

[4]

- OR iv. Discuss construction and working principle of D.C. motor. **5**
- Q.5 i. Explain following reason with reference to a transistor. **2**
 (a) Emitter region is highly doped
 (b) Base region is narrow and lightly doped
- ii. What is zenor diode draw its equivalent circuit and also Explain the application of zenor diode as voltage regulator. **3**
- iii. Define α and β of a BJT and establish relationship between then, where α and β denote current gain in CB and CE configurations respectively. **5**
- OR iv. Draw the input and output characteristics of transistor in CE configuration with focus on cut off region, active region and saturation region. **5**
- Q.6 i. Explain in short 1's and 2's compliment with a suitable example. **2**
 ii. Convert with suitable & simple example. **3**
 (a) Octal to decimal and decimal to octal
 (b) Octal to hexadecimal and hexadecimal to octal
 (c) Binary to decimal and decimal to binary
- iii. Explain EX-OR and EX-NOR gate with boolean expression, logic diagram and truth table. **5**
- OR iv. Explain full adder with truth table, boolean expression and logic diagram and application. **5**

Total No. of Questions: 6

Total No. of Printed Pages:4

Enrollment No.....



Faculty of Engineering
 End Sem (Even) Examination May-2019
 EN3ES04 Basic Electrical and Electronics Engineering
 Programme: B.Tech. Branch/Specialisation: All

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.

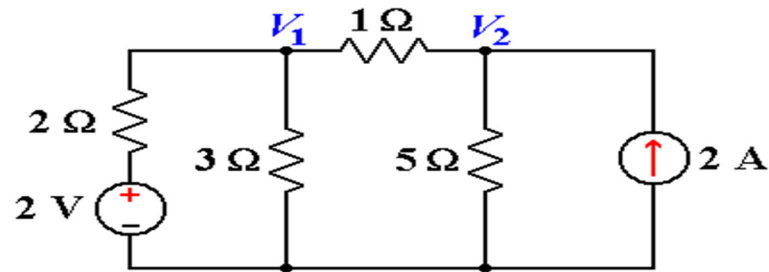
- Q.1 i. When power transferred to the load is maximum, the efficiency of power transfer is. **1**
 (a) 25 % (b) 75 % (c) 50 % (d) 100 %
- ii. For an ideal voltage source, internal resistance is **1**
 (a) Zero (b) Infinite (c) 10 ohm (d) None of these.
- iii. The apparent power and active power drawn are equal for an a.c. circuit of: **1**
 (a) Inductive load (b) Capacitive load
 (c) Resistive load (d) None of these
- iv. The quantity $(12+j9)$ represents the resistive and reactive components of the current drawn by an a.c. circuit. The phase angle between the applied voltage and the current is: **1**
 (a) 41.4 degree (b) 53.13 degree
 (c) 36.87 degree (d) 48.6 degree
- v. A transformer has negative voltage regulation, when its load power factor is: **1**
 (a) Zero (b) Unity (c) Leading (d) Lagging
- vi. During open circuit test of a transformer **1**
 (a) Primary is supplied rated voltage
 (b) Primary is supplied full-load current
 (c) Primary is supplied current at reduced voltage
 (d) None of these

P.T.O.

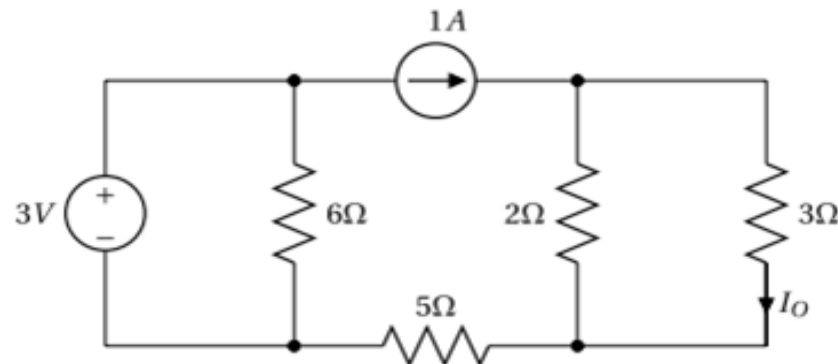
[2]

- vii. A transistor is a controlled operated device 1
 (a) Current (b) Voltage
 (c) Both (a) and (b) (d) None of these
- viii. In a common base configuration, current amplification factor is 0.9. 1
 If the emitter current is 1 mA, determine the value of base current.
 (a) 0.9 mA (b) 0.1 mA (c) 1 mA (d) None of these
- ix. Addition of two octal no. $(675)_8 + (764)_8$ is. 1
 (a) 1661 (b) 1439 (c) 661 (d) None of these
- x. Subtraction of two binary no $(1010 - 0101)_2$ is 1
 (a) 0101 (b) 0111 (c) 1001 (d) None of these

- Q.2 i. Write only nodal equation of given circuit. 2

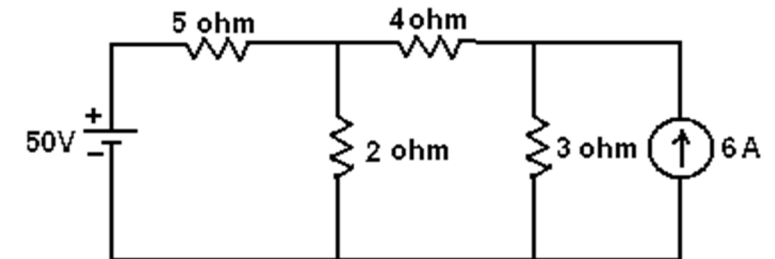


- ii. Explain ideal voltage and current sources with neat diagram. How voltage source can be converted into current sources and vice-versa? 3
- iii. Find I_o (current through 3 ohm resistance) using superposition theorem. 5



[3]

- OR iv. Determine the current through branch 4 Ohm resistor for the network shown below using Thevenin Theorem. 5



- Q.3 i. A 230 V (rms) 50 Hz source voltage is applied first to resistor of value of 100 ohm and then to a capacitor of 100 micro farad. Obtain the expressions for the instantaneous current for both cases. 2
- ii. Explain Faraday's law of electro-magnetic induction. 3
- iii. A choke coil has a resistance of 2 ohm and a inductance of 5 H. A capacitor C is connected in series with the choke coil and the combination is fed from a 230volt, 50 Hz source. What should be the value of C so that the voltage across the choke coil is 250 volts? 5
- OR iv. Explain series resonance of R-L-C series circuit with derivation, graphical representation and its properties. 5

- Q.4 i. Drive the EMF equation of 1 phase transformer. 2
- ii. Define (or explain in short) the following term of electrical machine 3
 (a) Field winding & Armature winding
 (b) Commutator & its function
 (c) Synchronous speed
- iii. A 5 kVA, 250/500 V, 50 Hz, 1 phase Transformer gave following result: 5
 No load Test : 250 V, 0.75 A, 60 W (L.V. Side)
 Short Circuit Test : 9 V, 6 A, 21.6 W (H.V. Side)
 Calculate and draw the equivalent circuit parameter referred to L.V. side

P.T.O.

Marking Scheme

EN3ES04 Basic Electrical and Electronics Engineering

| | | | |
|-----|-------|--|---|
| Q.1 | i. | When power transferred to the load is maximum, the efficiency of power transfer is. (c) 50 % | 1 |
| | ii. | For an ideal voltage source, internal resistance is (a) Zero | 1 |
| | iii. | The apparent power and active power drawn are equal for an a.c. circuit of: (c) Resistive load | 1 |
| | iv. | The quantity $(12+j9)$ represents the resistive and reactive components of the current drawn by an a.c. circuit. The phase angle between the applied voltage and the current is: (c) 36.87 degree | 1 |
| | v. | A transformer has negative voltage regulation, when its load power factor is: (c) Leading | 1 |
| | vi. | During open circuit test of a transformer (a) Primary is supplied rated voltage | 1 |
| | vii. | A transistor is a controlled operated device (a) Current | 1 |
| | viii. | In a common base configuration, current amplification factor is 0.9. If the emitter current is 1 mA, determine the value of base current. (b) 0.1 mA | 1 |
| | ix. | Addition of two octal no. $(675)_8 + (764)_8$ is. (a) 1661 | 1 |
| | x. | Subtraction of two binary no $(1010 - 0101)_2$ is (a) 0101 | 1 |
| Q.2 | i. | Only nodal equation of given circuit. 1 mark for each equation (1 mark * 2) | 2 |
| | ii. | Ideal voltage and current sources with diagram 1.5 marks Voltage source can be converted into current sources & vice-versa 1.5 marks | 3 |
| | iii. | Find I_o (current through 3 ohm resistance) using superposition theorem. | 5 |

| | | | | |
|-----|------|--|-----------|---|
| OR | iv. | Current due to 3 V source | 2 marks | 5 |
| | | Current due to 1 A source | 2 marks | |
| | | Total current | 1 mark | |
| | | Current through branch 4 Ohm resistor for the network shown | | |
| | | Thevenin Voltage | 2 marks | |
| Q.3 | i. | Thevenin resistance | 2 marks | 2 |
| | | Total current | 1 mark | |
| | ii. | Obtain the expressions for the instantaneous current for both cases 1 mark for each equation (1 mark * 2) | | 3 |
| | | Faraday's law of electro-magnetic induction. | | |
| | iii. | First Law | 1.5 marks | 5 |
| | | Second law | 1.5 marks | |
| | iv. | What should be the value of C so that the voltage across the choke coil is 250 volts? | | 5 |
| | | Impedance of Coil | 1 mark | |
| | | Total current | 1 mark | |
| OR | iv. | Capacitance calculation | 3 marks | 5 |
| | | Series resonance of R-L-C series circuit | | |
| | | Derivation | 2 marks | |
| | | Graphical representation | 2 marks | |
| | | Properties | 1 mark | |
| Q.4 | i. | Derivation of EMF equation of 1 phase transformer. | | 2 |
| | | Define (or explain in short) the following term of electrical machine | | |
| | ii. | (a) Field winding & Armature winding | 1 mark | 3 |
| | | (b) Commutator & its function | 1 mark | |
| | | (c) Synchronous speed | 1 mark | |
| | iii. | Calculate and draw the equivalent circuit parameter referred to L.V. side | | 5 |
| | | No load parameters | 2 marks | |
| OR | iv. | Winding parameter | 2 marks | 5 |
| | | Equivalent circuit | 1 mark | |
| | | Construction of D.C. motor | 2 marks | |
| | | Working principle of D.C. motor. | 3 marks | |
| | | | | |

| | | | | |
|-----|------|--|---------------|----------|
| Q.5 | i. | Explain following reason with reference to a transistor. | | 2 |
| | | (a) Emitter region is highly doped | 1 mark | |
| | | (b) Base region is narrow and lightly doped | 1 mark | |
| | ii. | Zenor diode draw its equivalent circuit | 1.5 marks | 3 |
| | | Application of zenor diode as voltage regulator. | 1.5 marks | |
| | iii. | Define α and β of a BJT | 2 marks | 5 |
| | | Derivation | 3 marks | |
| OR | iv. | Input characteristics of transistor | 1.5 marks | 5 |
| | | Output characteristics of transistor | 1.5 marks | |
| | | Explanation | 2 marks | |
| Q.6 | i. | Short 1's and 2's compliment with example | | 2 |
| | | 1 mark for each compliments | (1 mark * 2) | |
| | ii. | Convert with suitable & simple example. | | 3 |
| | | 0.5 mark for each conversion | (0.5 mark *6) | |
| | | (a) Octal to decimal and decimal to octal | | |
| | | (b) Octal to hexadecimal and hexadecimal to octal | | |
| | | (c) Binary to decimal and decimal to binary | | |
| | iii. | EX-OR gate | 2.5 marks | 5 |
| | | EX-NOR gate | 2.5 marks | |
| OR | iv. | Full adder with | | 5 |
| | | Truth table | 1.5 marks | |
| | | Boolean expression | 1.5 marks | |
| | | Logic diagram and application | 2 marks | |
