Total No. of Questions—**8**] [Total No. of Printed Pages—**3**

Seat No.	

[5252]-533

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**.

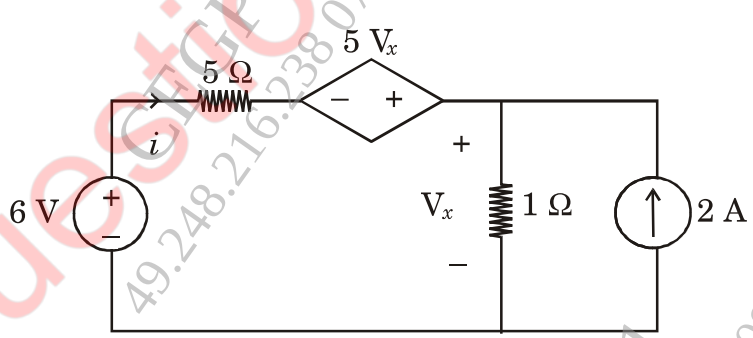
(*ii*) Figures to the right indicate full marks.

(*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 0.5 Ω and that of shunt field winding is 200 Ω. 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]