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[5668]-157

S.E. (Electrical) (Second Semester) EXAMINATION, 2019

ELECTRICAL MACHINES—I

(2015 PATTERN)

Time : Two Hours

Maximum Marks : 50

N.B. :— (i) Attempt question Nos. 1 or 2, 3 or 4, 5 or 6, 7 or 8.

(ii) Figures to the right indicate full marks.

(iii) Draw neat sketch, wherever necessary.

1. (a) With neat circuit diagrams, explain open circuit and short circuit tests on a single phase transformer for finding the voltage regulation and efficiency. [6]

(b) With proper connection and phasor diagrams describe the different ways of connecting there phase transformers. [6]

Or

2. (a) O.C. and S.C. test is conducted on 200/400 V, 50 Hz single phase transformer gives reading as : [6]

O.C. Test: 200 V, 0.8 A, 80 W ... on L.V. Side,

S.C. Test: 15 V, 10 A, 100 W on H.V. Side,

P.T.O.

Find :

- (i) No load current components
 - (ii) Equivalent resistance and leakage reactance referred to primary side.
 - (b) With neat sketch and phasor diagram explain open delta or V-V connection of transformer. [6]
3. (a) Derive the torque equation of DC motor with usual notations. State the meaning of each notation used. [6]
- (b) A DC shunt motor working at 220 V takes a current of 4 Amp at no-load and runs at 720 rpm. The armature resistance is 0.2 ohm and shunt field resistance is 110 ohm. Calculate its speed at full load condition if full load current is 50 Amp. Assume that flux is reduced by 3% on full load condition due to armature reaction. [7]
- Or
4. (a) Draw and explain the torque armature current characteristics of D.C. series motor. [6]
- (b) Explain the process of commutation and its types in detail. [7]
5. (a) Draw power flow diagram of 3-phase induction motor. Write respective mathematical expressions for each stage. [6]
- (b) A 3-phase induction motor has synchronous speed of 250 rpm and slip of 4% at full load. The rotor has resistance of 0.02 ohm per phase and standstill reactance of 0.15 ohm per phase. Calculate :
- (i) Ratio of maximum torque to full load torque.
 - (ii) The speed at which maximum torque is developed. [7]

Or

6. (a) Sketch and explain the torque slip characteristics of a 3-phase induction motor. Show the starting torque; pull out torque, maximum torque at starting and full load operating region. [7]
- (b) Derive relationship between rotor input, rotor copper loss and gross mechanical power developed. [6]
7. (a) Develop approximate equivalent circuit for 3-phase induction motor in steps. Write the assumptions made. [6]
- (b) With a suitable diagram explain DOL starter used for 3-phase induction motor. [6]

Or

8. (a) With suitable diagram explain the working of rotor resistance starter used for 3-phase induction motor. [6]
- (b) Sketch and explain the circle diagram indicating full load current, output line, torque line, rotor Cu loss, stator Cu loss and fixed losses. [6]