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Question Paper Code : 10287

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2012.

Third Semester

Electronics and Communication Engineering

EC 2201/131307/EC 32/EE 1204/10144 EC 302/080290008 –
ELECTRICAL ENGINEERING

(Regulation 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. What is the necessity of a starter for starting DC motor?
2. Draw the speed torque characteristics of DC shunt and series motors.
3. State the condition for maximum efficiency of transformer.
4. Transformer rating is referred in KVA. why?
5. Draw the equivalent circuit of a induction motor with respect to primary.
6. How the direction of rotation of a 3 phase induction motor could be reversed.
7. Mention the application of Hysteresis motor.
8. Define hunting.
9. Define load factor and capacity factor.
10. What are the advantages of grid formation in power system?

PART B — ($5 \times 16 = 80$ marks)

11. (a) (i) A 240 V DC shunt motor has an armature resistance of 0.5 Ω and field resistance of 120 Ω. This motor drives a constant torque load and takes an armature current of 22A at 850 rpm. If the motor speed is to be raised to 1000 rpm from 850 rpm. Find the resistance that must be inserted in the shunt field circuit. Assume magnetization curve to be straight line. (8)

(ii) Draw the schematic diagram of 3 point starter and explain its working principle. (8)

Or

(b) (i) A 4 pole DC motor runs at 600 rpm on full load and takes 25A, 450V the armature is lap wound with conductors and flux per pole is given by $\phi = (1.7 \times 10^{-2})I^{0.5}$ wb where I is the motor current. If the supply voltage and torque are halved, calculate the speed at which the motor will run. Neglect stray losses. (8)

(ii) Discuss various speed control techniques of DC machines. (8)

12. (a) A single phase 25 KVA, 50Hz 2200/220V single phase transformer has the following test results. O.C. test: 220V, 4.2A 148W on LV side S.C. test: 85V, 10.5A, 360W on HV side. Determine

(i) Regulation and efficiency at 0.8 p.f. lagging at full load, and

(ii) p.f. on short circuit. And Obtain the approximate equivalent circuit referred to HV side. (16)

Or

(b) The maximum efficiency of a single phase 11000/400V, 550kVA transformer is 97.5% and occurs at 80% full load unity power factor. The % impedance is 3.5% and the load power factor is varied while the load current and the supply voltage are held constant at their rated values. Determine the load power factor at which the secondary terminal voltage is minimum and find the value of the latter. (16)

13. (a) Describe various methods of speed control of 3 phase induction motor. (16)

Or

(b) (i) An induction motor has an efficiency of 0.9 when delivering an output of 37KW. At this load the stator copper loss and rotor copper loss each is equal to the iron loss. The mechanical losses are one third of the no load. Calculate the slip. (8)

(ii) The starting torque and maximum torque of a three phase induction motor are 140% and 220% of the full load torque. Neglecting stator resistance and assuming constant rotor resistance calculate

(1) Slip at maximum torque

(2) Full load slip

(3) Rotor current at starting in terms of full load current. (8)

14. (a) (i) A 6.6 kV star connected 3 phase synchronous motor works at constant voltage and constant excitation. Its synchronous reactance is 30 Ω per phase. Neglecting resistance When the input is 1000kw the power factor is 0.8 lagging. Find the power factor when the input is increased to 1400kw. (8)

(ii) Explain the construction and working principle of Hybrid stepper motor. (8)

Or

(b) (i) Describe the construction and working mechanism of reluctance motor. (8)

(ii) The efficiency of a three phase 400V star connected synchronous motor is 92% and it takes 22A at full load unity p.f. What will be the back e.m f. generated and total mechanical power developed in kW for full load and 0.8 p.f lagging? The impedance per phase is $(0.3 + j4)\ \Omega$. (8)

15. (a) (i) Compare the AC and DC transmission system. (8)

(ii) Draw the layout of Sub-station and explain its components. (8)

Or

(b) (i) Discuss the construction of different types of insulators. (8)

(ii) Draw the schematic diagram of power system network and describe the role of all the components. (8)