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B.Tech
(SEM I) THEORY EXAMINATION 2017-18
BASIC ELECTRICAL ENGINEERING

Time: 3 Hours

Total Marks: 70

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief.

2 x 7 = 14

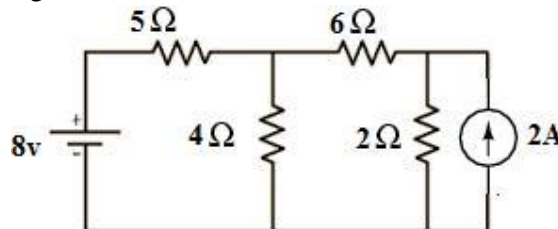
- a. Explain (i) Ideal current source (ii) Practical Voltage source
- b. A three phase connected balanced load is connected by 400V ,50 Hz 3 phase supply. the impedance of each phase is 10 ohm. Find the total three phase power .
- c. Define :
 (i) Active and passive element (ii) bilateral and unilateral elements
- d. Why series resonant circuit is known as acceptor circuit & parallel resonant circuit as rejecter circuit?
- e. Why transformer is not used on DC?
- f. What is the power factor of a circuit having impedance of $3+j4$ ohms ?
- g. Explain the term slip and slip speed.

SECTION B

2. Attempt any three of the following:

7 x 3 = 21

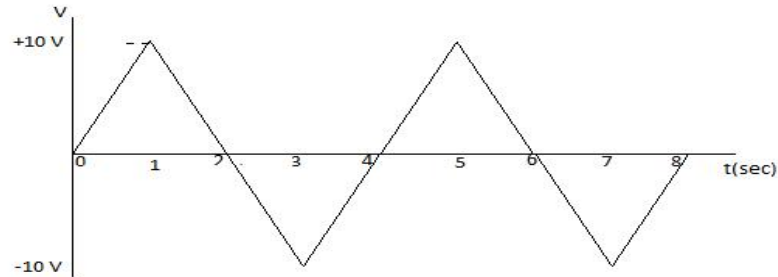
- a. Determine current in 4 ohm resistor by using mesh analysis in the circuit shown in figure below.



- b. Derive the expression of Bandwidth of a series RLC circuit. Explain the relationship between bandwidth and quality factor.
- c. Derive the relation for power factor using two wattmeter method with proper phasor diagram and show that the reading of two wattmeter measure three phase power.
- d. A 25 KVA, 2000/200V transformer has full load copper & iron losses are 1.8 KW & 1.5 KW respectively. Find (i)The efficiency at half the rated KVA & at unity power factor (ii)The efficiency at full load & at 0.8 power factor lagging.(iii)KVA load for maximum efficiency & value of maximum efficiency.
- e. Draw and discuss the construction and principle of operation of a D.C. motor and also give some of its applications.

SECTION C

3. Attempt any one part of the following: 7 x 1 = 7
- (a) Calculate average value, rms value, form factor and peak factor of the following waveform shown in figure



- (b) Derive the relation for star to delta and delta to star transformation.
4. Attempt any one part of the following: 7 x 1 = 7
- a) Explain the concept of phasors. Derive the phasor relationship between voltage and current phasors for purely inductive, purely capacitive and purely resistive circuits.
- b) A non inductive resistance of 10 ohm is connected in series with an inductive coil across 200 V, 50 Hz ac supply. The current drawn by the series combination is 10 Amp. The resistance of coil is 2 ohms. Determine: (i) Inductance of the coil (ii) Power factor (iii) Voltage across the coil.
5. Attempt any two parts of the following: 3.5 x 2 = 7
- (a) Explain the causes of low power factor. How can it be improved?
- (b) Three similar coils of impedance $Z = (8 + j6)$ are connected in delta & supplied from 3, 400V, 50 Hz supply. Find line current, power factor, total active power, total reactive power, total volt amperes.
- (c) A moving coil ammeter has a full scale deflection of $15 \mu\text{A}$ and a coil resistance of 75Ω . Find the value of the shunt resistance required for the instrument to be converted to read a full scale reading of 1 amp.
6. Attempt any two part of the following: 3.5 x 2 = 7
- (a) Give the analogy between electric circuit and magnetic circuit.
- (b) An iron ring 10 cm mean diameter is made of round iron rod 1.5 cm in diameter of relative permeability 900 and has an air gap of 5 mm in length. It has a winding of 400 turns. If the current through winding is 3.4 amp. Determine (a) MMF (b) Total reluctance of the circuit (c) flux in the ring (d) flux density in the ring
- (c) Explain working of a single phase transformer and also derive the condition for maximum efficiency in the transformer.

7. Attempt any one part of the following:

7 x 1 = 7

- (a) Draw torque slip characteristic of 3 phase induction motor. A 12 pole alternator is coupled to an engine running at 500 rpm. It supplies a 3 phase induction motor having full load speed at 1440 rpm. Find % slip and number of poles of the motor.
- (b) Give the E.M.F. equation of a D.C. generator and draw the characteristics of a D.C. series motor. A 25kw, 250V, dc shunt generator has armature and field resistances of 0.06ohm and 100ohm respectively. Determine the total armature power developed.