

**B. E. (First Semester) (CGPA)
EXAMINATION, 2011-12**

(Computer Science & Engg.)

BASIC ELECTRICAL ENGINEERING

(CS-103)

Time : Three Hours

Maximum Marks : 60

Note : Attempt all questions. Answers to all parts of a question should be given in sequence.

1. Choose the correct answer. 10
- (i) Which torque does not act on the moving system, when an indicating instrument shows steady non-zero reading ?
- (a) Deflecting torque
 - (b) Controlling torque
 - (c) Restraining torque
 - (d) Damping torque
- (ii) The no. of parallel paths in armature winding of a 4 P lap connected d.c. machine having 40 coil sides is :
- (a) 40

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(b) 20

(c) 4

(d) 2

(iii) Which one is true for a three-phase induction motor ?

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

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

(c) $f = \frac{PN_s}{120}$

(d) $f = 120 \frac{N_s}{P}$

(iv) A parallel resonant circuit magnifies :

- (a) Voltage
- (b) Current
- (c) Both (a) and (b)
- (d) None of these

(v) In a series RLC circuit, the inductive reactance is 10Ω and capacitive reactance is 15Ω . Total reactance in the circuit is :

- (a) 25Ω
- (b) 18.03Ω
- (c) 5Ω
- (d) 1.5Ω

(vi) The power consumed by a pure inductance connected to an a. c. source is :

- (a) zero

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- (b) very low
 - (c) very high
 - (d) infinite
- (vii) An air gap is inserted in a magnetic circuit to :
- (a) Prevent saturation
 - (b) Increase flux
 - (c) Increase mmf
 - (d) Decrease flux
- (viii) The internal resistance of an ideal voltage source is :
- (a) Infinity
 - (b) Zero
 - (c) 10Ω
 - (d) 100Ω
- (ix) The no load current in a transformer is about% of full load current.
- (a) 10 to 20
 - (b) 30 to 50
 - (c) 2 to 6
 - (d) 80
- (x) The readings of measuring instruments in open circuit test are taken at :
- (a) rated voltage
 - (b) rated current
 - (c) rated power
 - (d) any time

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2. (a) Calculate the current i_1 in fig. 1, using mesh analysis.

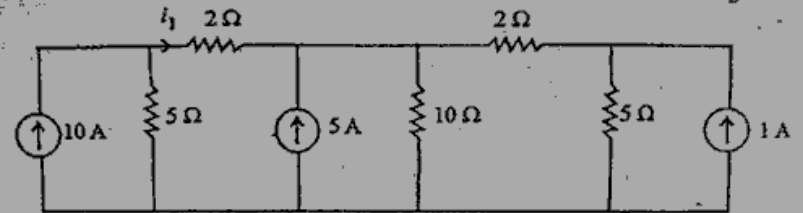


Fig. 1

(b) State and prove Norton's theorem with the use of a simple example.

Or

(a) Find power loss in 4Ω resistor using superposition method (Refer fig. 2).

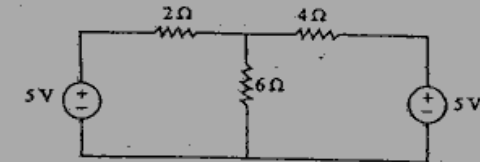


Fig. 2

(b) Find the current drawn from the source and each resistor of fig. 3, using star-delta transformation. Take $R_1 = 300 \Omega$, $R_2 = 100 \Omega$.

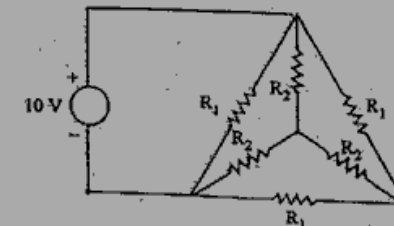


Fig. 3

3. (a) An iron ring with a mean length of magnetic path of 20 cm has an air gap 1 mm long. A current of 1 A in a coil of 440 turns wound uniformly over the ring produces a flux density of $16\pi \times 10^{-3}$ T. Neglecting leakage and fringing, determine relative permeability of iron. 5
- (b) Derive an expression for equivalent inductance of two coupled coils connected in parallel such that their fluxes oppose each other. 5

Or

- (a) State Lenz's law. Show using an example, that the Lenz's law and Fleming's right hand rule, give the same direction of induced emf in a circuit. 5
- (b) Two similar coils have a coupling coefficient of 0.25. When they are connected in series, the total inductance is 80 mH. Calculate self inductance of each coil. Also calculate the total inductance when coils are differentially connected in series. 5
4. (a) What is an impedance triangle? Draw the impedance triangle for series RL circuit and series RC circuit. 5
- (b) The circuit shown in Fig. 4 operates at a frequency of 50 Hz. Determine the value of C such that the input voltage V and input current I are in same phase. 5

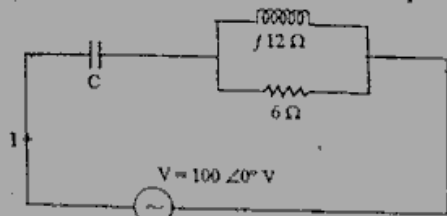


Fig. 5

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Or

- (a) Draw the phasor diagrams for (i) pure resistive (ii) pure inductive (iii) RLC series circuit, giving various current, voltage and power equations for each. 5
- (b) A balanced delta connected 3- ϕ load is fed from a 3- ϕ , 400 V supply. The line current is 20 A and total power absorbed by load is 10 kW. Calculate : 5
- Impedance in each branch
 - Power factor
 - Total power consumed, if connected in delta
5. (a) What are the essential components of an indicating instrument? Explain with the help of suitable diagram. 5
- (b) Describe the operating principle of a dynamometer type instrument. 5

Or

- (a) Explain, why control mechanism is provided in an indicating instrument. 5
- (b) Explain the construction and working of permanent magnet moving coil instrument. 5
6. (a) Derive an expression for induced emf in an alternator. 5
- (b) Give the constructional differences between a core type and a shell type transformer. 5

Or

- (a) Explain the principle of working of a d. c. generator. Name the main parts of the d. c. machine. 5

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(b) A 1-phase transformer has 100 turns on the primary winding and 400 turns on the secondary winding. The net cross-sectional area of the core is 250 cm^2 . If the primary winding is connected to a 50 Hz, 230 V supply. Calculate :

5

- (i) emf induced in the secondary winding
- (ii) maximum flux density in the core.