iii.   Draw and explain the circuit diagram of a half wave rectifier.   **5**
       Explain its working and disadvantages as compare to full wave
       rectifier.

OR   iv.   Draw the typical output characteristics of a p-n-p transistor in CB   **5**
           configuration. Label all variable and indicate active, cut-off and
           saturation region.

Q.6   i.   State and explain De-Morgan's theorem.   **2**

      ii.   Convert the following numbers into the respective index given: **3**
            (a) $(1101011010.101)_2 = ($ $)_{16}$
            (b) $(35.726)_{10} = ($ $)_{16}$
            (c) $(206)_8 = ($ $)_{10}$

      iii.   Draw and explain full adder with its truth table. Derive the logic   **5**
             expression for sum and carry.

OR   iv.   Explain universal gates and implementation of AND gates using   **5**
           universal gates.

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Enrollment No.....................................

Faculty of Engineering

End Sem (Odd) Examination Dec-2019

EN3ES04 Basic Electrical and Electronics Engineering

Programme: B.Tech.   Branch/Specialisation: All

MEDI-CAPS
UNIVERSITY
Knowledge is Power

Duration: 3 Hrs.   **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1   i.   An ideal voltage source has internal resistance   **1**
           (a) Zero ohm   (b) 10 ohm   (c) 3.33 ohm   (d) Infinite

      ii.   The circuit whose properties are same in either direction is known as   **1**
            (a) Unilateral circuit   (b) Bilateral circuit
            (c) Irreversible circuit   (d) Reversible circuit

      iii.   Power factor of a series RL circuit is   **1**
             (a) Leading   (b) Lagging   (c) Unity   (d) None of these

      iv.   What happens to the MMF when the magnetic flux decreases?   **1**
            (a) Increases   (b) Decreases
            (c) Remains constant   (d) Becomes zero

      v.   Open circuit test is performed to determine   **1**
           (a) Core losses   (b) Copper losses
           (c) Temperature rise   (d) None of these

      vi.   Which of the following rule is used to determine the direction of   **1**
            rotation of D.C. motor?
            (a) Coulomb's Law
            (b) Lenz's Law
            (c) Fleming's Right-hand Rule
            (d) Fleming's Left-hand Rule

      vii.   If the PIV rating of a diode is exceeded, ………………   **1**
             (a) The diode conducts poorly
             (b) The diode is destroyed
             (c) The diode behaves like a zener diode
             (d) None of these

P.T.O.

viii. The emitter of a transistor is   **1**
(a) Lightly doped   (b) Highly doped
(c) Moderately doped   (d) Not doped at all

ix. 2's complement of 11001011 is _____   **1**
(a) 01010111 (b) 11010100 (c) 00110101 (d) 11100010

x. How many AND, OR and EXOR gates are required for the **1** configuration of full adder?
(a) 1, 2, 2   (b) 2, 1, 2   (c) 3, 1, 2   (d) 4, 0, 1

Q.2 i. Define and explain active and passive elements.   **2**

ii. State and explain Thevenin's theorem as applicable to electrical **3** circuit.

iii. Calculate the current in each branch of the network shown in Fig.1 **5** using mesh current method.

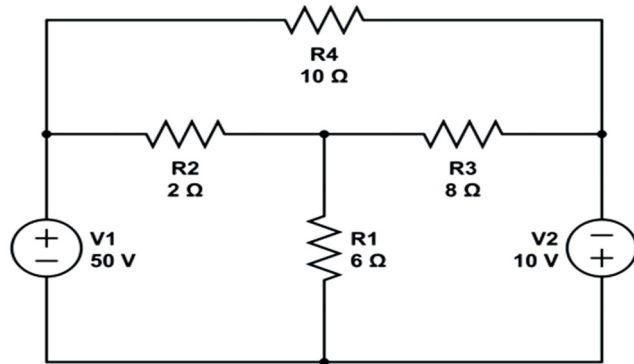
Fig. 1

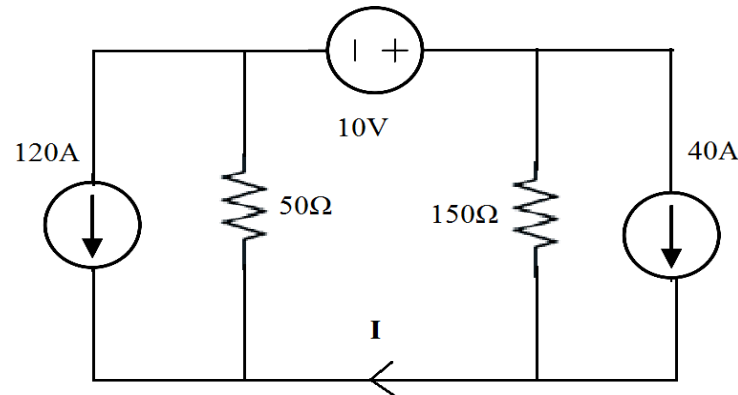OR iv. Use superposition theorem to find current (I) in the network given in **5** Fig.2

Fig. 2

Q.3 i. Compare the magnetic circuit with electric circuit in tabular form.   **2**

ii. Define the following terms: **3**
(a) Flux   (b) mmf
(c) Flux density   (d) Permeability
(e) rms value   (f) Form factor

iii. A series circuit has R=10Ω, L=50mh, and C=100μf and is supplied **5** with 200V, 50Hz. Find:
(a) Impedance   (b) Current
(c) Active power   (d) Power factor
(e) Voltage drops across capacitance.

OR iv. A series R-C circuit takes a power of 7kW when connected to 200V, **5** 50Hz supply. The voltage across the resistor is 130V. Calculate:
(a) Resistance   (b) Current
(c) Power factor   (d) Capacitance
(e) Impedance.

Q.4 i. Why rotor of a three phase induction motor does not rotate with **2** synchronous speed?

ii. What are the different losses in a transformer? Distinguish between **3** constant losses and variable losses.

iii. Draw and explain phasor diagram of single phase transformer at **5** leading power factor load.

OR iv. A 5kVA, 400/200V, 50Hz. Single phase transformer gave the **5** following results during no load and short circuit test.
No load: 400V, 1A, 60W (HV side)
Short-circuit: 15V, 12.5A, 50W (HV side)
Calculate:
(a) No load parameters
(b) Short-circuit parameters
(c) Full load efficiency at 0.8 p.f. lagging
(d) Regulation at full load and 0.8 p.f. lagging
(e) Iron and copper loss at full load

Q.5 i. Explain zener diode as a voltage regulator.   **2**

ii. Draw and explain voltage-current characteristics of P-N diode.   **3**

P.T.O.

Q.1   i.   An ideal voltage source has internal resistance   **1**
           (a) Zero ohm

     ii.   The circuit whose properties are same in either direction is known as   **1**
           (b) Bilateral circuit

     iii.   Power factor of a series RL circuit is   **1**
           (b) Lagging

     iv.   What happens to the MMF when the magnetic flux decreases?   **1**
           (b) Decreases

     v.   Open circuit test is performed to determine   **1**
           (a) Core losses

     vi.   Which of the following rule is used to determine the direction of   **1**
           rotation of D.C. motor?
           (d) Fleming's Left-hand Rule

     vii.   If the PIV rating of a diode is exceeded, ………………   **1**
           (b) The diode is destroyed

     viii.   The emitter of a transistor is   **1**
           (b) Highly doped

     ix.   2's complement of 11001011 is _____   **1**
           (c) 00110101

     x.   How many AND, OR and EXOR gates are required for the   **1**
           configuration of full adder?
           (b) 2, 1, 2

Q.2   i.   Definition of active elements   1 mark   **2**
           Definition of passive elements   1 mark

     ii.   Thevenin's theorem as applicable to electrical circuit   **3**
           Statement   1 mark
           Explanation   2 marks

     iii.   Calculate the current in each branch of the network shown   **5**
           Mesh current   3 marks
           Branch current   2 marks

OR   iv.   Use superposition theorem to find current (I) in the network   **5**
           1.5 mark for each response (1.5 marks * 3)   4.5 marks
           For sum   0.5 mark

Q.3   i.   Compare the magnetic circuit with electric circuit in tabular form.   **2**
           0.5 mark for each point   (0.5 mark *4)

     ii.   Define the following terms: **3**
           0.5 mark for each term   (0.5 mark * 6)

     iii.   A series circuit has R=10Ω, L=50mh, and C=100μf and is supplied   **5**
           with 200V, 50Hz. Find:
           1 mark for each   (1 mark * 5)

OR   iv.   A series R-C circuit takes a power of 7kW when connected to 200V,   **5**
           50Hz supply. The voltage across the resistor is 130V. Calculate:
           1 mark for each   (1 mark * 5)

Q.4   i.   Why rotor of a three phase induction motor does not rotate with   **2**
           synchronous speed

     ii.   Different losses in a transformer   2 marks   **3**
           Distinguish b/w constant losses and variable losses   1 mark

     iii.   Phasor diagram of single phase transformer at leading power factor   **5**
           load.
           Drawing   3 marks
           Explanation   2 marks

OR   iv.   Single phase transformer gave the following results during no load   **5**
           and short circuit test. Calculate: 1 mark for each   (1 mark * 5)

Q.5   i.   Zener diode as a voltage regulator.   **2**

     ii.   Voltage-current characteristics of P-N diode   **3**
           Drawing   1 mark
           Explanation   2 marks

     iii.   Draw the circuit diagram of a half wave rectifier   1 mark   **5**
           Its working   2 marks
           Disadvantages as compare to full wave rectifier   2 marks

OR   iv.   Typical output characteristics of a p-n-p transistor in CB   **5**
           configuration.
           Diagram   1 mark
           Explanation   2 marks
           Label all variable and indicate active, cut-off and saturation region
                                                 2 marks

Q.6   i.   De-Morgan's theorem.   **2**
           Statement   1 mark
           Explanation   1 mark

     ii.   Convert the following numbers into the respective index given: **3**
           1 mark for each   (1 mark * 3)

	iii.	Full adder with its truth table		**5**
		Diagram	1 mark	
		Explanation	2 marks	
		Derivation the logic expression for sum and carry	2 marks	
OR	iv.	Explanation of universal gates	3 marks	**5**
		Implementation of AND gates	2 marks	

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