Ref. No. :EX/PRN/PE/T/123/2017

B.E. PRINTING ENGINEERING FIRST YEAR SECOND SEMESTER - 2017

Subject: **ELECTRICAL TECHNOLOGY** Time: 3 hrs Full Marks: 100

Instructions : Answer Question no. 1 and any four from the rest.

1. Short answer type questions – 2 x 10 = 20

(a) Define hysteresis loss.

(b) What are the measures taken to minimize the eddy current loss in a transformer?

(c) Write the advantages of squirrel cage rotor over slip ring rotor.

(d) What is the value of slip when the rotor is at standstill condition?

(e) State the function of pole shoe.

(f) State the process called "Flashing the field".

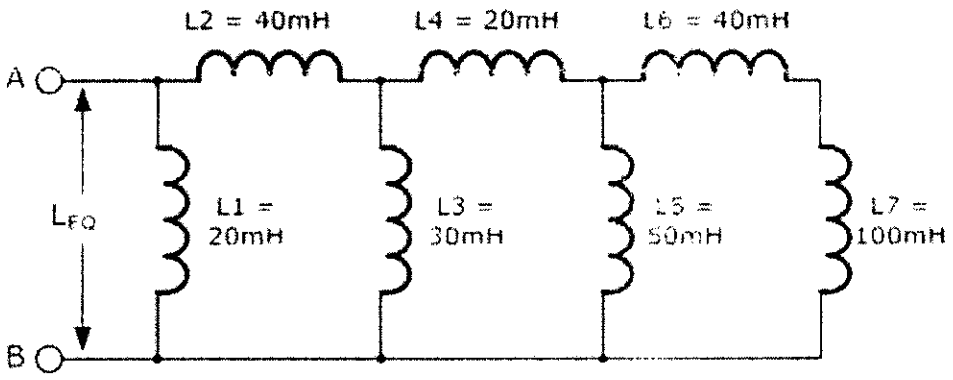
(g) Define transformation ratio of a transformer.

(h) State Lenz's law.

(i) Why dc series motor should always be in loaded condition at start up?

(j) What is the function of brush in a dc generator?

2. (a) Calculate the equivalent inductance of the following inductive circuit – 5



(b) Deduce the average value of a sinusoidal voltage waveform. 3

(c) A current wave is represented by i = 10 sin 377t. Find the (i) frequency, (ii) time period, (iii) maximum value, (iv) RMS value, (v) instantaneous value at, t = 0.05 second, of the waveform. 10

(d) Define Form Factor. 2

3. (a) Draw the phasor diagram of a R-L-C parallel circuit. 5

(b) Establish the relation between the line and phase voltage and current in delta connection of a three phase system through proper phasor diagram. 10

(c) In an a.c. circuit, containing pure inductance, the voltage applied is 110 V, 50 Hz while the current is 10 A. Find the value of inductive reactance and inductance. 5

4. (a) Derive the equivalent circuit of a transformer from the complete circuit model. 10

(b) A 125 kVA transformer having primary voltage of 2 kV at 50 Hz has 182 primary and 40 secondary turns. Neglecting losses, calculate (i) the full load primary and secondary currents, (ii) the no-load secondary induced e.m.f. and (iii) maximum flux in the core. 10

5. (a) Deduce the e.m.f. equation of a d.c. machine. 5

(b) Draw the no-load, internal and external characteristics of a separately excited dc machine. 5

(c) A 110 V dc shunt generator delivers a load current of 50A. The armature resistance is 0.2 ohm, and the field resistance is 55 ohm. The generator, rotating at a speed of 1800 rpm, has 6 poles, lap wound, and a total of 360conductors. Calculate the no-load voltage at the armature and the flux per pole. 10

6. (a) Draw and explain the torque speed characteristics of a dc series motor. 5

(b) Draw the connection diagrams of compound motors and also write down their corresponding emf equations. 3 + 3

(c) A 220 V dc series motor is running at a speed of 800 rpm and draws a current of 100A. Calculate at what speed the motor will run when developing half the torque. Total resistance of the armature and field is 0.1 ohm. Assume that the magnetic circuit is unsaturated. 9

7. (a) Write the principle of operation of a three phase induction motor. 5

(b) The frequency of the emf in the stator of a 4 pole induction motor is 50 Hz, and that in the rotor is 1.5Hz. What is the slip, and at what speed is the motor running? 5

(c) Write a short note on the production of rotating field in an induction motor. 10