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Question Paper Code : 80318

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Fourth Semester

Robotics and Automation Engineering

RO 8402 — ELECTRICAL MACHINES AND POWER SYSTEMS

(Regulation 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List out the two types of starters used for DC motors.
2. Name the different methods of electrical braking of D.C motors.
3. Give the E.M.F equation of a transformer and define each terms.
4. Why transformer are rated in kVA?
5. Mention the reason for constructing the cage rotor of induction motor slots slightly skewed.
6. How the slip of three phase induction motor can be measured?
7. What is synchronous capacitor?
8. List out the application of reluctance motor.
9. Mention the type (links) of HVDC systems.
10. List out the types of insulators in overhead lines.

PART B — (5 × 13 = 65 marks)

11. (a) Derive an E.M.F equation for both LAP and WAVE wound of a D.C Generator. (13)

Or

(b) With relevant sketches explain briefly the characteristics of D.C Series and Shunt motors. (13)

12. (a) Explain the step by step procedure to obtain the equivalent circuit of a transformer using open circuit and short circuit tests from laboratory setups. (13)

Or

(b) Elucidate star-star, delta-delta, star-delta and delta star connections of Primary and Secondary windings of three phase transformer with relevant diagrams. (13)

13. (a) Explain the speed control methods from stator side (by changing the applied voltage and by changing the applied frequency) and rotor side (by rotor rheostat control and by injecting emf from rotor circuit) of three phase induction motors. (13)

Or

(b) Explain the methods which makes single phase induction motor self-starting. Draw the schematic diagram of the arrangements, vector diagram and slip-torque characteristics and also its applications. (13)

14. (a) Derive the E.M.F equation of three phase alternator. (13)

Or

(b) Explain the principle of operation of Reluctance motor with relevant sketches. Also list out its applications. (13)

15. (a) With the relevant diagram explain the structure of electrical power systems. (13)

Or

(b) Compare the HVAC and HVDC transmission systems in terms of power generated per conductor, economy, fault level reliability and controllability. (13)

PART C — (1 × 15 = 15 marks)

16. (a) A DC shunt generator has a full load output of 10 kW at a terminal voltage of 240 V. The armature and the shunt field winding resistance are 0.6 and 160 ohms respectively. The sum of the mechanical and core-losses is 500 W. Calculate the power required in kW at the driving shaft at full load and the corresponding efficiency. (15)

Or

(b) A 30 kVA, 2400/120-V. 50-Hz transformer has a high voltage winding resistance of 0.1 ohm and a leakage reactance of 0.22 ohm. The low voltage winding resistance is 0.035 ohm and the leakage reactance is 0.012 ohm. Find the equivalent winding resistance, reactance and impedance referred to the

(i) high voltage side and

(ii) the low voltage side. (15)