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BIEE-001

BTCSVI / BTECVI / BTELVI

Term-End Examination

00696

June, 2015

BIEE-001 : BASICS OF ELECTRICAL ENGINEERING

Time : 3 hours *Maximum Marks : 70*

Note : *Answer **five** questions in all. Question number 1 is **compulsory**.*

1. State whether the following statements are *True* or *False* : *10×1=10*

(a) In parallel combination, the equivalent resistance is less than the least among the resistors.

(b) Norton's theorem reduces a given complicated network to a simple parallel circuit.

(c) Reluctance in a magnetic circuit is analogous to resistance in an electric circuit.

(d) As compared to constant current method of charging a cell, the constant voltage charging method takes much longer time.

(e) The direction of the e.m.f. induced in a conductor is given by Fleming's left-hand rule.

(f) Mutual induction between the coils is dependent on the number of turns of both coils.

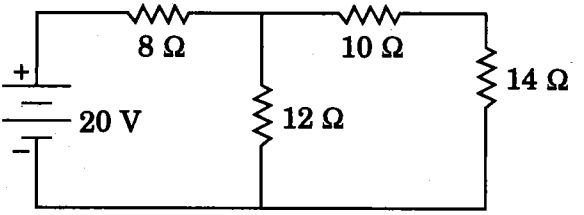
(g) Hysteresis loss cannot occur in non-magnetic materials.

(h) The power factor of the RLC circuit varies between zero and unity, lag or lead.

(i) The unit of admittance, conductance and susceptance is Siemens.

(j) Two-wattmeter method gives true power in a 3-phase system only if it is balanced.

2. (a) Using Norton's theorem, determine the current in the 12 Ω resistor in the following network. *7*



(b) State and explain Kirchhoff's current and voltage laws. *8*

3. (a) Distinguish between primary and secondary cells. *7*

(b) Explain the construction and working of a lead acid storage battery. *8*

4. (a) Derive an expression for the field strength at the centre of a long solenoid of 'N' turns having a length of 'l' metres and carrying a current 'I' amperes. *7*

(b) Define the terms m.m.f., magnetic flux and magnetic reluctance and establish the relation which holds between these quantities for a magnetic circuit. *8*

5. (a) Two air-cooled coils are placed close to each other so that 80% of the flux of one coil links with the other. Each coil has a mean diameter of 2 cm and a mean length of 50 cm. If there are 1800 turns of wire on one coil, calculate the number of turns on the other coil to give a mutual inductance of 15 mH. *7*

(b) State and explain Faraday's law of electromagnetic induction. *8*

6. (a) Explain why the series resonant circuit is often regarded as the acceptor circuit and the parallel circuit as the rejector circuit. *7*

(b) A coil of resistance 10 Ω and inductance 0·1 H is connected in series with a condenser of capacitance 150 μF across a 200 V, 50 Hz supply. Determine (i) impedance, (ii) current, (iii) power factor and (iv) voltage across the coil. *8*

7. (a) Develop an expression for the total power in a balanced 3-phase load. 7

(b) Three similar coils each having a resistance of 15 Ω and an inductance of 0·04 Henry are connected in star to a 3-phase 50 Hz supply, 200 volts between lines. Calculate the current. If they are now connected in delta, calculate the phase current, line current and the total power absorbed in each phase. 8

8. Write short notes on any ***two*** of the following : $2 \times 7\frac{1}{2} = 15$

(a) Advantages of 3-phase system over 1-phase system

(b) Lenz's law

(c) Superposition theorem

(d) Rise and decay of current in RC circuits