Jharkhand University of Technology, Ranchi

B.Tech. 1st Semester Examination, 2018

Subject : Basic Elect. Engg. **Subject Code : 18109**

Time Allowed : 3 Hours **Full Marks : 70**

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer any five *questions.*

1. Choose the correct answer: 2×7=14

(i) For a given circuit, four heating coils will produce maximum heat, when connected in

(a) all in parallel

(b) all in series

(c) with two parallel pairs in series

(d) one pair in parallel with the other two in series

(ii) For a given sinusoidal signal waveform, the

(a) RMS value < Average value

(b) RMS value > Average value

(c) RMS value = Average value

(d) All of above is correct as per condition given

(iii) For a RLC series circuit, when resonance occurs, the power factor will be

(a) 0

(b) 0·5

(c) infinity

(d) 1

(iv) In a star connected system, the line voltage is

(a) greater than phase voltage.

(b) less than phase voltage.

(c) equal to the phase voltage.

(d) None of the above

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(v) The synchronous speed is given as

(a) $Ns = \frac{120f}{P}$

(b) $Ns = \frac{120P}{f}$

(c) $Ns = \frac{60P}{f}$ (2)

(d) $Ns = \frac{120}{Pf}$

(vi) For conducting the short circuit test of a transformer, the

(a) low voltage side is short circuited.

(b) open voltage side is short circuited.

(c) low voltage side is given supply. (2)

(d) applied voltage is as rated voltage.

(vii) DC Buck converters are used for

(a) enhance the voltage.

(b) lower the voltage. (2)

(c) equal the voltage.

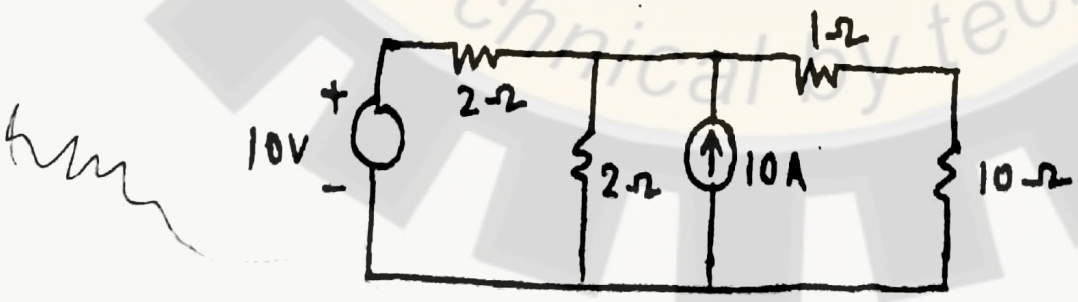
(d) All of the above

Or,

(a) State and explain Thevenin's Theorem. Enumerate its application.

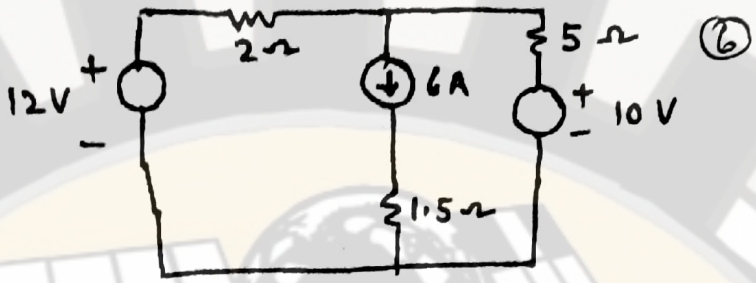
(b) Determine the current in 10Ω resistor using Thevenin's theorem for the following network.

6+8=14



2. (a) State and Explain Supperposition theorem. (5)

(b) Determine the current in 2Ω resistor in the given circuit using superposition. 6+8=14



(6)

3. (a) Define Real power, Reactive power and Apparent power. (3)

(b) In a given R-L Circuit, R = 35Ω, L=0·1H. If a 50Hz frequency, voltage V = 220 ∠30° is applied across the circuit, find (i) current through the circuit (ii) Power factor. (8)

(c) Explain about 3-ϕ balanced and unbalanced supply and load. (3) 3+8+3=14

4. (a) Describe the operating principle of a single phase transformer with neat sketch and governing equations.

(b) A single phase 3300/400 V transformer has the following winding resistances and reactances

$R_1 = 0{\cdot}7\Omega$ $R_2 = 0{\cdot}011\Omega$

$X_1 = 3{\cdot}6\Omega$ $X_2 = 0{\cdot}040\Omega$

The secondary is connected to a coil having a resistance of 4·5Ω and inductive of 3·2Ω. Calculate the secondary terminal voltage and the power consumed by the coil. 7+7=14

5. (a) Describe the construction and working of a 3-ϕ Induction motor. (6)

(b) A 3-ϕ 50-Hz, Induction motor has 4 poles and operates with a slip of 4% at a certain load. Determine:

(i) Speed of rotor w.r. to stator.

(ii) Frequency of rotor current. (6)

(iii) Speed of rotor magnetic field w.r. to rator.

(iv) Speed of rotor magnetic field w.r. to stator magnetic field. 6+8=14

6. (a) Define Duty ratio.

(b) Explain the working of a DC boost converter.

(c) What is the necessity of power factor improvement?

(d) Why earthing is used?

(e) Define slip of 3-ϕ induction motor. 2+5+3+2+2=14

7. Write short notes on *any three* of the following:

(a) Torque-Slip characteristic of 3-phase induction motor (5)

(b) Time domain analysis of R-C circuit

(c) Auto transformer (5)

(d) Open circuit and short circuit test transformer (5)

(e) Speed control of DC motor 4+5+5=14
