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Paper Id: 120101 Roll No:

BTECH
(SEM I) THEORY EXAMINATION 2018-19
BASIC ELECTRICAL ENGINEERING

Time: 3 Hours *Total Marks:100*

Note: 1.The question paper contains three sections- A, B & C.
2. Read the instructions carefully in each section
3. Course outcome(CO) has been mentioned against each question.

SECTION-A

1. Attempt ALL: [2x10=20]

a. Define with examples: (i) Active and passive element (ii) bilateral and unilateral elements. (CO 1)
b. Explain (i) Ideal current source (ii) ideal voltage source. (CO 1)
c. A series circuit has R= 10Ω, L= 0.02H and C= 2μF. Calculate Q-factor of the circuit. (CO 2)
d. Two ac currents one represented as $i_1 = 25 \sin(314 t + 20^0)$ & $i_2 = 35 \sin(314 t + 45^0)$. Draw the phasor & show the resultant when they are connected in parallel. (CO 2)
e. What will happen if the primary of a transformer is connected to dc supply? (CO 3)
f. How can we change the direction of rotation of DC motor? (CO 4)
g. Enlist the various methods of starting of single phase induction motor? (CO 4)
h. Why Earth pin is made thicker and bigger than line and neutral? (CO 5)
i. What are the advantages of auto-transformer over two winding transformer? (CO 4)
j. Calculate the energy consumption per day in a house using 5 CFLs of 20 W each, 3 fans of 60 W each for 3 hrs a day. (CO 5)

SECTION- B

2. Attempt any three parts of the following. Each part carries 10 marks. [3x10=30]

(a) Find current through 2Ω resistance using superposition theorem in figure 1 (CO1)

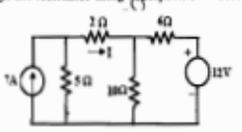


Figure 1

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(b) Derive expression of resonance frequency for series RLC circuit. A series circuit consists of a resistance of 10Ω, and inductance of 50mH and a variable capacitance in series across a 100V, 50Hz supply. Calculate-

(i) The value of capacitance to produce resonance.
(ii) Voltage across the capacitance.
(iii) Q-factor (CO2)

(c) The maximum efficiency of a 100 KVA, 1100/440 V, 50 Hz transformer is 96%. This occurs at 75% of full load at 0.8 p.f. lagging. Find the efficiency of transformer at 3.4 FL at 0.6 p.f. leading. (CO3)

(d) A 4-pole shunt generator with lap-connected armature has field and armature resistance of 50Ω and 0.1Ω respectively. If supplying power to 100W lamp load for 100 V. Calculate the armature current and the generated emf. Consider a contact drop of 1V per brush. (CO4)

(e) Draw the characteristics of battery.
Calculate the backup of battery of 100AH connected to load of 100 watts and supply voltage is 12V. (CO5)

SECTION- C

3. Attempt any ONE question: [10X1=10]

(a)Give the statement of Norton's Theorem. (CO 1)

Find the current in 12 ohm resistance using Norton's theorem for the given circuit.

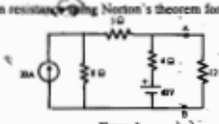


Figure 3

(b) Determine current through 15 ohm resistance by mesh analysis. (CO 1)

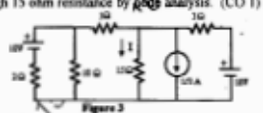


Figure 3

4. Attempt any ONE question: [10X1=10]

(a)Derive the expression for resonant frequency & quality factor for an ac circuit under the condition of parallel resonance. (CO 2)

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(b)Derive the relation between line current & phase current in case of three phase delta connected balanced load. Three identical coils of resistance 8Ω and inductive reactance 6Ω are connected in delta across 400V mains. Determine power, power factor and line current. Draw phasor diagram. (CO 2)

5. Attempt any ONE question: [10X1=10]

(a) Discuss the principle of operation of a single phase transformer. Derive EMF equation for a single phase transformer. (CO 3)

(b) What is voltage Regulation in a single Phase Transformer? What should be its value for an ideal transformer? (CO 3)

6. Attempt any ONE question: [10X1=10]

(a) Derive the EMF equation of D.C. Generator. An 8 pole lap wound dc generator has 450 armature turns. It operates at 0.02 wb flux per pole and runs at 1000 rpm at no load. Find the emf induced by it. (CO 4)

(b)What is the relation between frequencies of stator & rotor currents? A 3-phase, 50Hz induction motor has 6 poles and operates with a slip of 5% at a certain load. Determine

(i) The speed of rotor with respect to the stator.

(ii) The frequency of the rotor current.

(iii) The speed of the rotor magnetic field with respect to the stator. (CO 4)

7. Attempt any ONE question: [10X1=10]

(a)Write short notes on the following: (CO 5)

(i) MCB (ii) MCCB (c) Fuse (d) Types of wires

(b) Explain following: (CO 5)

(i) Need of Earthing

(ii)Battery backup

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