Reg. No.													

B.Tech. DEGREE EXAMINATION, MAY 2019
1st and 2nd Semester

18EES101J – BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(For the candidates admitted during the academic year 2018-2019)

Note:
(i) **Part - A** should be answered in OMR sheet within first 45 minutes and OMR sheet should be handed over to hall invigilator at the end of 45th minute.
(ii) **Part - B** and **Part - C** should be answered in answer booklet.

Time: Three Hours   Max. Marks: 100

PART – A (20 × 1 = 20 Marks)
Answer **ALL** Questions

1. Krichoff's voltage law is based on
   (A) Law of conservation of energy
   (B) Law of conservation of charge
   (C) Faraday's law of electromagnetic induction
   (D) Fleming's right hand rule

2. Superposition theorem is applied to
   (A) Only linear circuit
   (B) Only non linear circuit
   (C) Either on linear or non linear circuit
   (D) Only on DC circuit

3. Three equal resistances of 3 Ω are connected in star. What is the resistance in one of the arms in an equivalent delta circuit?
   (A) 10 Ω
   (B) 27Ω
   (C) 9 Ω
   (D) 3Ω

4. In a certain series RC circuit, the true power is 2W, and the reactive power is 3.5 VAR. What is the apparent power?
   (A) 3.5 VA
   (B) 2.03 VA
   (C) 4.03 VA
   (D) 3 VA

5. A power factor of '0' indicates
   (A) Purely resistive element
   (B) Purely inductive element
   (C) Combination of both (A) and (B)
   (D) Purely capacitive element and resistive element

6. No load speed of which of the following motor will be highest
   (A) Shunt motor
   (B) Cumulatively compound motor
   (C) Differentially compound motor
   (D) Series motor

7. Which of the following is the most economical method of starting a single phase motor?
   (A) Resistance start method
   (B) Inductance start method
   (C) Capacitance start method
   (D) Split phase method

8. Material used for the construction of transformer core is usually
   (A) Wood
   (B) Copper
   (C) Aluminium
   (D) Silicon steel

9. The function of choke and starter in a fluorescent lamp circuit is to
(A) Reduce the power consumed by the fluorescent lamp
(B) Create a high voltage across the tube during starting
(C) Help to draw very high current during starting
(D) Improve the power factor of the fluorescent lamp circuit

10. Which of the following statement is not true for a zener diode?
(A) A forward-biased zener diode behaves identical to a forward-biased diode
(B) Zener diode under the reverse-biased condition is used as a voltage regulator
(C) Zener diode under the forward – biased condition is used as a voltage regulator
(D) The operation of a reversed-biased zener diode is different than that of a reverse biased diode

11. Transistor can be used as an amplifier when it is operated
(A) In the saturation region
(B) In the active region
(C) In the cut-off region
(D) In both saturation and cut-off regions

12. MOSFET stands for
(A) Metal oxide semiconductor field effect transistor
(B) Metal oxide silicon field effect transistor
(C) Metal oxide semiconductor field excited transistor
(D) Metal oxide silicon field excited transistor

13. Moving coil instruments can be used on
(A) DC only
(B) Sinusoidal AC only
(C) All AC waveforms
(D) AC and DC both

14. A strain gauge should have
(A) High gauge factor and low sensitivity
(B) High gauge factor and high sensitivity
(C) Low gauge factor and low sensitivity
(D) Low gauge factor and high sensitivity

15. Which of the following is not a source of power?
(A) Solar cell
(B) Thermocouple
(C) Photoelectric cell
(D) Photovoltaic cell

16. Which of the following is not a pressure measurement transducers?
(A) Piezo electric tansducer
(B) Strain gauge
(C) LVDT
(D) Thermocouple

17. The sum of binary 10011 and 0111 is
(A) 01010
(B) 11010
(C) 11101
(D) 10110

18. Which of the following statements is true, according to Demorgan's theorem
(A) $\overline{A+B} = \overline{A}.\overline{B}$
(B) $\overline{A}+\overline{B} = \overline{A}.\overline{B}$
(C) $\overline{\overline{A+B}} = \overline{A}.\overline{B}$
(D) $A.B = \overline{A}+\overline{B}$

19. Connecting of inverters at all the inputs of an AND gate produces a
(A) NAND gate
(B) OR gate
(C) NOR gate
(D) XOR gate

20. In frequency modulation
    (A) Carrier amplitude is changed by the modulating signal
    (B) Carrier frequency is changed by the modulating signal
    (C) If amplitude of modulating signal increases the carrier frequency remains constant
    (D) Frequency of the carrier must be lower than the modulating frequency

PART – B (5 × 4 = 20 Marks)
Answer ANY FIVE Questions

21. For the circuit shown, find the voltage across the 1 ohm resistors.
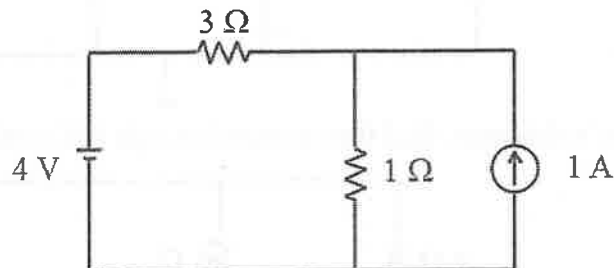
22. A magnetic circuit has a uniform cross sectional area of 5 cm² and a length of 25 cm. A coil of 100 turns is wound uniformly over the magnetic circuit. When the current in the coil is 2 A, the total flux is 0.3 mWb and when the current in the coil is 5 A, the total flux is 0.58 mWb. For each value of current calculate
    (i) Magnetizing force
    (ii) Relative permeability
    (iii) Magnetic flux density

23. Discuss the following domestic wiring circuits
    (i) Fluorescent lamp wiring
    (ii) Stair case wiring

24. Compare active transducer and passive transducer.

25. Write the truth tables for the following logic gates with neat sketches
    (i) NAND gate
    (ii) NOR gate
    (iii) XOR gate
    (iv) X-NOR gate

26. Determine the Norton's equivalent circuit for the circuit shown below.
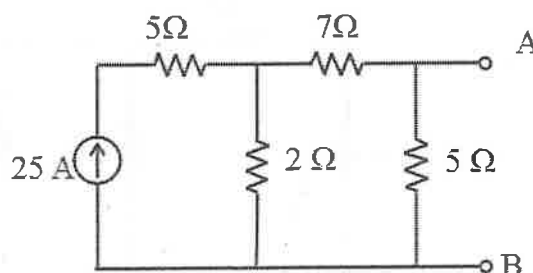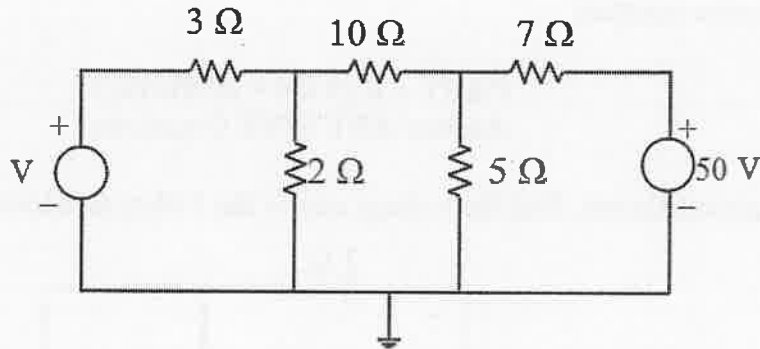

27. Explain the working of zener diode and draw the forward bias and reverse bias characteristics. Also write the applications.
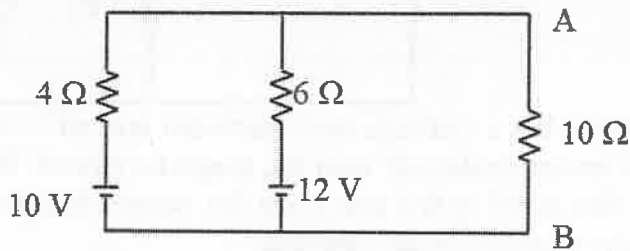
PART – C (5 × 12 = 60 Marks)
Answer ALL Questions

28. a.i. Find the voltage 'V' in the circuit shown below which makes the current in the 10 Ω resistor zero by using nodal analysis.
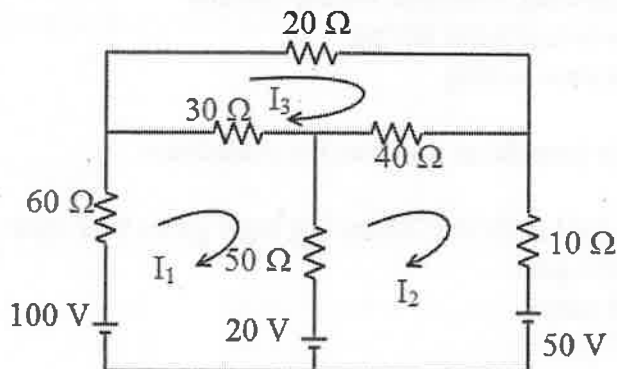

ii. Using Thevenin's theorem, find the current through 10Ω resistor in the circuit shown below.

(OR)

b.i. Find the current that flows through the 50 Ω resistor for the circuit shown below using mesh analysis.

ii. Determine the value of load resistance R_L when it is dissipating maximum power. Also find the maximum power dissipated in the load resistance for the circuit given below.
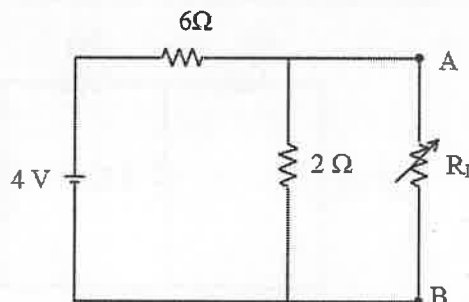
29. a.i. Derive the average value, RMS value, peak factor and form factor for a full-wave rectified sinusoidal waveform. (8 Marks)

ii. State and explain faraday's laws of electromagnetic induction. (4 Marks)

(OR)

b.i. Explain the working principle of single phase transformer. Also write the applications. (8 Marks)

ii. Explain the three characteristics of (4 Marks)
    (1) DC shunt motor
    (2) DC series motor

30. a.i. Explain the working principle of moving iron instruments with neat sketches. (8 Marks)

ii. What are the applications of transistor? (4 Marks)

(OR)

b.i. Discuss the operation of full wave rectifier (center tape type) with neat sketches. (8 Marks)

ii. Explain the operation of NPN type BJT and sketch the characteristics. (4 Marks)

31. a. Write short notes on the following transducers with sketches
    (i) Photo transistors
    (ii) Solar cell
    (iii) LDR
    (iv) Thermocouple
    (v) LED
    (vi) Photo voltaic cell

(OR)

b. Discuss the principle of operation and applications of the following transducers
    (i) LVDT
    (ii) Strain gauge

32. a.i. Simplify the given Boolean expression using Boolean laws and theorems
    (1) $Y = ABC + A\bar{B}C + A\bar{B}C + AB\bar{C}$
    (2) $Y = AB + A\bar{B}\left(\overline{\overline{AB}}\right)$

ii. Using k-map simplify the following Boolean expressions
$F = ABC + AB + A\bar{C} + \bar{A}\bar{B}\bar{C}$

(OR)

b.i. Explain the principles of amplitude modulation with necessary equations. (8 Marks)

ii. Draw and explain the general block diagram of communication system. (4 Marks)

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