Exam.Code:0933
Sub. Code: 6971

1078

B.E. (Electrical and Electronics Engineering)
Third Semester
EE-301: Electric Machinery – I

Time allowed: 3 Hours Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Part. Missing data if any cab be appropriately assumed.

x-x-x

Q1. Explain briefly (10)

A) Why we perform polarity test on the transformers to be connected in parallel? (1)
B) In which situation a dc series motor cannot be used? Support your answer. (1)
C) Draw the labeled speed torque characteristics of series DC motor for three different external resistance values. (1)
D) Draw the practical equivalent circuit diagrams of a three phase transformer refer to the high voltage and low voltage side. (2)
E) Why we design the DC machine using lap and wave windings? (2)
F) What is the prime condition in the shaded pole induction motor operation? (1)
G) Define slip present in induction machine. Is it necessary for machine working? Write the range of the slip for any induction machine. (2)

Part A

Q2. A) A small industrial unit draws an average load of 100A at 0.8 power factor lagging from the secondaries of its 2000/200V, 60KVA Y/ Δ transformer bank. Find:
(i) The power consumed by the unit in KW, (ii) the total KVA used, (iii) the rated line currents available from the transformer bank, (iv) the rated transformer phase currents of the Δ-- secondaries, (v) percent of rated load on transformers, (vi) primary line and phase currents (vii) the kVA rating of each individual transformer. (05)

B) Write all types of losses present in transformer. Also explain the effect of frequency change on these losses of the transformer supported by the formulas. (05)

Q3. A) What is an autotransformer? Explain the construction and types of autotransformer in detail. (05)

B) Explain commutation process in detail with suitable diagrams. (05)

Q4. A) A 15KW, 250V, 1200 RPM shunt motor has 4 poles, 4 parallel armature paths, and 900 armature conductors; $R_a = 0.2\ \Omega$. At rated speed and rated output the armature current is 75 A and I_f = .5 A. calculate (i) the flux per pole, (ii) the torque developed, (iii) rotational losses, (iv) efficiency (v) the shaft load and (vi) if the shaft load remains fixed, but the field flux is reduced to 70% of its value by field control, determine the new operating speed. (05)

B) Explain the speed control methods applied to DC Shunt motor in detail with suitable diagrams. (05)

Part B

Q5. A) Explain the rotor e.m.f. injection method of speed control of induction motor. (05)

B) The active power input to a 415V, 50Hz, 6 pole, three phase induction motor running at 970 RPM is 41 KW. The input power factor is 0.9, the stator losses amount to 1.1KW and the mechanical losses total .2 KW. Calculate line current, slip, rotor copper loss, mechanical power output and efficiency. (05)

Q6. A) Explain the effect of slip on the following rotor parameters (i) frequency (ii) induced e.m.f. (iii) current (iv) power factor (v) reactance (vi) impedance. (05)

B) Explain rotor resistance speed control of induction motor. (05)

Q7. A) Draw and explain the equivalent circuit of a single phase induction motor based on Double revolving field theory. (05)

B) Explain why starting torque in capacitor start induction motor is more than resistance split phase induction motor with the help of diagrams? (05)