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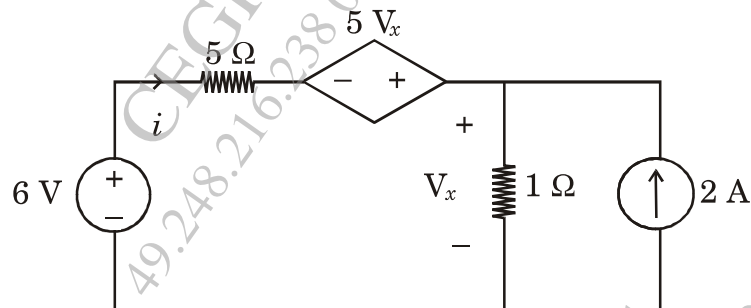
S.E. (E & TC and Electronics) (I Semester) EXAMINATION, 2017
ELECTRICAL CIRCUITS AND MACHINES
(2015 PATTERN)

Time : Two Hours

Maximum Marks : 50

- N.B. :—** (i) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
(ii) Figures to the right indicate full marks.
(iii) Neat diagrams must be drawn wherever necessary.
(iv) Use of non-programmable electronic pocket calculator is allowed.
(v) Assume suitable data if necessary.

1. (a) Using superposition theorem, calculate current ' i ' for the circuit shown in the following fig. [6]



- (b) Derive the e.m.f. equation of a single phase transformer. [6]

Or

2. (a) The equivalent circuit of 20 kVA, 2500 V/250 V, 50 Hz. single phase transformer gave the following test results : [6]
O.C. Test (L.V. Side) : 250 V, 1.4 A, 105 W
S.C. Test (H.V. Side) : 104 V, 8 A, 320 W
Calculate the parameters of approximate equivalent circuit.

P.T.O.

- (b) State and explain Thevenin's theorem and Norton's theorem.[6]
3. (a) A 200V, 4 pole, lap wound, d.c. shunt motor has 800 conductors on its armature. The resistance of the armature winding is 0.5Ω and that of shunt field winding is 200Ω . The motor takes a current of 21 A, the flux per pole is 30 mWb. Find the speed and the gross torque developed in the motor.[6]
- (b) Obtain the condition for maximum torque for 3 phase induction motor. State the equation for maximum torque. [6]
- Or*
4. (a) The power input to the rotor of a 400 V, 50 Hz, 6 pole, three-phase induction motor is 75 kW. Motor has 2 kW stator losses and mechanical losses 750 watts. If frequency of e.m.f. induced in the rotor circuit has 4 Hz, determine :
- (i) Slip of the motor
 - (ii) Rotor speed
 - (iii) Rotor copper loss per phase
 - (iv) Output of the motor
 - (v) Input of the motor
 - (vi) Efficiency of motor. [6]
- (b) Draw and explain the characteristics of d.c. series motor.[6]
5. (a) What are universal motors ? Explain torque-speed characteristic of compensated type and non-compensated type universal motor.[7]
- (b) Distinguish between brushless DC motor and Conventional DC motor. [6]
- Or*
6. (a) Explain construction, principle and applications of Reluctance motor. [7]
- (b) What are brushless motors and explain with neat diagram operation of unipolar brushless DC motor. [6]

7. (a) Compare Variable Reluctance and Permanent Magnet stepper motors. [7]
- (b) Explain the working and features of armature controlled d.c. servomotor. [6]

Or

8. (a) Explain the principle of operation of shaded pole induction motor along with the torque-slip characteristics and state its applications. [7]
- (b) What are stepper motors ? Explain any *one* type in detail.[6]