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Question Paper Code : 21442

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Third Semester

Electronics and Communication Engineering

EC 2201/EC 32/EE 1204/080290008/10144 EC 302 – ELECTRICAL ENGINEERING

(Regulations 2008/2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the significant of counter emf?
2. Define armature reaction.
3. Why transformer rating in KVA?
4. Drive the expression for the voltage transformation ratio.
5. Draw the equivalent circuit of the induction motor.
6. Give the types of the induction motor.
7. Write the applications of the synchronous motor.
8. Write the emf and mmf equations of the synchronous motor.
9. What are the components of electric power system?
10. What are the types of insulators?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Discuss about the principle and operation of DC motor. (8)

(ii) A DC series motor drives a load, the torque of which varies as the square of the speed. Assuming the magnetic circuits to be remain unsaturated and the motor resistance to be negligible, estimate the percentage reduction in the motor terminal voltage which will reduce the motor speed to half the value it has on full voltage. What is then the percentage fall in the motor current and efficiency? (8)

Or

(b) (i) Explain about the Armature control method of DC shunt motor. (8)

(ii) A 6-pole, 500V wave connected shunt motor has 1200 armature conductors and useful flux per pole of 20 mWb. The armature and field resistance are 0.5 Ω and 250 Ω respectively. What will be the speed and torque developed by motor when it draws 20 amps from the supply mains? Neglect Armature reaction. If magnetic and mechanical losses amount to 900 W, find (1) useful torque (2) output in kW (3) Efficiency. (8)

12. (a) (i) Explain about construction details and working principle of transformer. (8)

(ii) A efficiency of 1000 KVA, 110/220V, 50hz, single phase transformer, is 98.5% at half full load at 0.8 power factor leading and 98.8% at full load unity power factor. Determine (1) Iron loss (2) Full load copper loss (3) Maximum Efficiency at unity power factor. (8)

Or

(b) (i) Drive the emf equations of the transformer. (8)

(ii) The equivalent circuit for a 200/400V step-up transformer has the following parameters referred to the low voltage side. Equivalent resistance = 0.15 Ω; Equivalent reactance = 0.37 Ω, Core loss component resistance = 600 Ω; Magnetizing reactance 300 Ω. When the transformer is supplying a load at 10A at a power factor of 0.8 lag, calculate (1) primary current (2) secondary terminal voltage. (8)

13. (a) (i) Explain about the construction and working operation of three phase induction motor. (8)

(ii) Draw the equivalent circuit and performance calculation of three phase induction motor. (8)

Or

(b) (i) Explain about principle and operation of single phase induction motor. (8)

(ii) A 3-phase 400V, star connected induction motor has a star connected rotor with a stator to rotor turn ratio of 6.5. The rotor resistance and standstill reactance per phase are 0.05 Ω and 0.25 Ω respectively. What should be the value of external resistance per phase to be inserted in the rotor circuit to obtain maximum torque at starting and what will be the rotor starting current with this resistance? (8)

14. (a) (i) The excitation of a 415V, 3 phase, mesh connected synchronous motor is such that the induced emf is 520V. The impedance per phase is $0.5+j4\,\Omega$. If the friction and iron losses are constant at 1000W, calculate power output, line current, power factor and efficiency for maximum power output. (8)

(ii) Explain about construction and working operation of synchronous motor. (8)

Or

(b) (i) Explain briefly about hysteresis motor and reluctance motor. (8)

(ii) Discuss about the types of stepper motor. (8)

15. (a) (i) With the neat sketch explain the structure of general transmission and distribution system. (8)

(ii) A generating station has a maximum demand of 25 MW. Load factor is 60%, plant capacity factor is 50% and plant use factor is 72%. Find the reverse capacity and daily energy produced. (8)

Or

(b) (i) Draw the schematic layout of EHVDC transmission system and explain. (8)

(ii) Explain briefly about insulators and cables. (8)