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

PAPER ID : 1117　Roll No. ☐☐☐☐☐☐☐☐☐☐

B.Tech.

(SEM. I) ODD SEMESTER THEORY
EXAMINATION 2013-14
ELECTRICAL ENGINEERING

Time : 3 Hours　　　　　　　　　　　*Total Marks : 100*

Note :– Attempt **all** Sections.

SECTION–A

1.　Attempt **all** parts :　　　　　　　　　　　(10×2=20)

　(a)　Define active and passive elements with example.

　(b)　Define form factor and peak factor.

　(c)　A series ckt has R = 10 Ω, L = 0.05 H, C = 10 μF. Calculate Q-factor of the ckt.

　(d)　What is the significance of back emf in dc motor ?

　(e)　Why dc series motor is never started on no load ?

　(f)　Draw approximate equivalent ckt of transformer referred to primary side.

　(g)　A 4-pole, 3-phase, 50 Hz, star connected Induction Motor has a full load slip of 4%. Calculate full load speed of motor.

　(h)　Define mmf, reluctance, flux in magnetic circuit.

　(i)　What are the applications of dc series and dc shunt motor ?

　(j)　Write an expression of hysteresis loss in a transformer. Why it decreases at higher frequencies with constant V ?

SECTION–B

2. Attempt any **three** parts :   (10×3=30)

(a) Derive emf equation for a single phase transformer. A 25 kVA, 2200/220 V, 50 Hz, 1-phase transformer has following parameters :

$R_1 = 1.75 \ \Omega$, $R_2 = 0.0045 \ \Omega$, $X_1 = 2.6 \ \Omega$, $X_2 = 0.0075 \ \Omega$.

Calculate :

(i) Equivalent resistance referred to primary and secondary.

(ii) Equivalent reactance referred to primary and secondary.

(b) Derive an expression for torque in dc motor. Draw the load characteristics of dc series and shunt motor.

(c) Define series resonance and resonant frequency. Why in series ckt voltage across L and C is very high ? Draw resonance curve.

(d) Explain two wattmeter method to measure three phase power. If in a two wattmeter method, readings of two wattmeters are 1200 W and 300 W. Find the power factor of the load.

(e) Describe the working principle and construction of single phase energy meter and its applications.

SECTION–C

Note :– Attempt all parts.   (10×5=50)

3. Attempt any **two** parts :

(a)
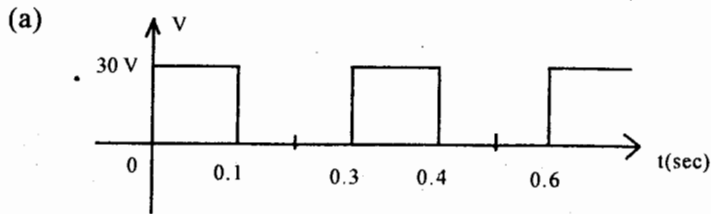

Find rms value, average value and form factor of the wave.

(b) A 120 V, 100 W lamp is to be connected to a 220 V, 50 Hz ac supply. What value of pure inductance should be connected in series in order that lamp is run on the rated voltage ?

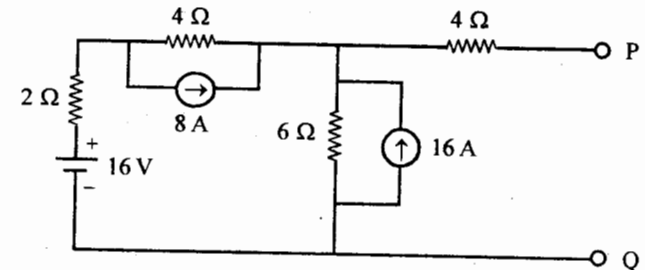(c) Define resonance in parallel RLC ckt. Draw resonance curve.

4. Attempt any **two** parts :

(a) State and prove maximum power transfer theorem in dc circuit.

(b) Find the voltage V_1 across 6 ohm resistance using loop analysis method.
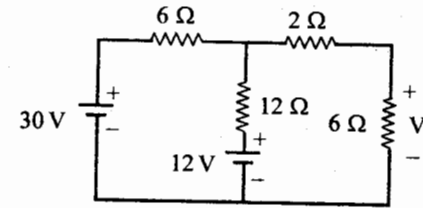
(c)

Find V_{th} and R_{th} for the ckt shown in figure.

5. Attempt any **one** part :

(a) Prove that in a 3-phase delta connected system $I_L = \sqrt{3} \ I_{ph}$. A 3-phase, 400 V supply is connected to a 3-phase star balanced load. The line current is 20 A and the power consumed by the load is 12 kW. Calculate the impedance of the load, phase current and power factor.

(b) (i) A moving coil instrument having internal resistance of 50 Ω indicates full scale deflection with a current of 10 mA. How can it be made to work as :

(a) Voltmeter to read 100 Volts

(b) Ammeter to read 1 A on full scale ?

(ii) Define analogy between electric and magnetic ckt.

6. Attempt any **two** parts :

(a) Draw single line diagram of power system and explain.

(b) Explain working principle of autotransformer. What are its advantages and applications ?

(c) What are different losses in transformer ? Explain.

7. Attempt any **one** part :

(a) Why single phase induction motor is not self starting ? What are the methods of starting ? Explain any one of them which is used in fan.

(b) (i) A 5 H.P., 230 V, 50 Hz induction motor has a rated full load speed of 950 rpm. The induced voltage per phase of rotor at standstill is 100 V. Calculate :

(a) No. of poles and % full load slip.

(b) Rotor induced voltage and its frequency at full load.

(ii) Explain working principle of synchronous motor and two applications.