SECTION - C

Note : Attempt any two questions of the following. **(2×15=30)**

10. Write short notes on the following :

a) 3-ϕ to 2-ϕ connection of transformers.

b) 3-ϕ to 6-ϕ connection of transformers.

11. A 4-pole series wound fan motor draws an armature current of 50 Amps, when running at 2000 r.p.m on a 230 V d.c. supply with four field coils connected in series. The four field coils are then reconnected in two parallel groups of two coils in series. Assuming flux / pole to be proportional to the - exciting current and load torque proportional to the square of the speed. Find the new speed and armature current.

12. a) Discuss the following tests on d.c. machines -

i) Hopkinson's test.

ii) D.C. resistance test.

b) Discuss the following test on 1-ϕ transformers.

i) Sumpener's Back-to-back test.

ii) Polarity test.

EN - II

(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 2012374 Roll No.

B.TECH.

Regular Theory Examination (Odd Sem - III), 2016-17

EMEC - I

Time : 3 Hours *Max. Marks : 100*

SECTION - A

1. Attempt all parts of the followings : (10×2=20)

a) Write the energy balance equation for motor action and draw power flow diagram.

b) What is back-emf in a dc motar?

c) Define "reactance voltage" in commutation process.

d) What is the effect of frequency and supply voltage on iron losses?

e) What are the effects of armature reaction?

f) Differentiate between 'armature voltage control' and 'flux control' of dc shunt motor.

g) What is the need of tertiary winding in a 3-ϕ transformer?

h) Why short circuit test is performed on HV side of transformer?

i) What is the need of starter while starting the dc motor?

j) Define energy and co-energy.

SECTION - B

Attempt any Five questions of the followings

(5×10=50)

2. a) Derive an expression for Reluctance torque in a rotating electrical machine.

   b) Explain the various phenomenon happening in electro mechanical energy conversion in rotating electrical machines.

3. What are various losses that occur in d.c. machines? Also, derive the condition for maximum efficiency of a d.c. generator.

4. Draw the 'speed-torque characteristics' of d.c. shunt, series and compound motors. A 200 V shunt motor has Ra = 0.1 Ω, R_f = 240 Ω and rotational loss 236 W. On full-load the line current is 9.8 A with the motor running at 1450 r.p.m. Determine

   a) The mechanical power developed.

   b) The power output.

   c) The load torque.

   d) The full load efficiency.

5. Explain the procedure of O.C. and S.C. tests for a transformer. How different parameters of the transformer can be determined from theses tests?

6. A 500 kVA, 11/0.43 kV, 3-ϕ delta/star connected transformer has on rated load. The HV copper loss of 2.5 kW and the LV loss of 2 kW and the total leakage reactance of 0.06 per unit. Find the ohmic values of the equivalent resistance and leakage reactance on the delta side.

7. a) Derive the relationship between magnetic field energy and co-energy for a singly-excited system.

   b) Derive the emf equation for a dc generator.

8. Two single-phase furnaces 1 and 2 are supplied at 80 V by means of a Scott connected transformer combination fed by a 3-phase 6600 V system. The voltage of furnace 1 is leading. Calculate the line currents on the 3-phase side when the furnaces take 500 kW and 800 kW, respectively -

   a) At unity p.f.

   b) Furnace 1 at unity p.f. and furnace 2 at 0.7 p.f. (lagging).

9. What do you mean by "PARALLEL OPERATION of 3-ϕ TRANSFORMERS"? Discuss the advantages and disadvantages of parallel operation of 3-ϕ transformers.