?

25. (a) Compare and contrast CB, CC and CE configurations   8   4   5

(OR)

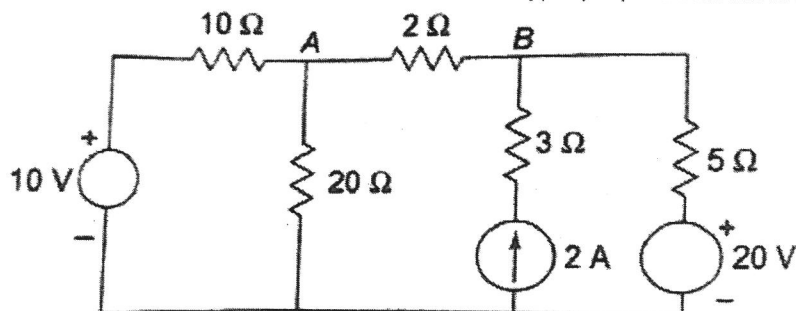(b) With a simple circuit, demonstrate how BJT can be used as a switch?

PART - C (1 × 15 = 15 Marks)
Answer **any 1** Questions

                                                                       Marks   BL   CO

26. Find the voltage across the 2Ω resistor using superposition theorem   15   4   3

27. With a neat diagram, Explain the operating principle of bridge rectifier and derive   15   3   1
necessary expressions that describes its performance measures.

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