

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

PAPER ID : 1117

Roll No.

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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)

- Define active and passive elements with example.
- Define form factor and peak factor.
- A series ckt has $R = 10 \Omega$, $L = 0.05 \text{ H}$, $C = 10 \mu\text{F}$. Calculate Q-factor of the ckt.
- What is the significance of back emf in dc motor ?
- Why dc series motor is never started on no load ?
- Draw approximate equivalent ckt of transformer referred to primary side.
- A 4-pole, 3-phase, 50 Hz, star connected Induction Motor has a full load slip of 4%. Calculate full load speed of motor.
- Define mmf, reluctance, flux in magnetic circuit.
- What are the applications of dc series and dc shunt motor ?
- Write an expression of hysteresis loss in a transformer. Why it decreases at higher frequencies with constant V ?

(b) (i) A moving coil instrument having internal resistance of 50Ω 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 :

- Draw single line diagram of power system and explain.
- Explain working principle of autotransformer. What are its advantages and applications ?
- 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.

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 :

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

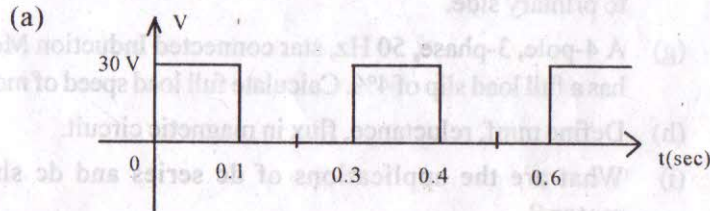
Calculate :

- (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 :



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

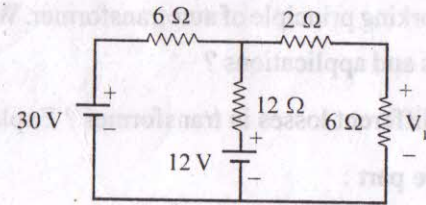
(b) A 220 V, 100 W lamp is to be connected to a 220 V, 50 Hz ac supply. What value of pure inductance should be connected in series in order that lamp is run on the rated voltage ?

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

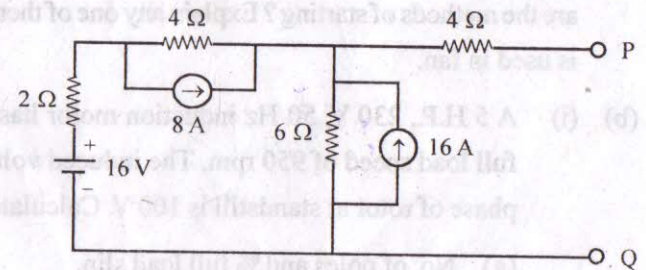
4. Attempt any **two** parts :

(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.