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

PAPER ID : 2018 Roll No.

B.Tech

(SEM I) ODD SEMESTER THEORY EXAMINATION 2009-10
ELECTRICAL ENGINEERING

Time : 3 Hours] *[Total Marks : 100*

Note : *(i) Attempt all questions.*
(ii) All questions carry equal marks.
(iii) In case of numerical problems assume data wherever not provided.
(iv) Graph paper is required.

1 Attempt any **four** parts of the following : **5×4=20**

(a) Find the average and RMS values of a sinusoidal current.

(b) An iron choke coil draws 5 A when connected to 40 V dc supply and draws 8 A when connected to 80 V, 50 Hz ac supply. Calculate :

(i) The resistance and inductance of the coil

(ii) The power drawn

(iii) Power factor.

(c) Calculate total current and equivalent impedance for the circuit given in **Fig. 1.1**

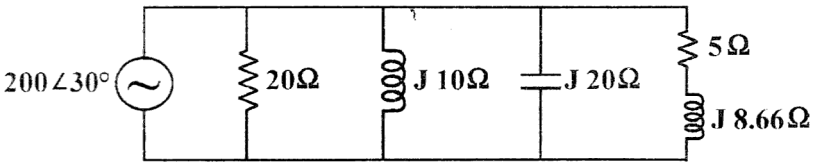

Fig. 1.1

(d) Explain series resonance in R-L-C circuit. Explain band-width and quality factor.

(e) An iron ring having a mean diameter of 25 cm and cross section area 2 cm^2 is uniformly wound with 400 turns and carries a current of 5 A. The permeability of iron is 450. Calculate (i) mmf (ii) reluctance (iii) flux (iv) flux density

(f) Give analogy between electric and magnetic circuits.

2 Attempt any **four** parts of the following : **5×4=20**

(a) State superposition theorem. Determine the current through 6Ω resistor using superposition theorem in **Fig. 2.1**.

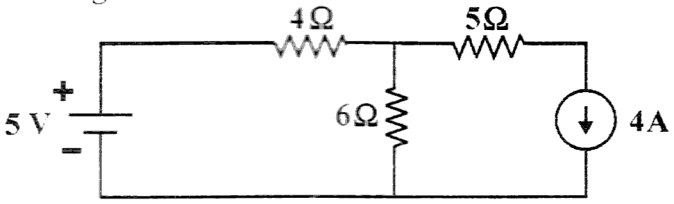

Fig. 2.1

(b) Explain nodal analysis and illustrate the application with reference to an electric circuit. State Thevenin's theorem.

(c) Determine Thevenin's equivalent circuit of the given network **Fig. 2.2.**

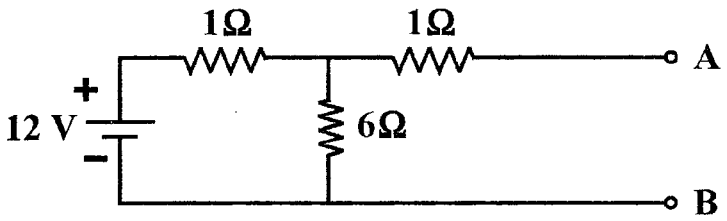

Fig. 2.2

(d) Define and explain maximum power transfer theorem.

(e) A moving coil ammeter has a resistance of **0.01 Ω** and full scale deflection current of 0.25 A. How this meter can be made to read (i) Voltage upto 250 V (ii) Current upto 20 A ?

(f) Explain the working principle of energy meter with a neat diagram.

3 Attempt any **two** parts of the following : **10×2=20**

(a) Prove for a delta connected system $I_L = \sqrt{3}\, I_{Ph}$ and $V_L = V_{Ph}$. Each phase of a delta connected load has a resistance of **25 Ω**, an inductance of 0.15 H and a capacitance of 120 μF. The load is connected across a 400 V, 50 Hz, 3-phase supply. Determine the (i) line current (ii) active power and (iii) reactive power.

(b) Explain the principle of operation of a transformer. Differentiate between shell type and core type of transformers. Draw labelled equivalent circuit of a single phase transformer.

(c) Explain short circuit test and open circuit test performed on single phase transformer.

4 Attempt any **two** parts of the following : **10×2=20**

(a) What are the conditions of voltage build up in dc shunt generator ? The magnetisation characteristic of a d.c. shunt generator at 800 rpm is given as :

$I_f(amp)$	0	0.2	0.40	0.65	1.02	1.75	3.15	5.00
$E_0(Volt)$	10	40	80	120	160	200	240	260

Determine :

(a) Critical field resistance

(b) No load voltage

(b) Describe armature resistance and field flux method of speed control for d.c. motors. A 400 V d.c. shunt motor takes 5 A at no load. Given $R_a = 0.5\,\Omega$ and $R_f = 200\,\Omega$. Calculate the efficiency when motor takes 40 A on full load.

(c) Differentiate between salient pole and cylindrical rotor alternator. Give the advantages of rotating field over stationary armature winding. Explain V-curve and give the applications of synchronous motor.

5 Attempt any **two** parts of the following : **10×2=20**

(a) Explain the principle of operation of 3 phase induction motor. Draw torque-slip characteristics and explain various operating regions.

(b) What are different starters used in 3 phase induction motors ? Describe any one of them.

(c) Why single phase induction motor is not self starting ? Explain any one method to start it.
