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B.Tech DEGREE EXAMINATION, DECEMBER 2023

First and Second Semester

18EES101J - BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(For the candidates admitted during the academic year 2020 - 2021 & 2021 - 2022)

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.

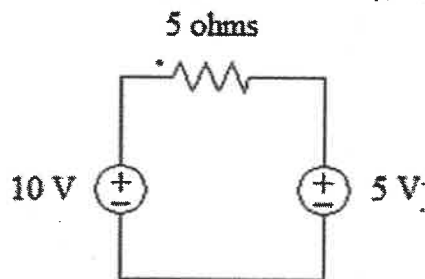ii. **Part - B** and **Part - C** should be answered in answer booklet.

Time: 3 Hours   **Max. Marks: 100**

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

		Marks	BL	CO

1. An independent source is _____ .   1   2   1
   (A) Voltage-controlled voltage source
   (B) Current controlled current source
   (C) Neither current source nor a voltage source
   (D) Either a current source or a voltage source

2. Find the current in the following circuit shown below.   1   3   1

   (A) 1 A
   (B) 2 A
   (C) 3 A
   (D) 5 A

3. When a fourth resistor is connected in series with three resistors, the total resistance _____ .   1   2   1
   (A) Increases by one-fourth
   (B) Increases
   (C) Decreases
   (D) Remains the same

4. The nodal method of circuit analysis is based on   1   1   1
   (A) Kirchhoff voltage law
   (B) Thevenin's theorem
   (C) Norton's theorem
   (D) Kirchhoff current law

5. The ability of a material to remain magnetized after removal of the magnetizing force is known as   1   1   2
   (A) Permeability
   (B) Reluctance
   (C) Hysteresis
   (D) Retentivity

6. The B/H curve can be used to determine?   1   2   2
   (A) Iron loss
   (B) Hysteresis loss
   (C) Voltage loss
   (D) Eddy current loss

7. An AC voltage is applied across a series RL circuit. If the voltage drop across the resistor and inductor is 30 V and 40 V respectively then the applied peak voltage will be _____ .   1   3   2
   (A) 50 V
   (B) $\sqrt{2}.(50)$ V
   (C) $\sqrt{2}.(70)$ V
   (D) 70 V

8. Which of the following generators can build up the terminal voltage without any external source?   1   1   2
(A) Self-excited generator   (B) Separately excited generator
(C) Compound generator   (D) Series generator

9. In a moving coil ammeter, the deflecting torque is directly proportional to   1   1   3
(A) Square of the current to be measured   (B) Square root of the current to be measured
(C) Current to be measured   (D) Twice the current to be measured

10. A pointer of an instrument deflected and returns to zero position, when the current is removed is known as   1   1   3
(A) Damping Torques   (B) Mass of the pointer
(C) Controlling Torque   (D) Action of gravity

11. The forward voltage drop across a silicon diode is about _____   1   2   3
(A) 2.5 V   (B) 3 V
(C) 10 V   (D) 0.7 V

12. Which circuit is used to cut the shape of output waveform?   1   1   3
(A) Clamper   (B) Clipper
(C) Peak amplifier   (D) Sample and hold

13. In LVDT, when the iron core is exactly at center of tube then the net output of the transducer is   1   2   4
(A) Maximum   (B) Average
(C) Unpredictable   (D) Zero

14. Photo diode will be generally connected in   1   1   4
(A) Forward bias   (B) Reverse bias
(C) No biasing required   (D) Neutral

15. The property of light emitted from LASER is   1   2   4
(A) Polychromatic   (B) Coherent
(C) Not directional   (D) Poor energy

16. A device is an adjustable resistor whose resistance differs inversely with the concentration of light   1   2   5
(A) Photo resistor   (B) Thermistor
(C) Photo transistor   (D) Thermo couple

17. In Frequency Modulation the Amplitude of the Carrier Wave is   1   2   5
(A) Varies   (B) Linearly Varies
(C) Constant   (D) Non-Linear

18. In FM wave the signal strength of each side band is determined by   1   1   5
(A) Modulation index   (B) Bandwidth
(C) Carrier wave   (D) Power

19. The number of cells in 6 variable K-map is   1   2   5
(A) 4   (B) 16
(C) 32   (D) 64

20. On a K-Map, grouping the 0s produces   1   2   5
(A) SOP expression   (B) POS expression
(C) A don't care condition   (D) AND-OR expression

Marks BL   CO

PART - B (5 × 4 = 20 Marks)
Answer **any 5** Questions

21. For the circuit shown below find voltages V_1, V_2, and V_3 using Kirchhoff's voltage   4   3   1
law.
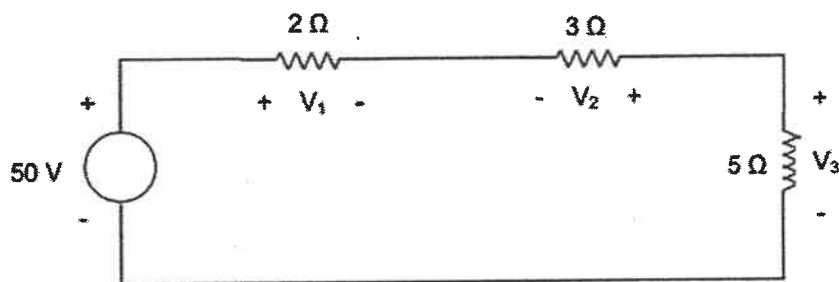
22. Derive the relation between line voltage and phase voltage for a star-connected   4   2   1
system.

23. A resistance of 100 Ω is connected in series with a 2 mH inductor to a supply at 230   4   3   2
V, 50 Hz. Determine current, power factor, and voltage across resistor and inductor.

24. Illustrate the operation of corridor wiring with its neat diagram.   4   1   3

25. Write short notes on photodiode.   4   2   4

26. Draw the block diagram of the communication system and explain the functions of   4   2   5
each block.

27. Draw the logical diagram for the following expression.   4   2   5
$$Y = AC + AB + A\bar{B}C + AD + ACD$$

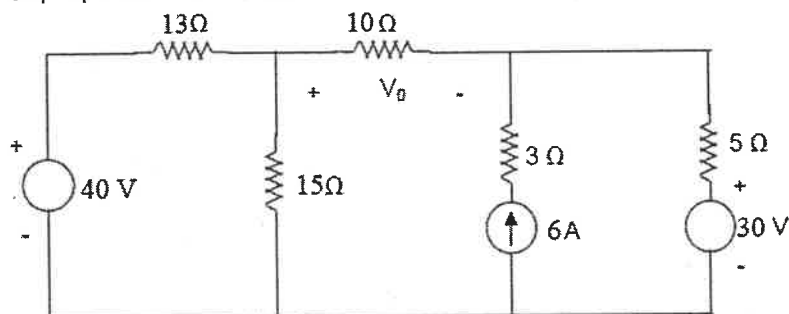## PART - C (5 × 12 = 60 Marks)
Answer **all** Questions

Marks BL CO

28.   (a) Find all the branch currents using Mesh analysis. Also find the power   12   1   1
dissipated from 3 Ω resistor.
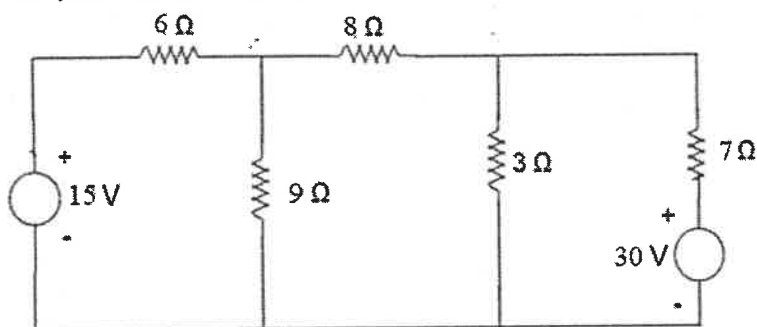
(OR)

(b) Find the voltage response V_0 across the 10 Ω resistor using the
Superposition theorem.

29. (a) With a neat diagram explain the construction and operation of a DC generator.   12   3   2

(OR)

(b) (i). Analyse that the RMS and Average value of half-rectified sine wave are $\frac{Im}{2}$ and $\frac{Im}{\pi}$ respectively.[6 Marks]

(ii). A mild steel has a radius of 50 mm and a cross-sectional area of 400 mm^2. A current of 0.5 A flows in a coil wound uniformly around the ring and the flux produced is 0.1 mWb. If the relative permeability at this value of current is 200 A, find (I) the reluctance of the mild steel and (II) the number of turns in the coil. [6 Marks]

30. (a) Describe the construction and operation of a moving coil type of measuring instrument with a neat diagram.   12   2   3

(OR)

(b) Interpret that $I_E = I_C + I_B$ in a BJT under CE configuration and also discuss the input and output characteristics with a neat diagram.

31. (a) Describe the construction and operation of LVDT with a neat diagram. Also justify that the output voltage is equal to the difference between the input voltages.   12   1   4

(OR)

(b) With a neat diagram describe the construction and operation of the liquid crystal display system.

32. (a) (i) Simplify the following expression using Boolean algebra.   12   2   5

$Y = \overline{A}BC\overline{D} + BC\overline{D} + B\overline{C}\,\overline{D} + B\overline{C}D$ [6 Marks]

(ii) Simplify the given expression using K map.

$Y(A,B,C) = \sum m(1,2,3,6,7)$ [6 Marks]

(OR)

(b) What is meant by modulation? Also, explain the following with a neat diagram.
(i) Amplitude modulation[6 marks]
(ii) Frequency modulation[6 Marks]

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