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

Seat
No.

[5352]-547

S.E. (ELECTRICAL) (II Sem.) EXAMINATION, 2018

ELECTRICAL MACHINES-I

(2015 COURSE)

Time : Two Hours　　　　　　　　　　**Maximum Marks : 50**

N.B. :— (*i*) Neat diagrams must be drawn wherever necessary.

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

(*iii*) Use of logarithmic tables side rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*iv*) Assume suitable data, if necessary.

(*v*) Solve Q. No. **1** or Q. No. **2**, Q. No. **3** or Q. No. **4**, Q. No. **5** or Q. No. **6**, Q. No. **7** or Q. No. **8**.

1. (*a*) With suitable circuit diagram explain OC, SC test on single-phase transformer. Explain how equivalent circuit parameters are obtained from these tests. [6]

(*b*) Explain VV connection of 3-phase transformer with suitable diagram. State its advantages. [6]

Or

2. (*a*) What is necessity of parallel operation ? State the conditions to be satisfied for parallel operation of transformers. [6]

(*b*) Develop equivalent circuit of transformer referred to primary side with usual notations. [6]

3. (*a*) Derive the torque equation of DC motor with usual notations. State the meaning of each notation used. [6]

(*b*) A 220 volt DC shunt motor takes 4 Amp at no load and runs at 720 rpm. Its armature resistance is 0.2 ohm and shunt field resistance is 110 ohm. Calculate the speed at full load if full load current is 50 Amp. The flux reduces by 5% on full load due to armature reaction. [6]

Or

4. (*a*) With suitable diagrams explain armature reaction in DC machine.[6]

(*b*) Draw a neat sketch of 3-point starter used for DC shunt motor. Explain its construction and working. [6]

5. (*a*) Draw torque-slip characteristics of 3-phase induction motor and explain it in detail. Clearly mark all important torque points on it. [6]

(*b*) A 12 pole 3-phase induction motor has rotor resistance per phase of 1 ohm and standstill reactance of 3 ohm per phase. The standstill emf between sliprings is 100 volt. Calculate the rotor current per phase and rotor power factor when :

(*i*) Sliprings are short circuited.

(*ii*) When resistance of 3 ohm per phase is added in the rotor circuit. [6]

Or

6. (*a*) Draw power flow diagram of 3-phase induction motor. Write respective mathematical expressions for each stage. State which losses are constant and which losses are variable with reasoning. [6]

(*b*) Derive the condition for maximum torque under running condition for 3-phase induction motor with usual notations. [7]

7. (*a*) With suitable diagram explain the working of rotor resistance starter used for 3-phase induction motor. [7]

(*b*) Develop approximate equivalent circuit for 3-phase induction motor in steps. Write the assumptions made. [6]

Or

8. (*a*) With a suitable diagram explain DOL starter used for 3-phase induction motor. [7]

(*b*) Plot circle diagram of 3-phase induction motor. Indicate the following quantities in it :

(*i*) No load current

(*ii*) Full load power factor angle

(*iii*) Constant losses

(*iv*) Stator copper loss

(*v*) Torque line

(*vi*) Output line. [6]