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Total No. of Questions : 6]

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**B.E. IInd Semester (CGPA)
Examination, 2017**

EF-317

CIVIL ENGG.

(Basic Electrical and Electronics Engg.)

Paper : CE-203

Time : 3 Hours]

[Maximum Marks : 60

Note :- Attempt all questions. Use of scientific calculator is allowed.

1. Choose the correct answer :

- (i) A current of 10A is flowing through a circuit. The power factor is 0.5 lagging. The instantaneous value of current can be written as :

- $\frac{\sqrt{2}}{2}$ (a) $i = 10 \sin 60^\circ \text{ A}$
(b) $i = 10 \sin (\omega t - 30^\circ) \text{ A}$
(c) $i = 14.14 \sin (\omega t - 60^\circ) \text{ A}$
(d) $i = 14.14 \sin (\omega t + 60^\circ) \text{ A}$

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(1)

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- (ii) In an R-L series circuit, the power factor of the circuit is increased if :

- (a) X_L , inductive reactance is increased
(b) X_L , inductive reactance is decreased
(c) R, resistance is decreased
(d) Supply frequency is increased

- (iii) Energy needed to establish an alternating current I in a coil of self-inductance L is :

- (a) $L \frac{dI}{dt}$ (b) $\frac{1}{2} LI^2$
(c) $\frac{1}{2} IL^2$ (d) Zero

- (iv) For a 6 pole wave wound dc generator the number of brushes will be :

- (a) 12 (b) 6
(c) 4 (d) 2

- (v) For a series motor , if T_a be the torque and I_a the armature current, then which relation is valid for conditions before saturation ?

- (a) $T_a \propto I_a$ (b) $T_a \propto I_a^2$
(c) $T_a \propto \frac{1}{I_a}$ (d) $T_a \propto \frac{1}{(I_a)^2}$

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(2)

(vi) Copper loss in a transformer occurs in :

- (a) Core (b) Winding
- (c) Main body (d) Bushings

(vii) The maximum load that a power transformer can carry is limited by its :

- (a) Voltage ratio
- (b) Copper loss
- (c) Temperature rise
- (d) dielectric strength of oil

(viii) Which of the following is not the unit of energy ?

- (a) kWh (b) Joules/sec
- (c) Watt-hr (d) Joules

(ix) The nature of emf induced in armature coils of dc machine is :

- (a) dc (b) ac
- (c) Pulsating dc (d) Variable dc

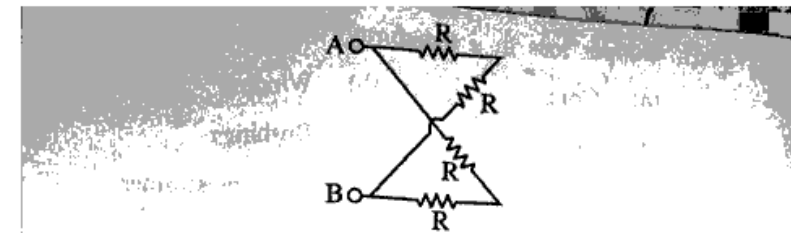
(x) What is the equivalent resistance between terminals A and B ?

- (a) $R/4$ (b) $R/2$
- (c) $4R$ (d) R $1 \times 10 = 10$

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(3)

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2. (a) Calculate the current flowing through the 2Ω resistor connected across terminals A and B in the network shown by applying nodal voltage analysis in Fig. 1.

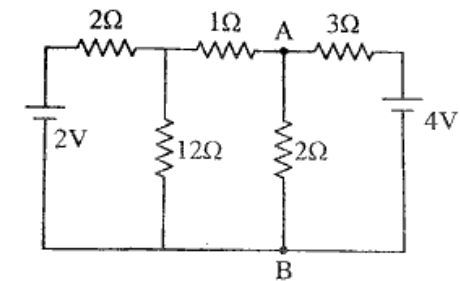


Fig. 1.

(b) State and explain superposition theorem applied to electrical network.

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Or

(a) Obtain Norton's equivalent circuit for the active linear network shown in Fig. 2.

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(4)

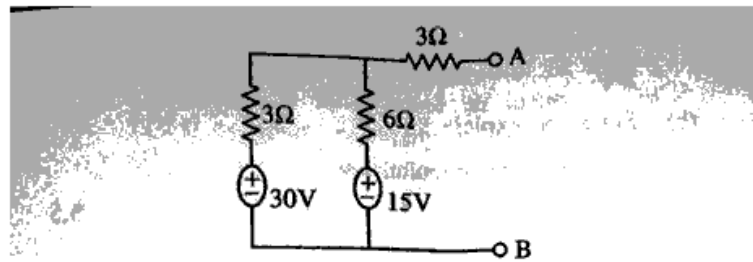


Fig. 2.

- (b) State Millman's theorem. Calculate voltage developed across $10\ \Omega$ resistor in the network of Fig. 3.

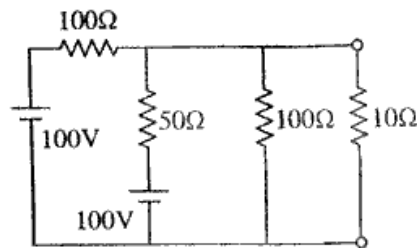


Fig. 3.

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3. (a) An iron ring of mean length of an iron path of 100 cm and uniform cross-section of 10 cm^2 is wound with two magnetising coils. The direction of current flowing through the two coils are such that they produce flux in opposite directions. The permeability of iron is 2000. There is a cut in the ring creating an air gap

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of 1 mm. Calculate flux availability in the air gap.

- (b) State and explain :

- (i) Amperes circuital law
(ii) Lenz's law

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Or

- (a) Two coils A and B of 600 and 100 turns respectively are wound uniformly around a wooden ring of mean circumference of 80 cm. The cross-sectional area of the ring is 4 cm^2 . Calculate :

- (i) Self-inductance of each coil,
(ii) Mutual inductance between the coils,
(iii) emf induced in coil B, when current of 2A in coil A is reversed in 0.01 sec.

- (b) Define and explain the terms :

- (i) mmf (ii) reluctance
(iii) permeance (iv) flux density
(v) fringing

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4. (a) Calculate rms value, average value, form factor and peak factor for a half wave rectified alternating current $i = I_m \sin\theta$.

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(6)

- (b) A circuit consists of a resistance of 12 ohm, a capacitance of 320HF and an inductance of 0.08H in series. A supply of 240V, 50Hz is applied across it, calculate :

- (i) Current in the coil
- (ii) Voltage drop in each element and
- (iii) Frequency at which current would have unity power factor.

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Or

- (a) Describe the two wattmeter method of calculating three phase power and power factor.
- (b) Two impedances $(14 + j5)\Omega$ and $(18 + j10)\Omega$ are connected in parallel across a 200V, 50Hz supply. Determine admittance of each branch and entire circuit, the total current, power and power factor of circuit.

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5. (a) A 15KVA, 2200/220V, 50Hz, single phase transformer gave the following test results :

O.C. test(LV side) – 220V, 2.72A, 185W

S.C. test(HV side) – 112V, 6.3A, 197W

Compute :

- (i) Core loss
- (ii) Culoss
- (iii) Efficiency and
- (iv) Voltage regulation at 0.8 pf lagging

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- (b) Discuss the difference between core type and shell type of construction of a single phase transformer.

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Or

- (a) Derive the emf equation of a single phase transformer.
 - (b) What is an autotransformer ? Explain the construction and copper saving in an auto-transformer.
- 5,5
6. (a) A 110V, dc shunt generator delivers a load of 50A. The armature resistance is 0.2Ω and field resistance is 55Ω . The generator is driven at 1800 rpm, with 6 poles having 360 conductors connected in lap winding calculate :
- (i) No load voltage
 - (ii) Flux per pole
- (b) Explain with real sketch, the construction of a dc machine.

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Or

- (a) Why starter is required in dc motor ? Explain three point starter.
- (b) Explain the speed-current, torque-current and speed-torque characteristics of dc series motor.

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(8)