Printed Pages—4   **NEE101**

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

PAPER ID : 3527   Roll No. ☐☐☐☐☐☐☐☐☐☐

B. Tech.

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

BASIC ELECTRICAL ENGINEERING

Time : 3 Hours   *Total Marks : 100*

SECTION—A

1. Attempt all parts from this section :   (2×10=20)

   (a) What are the properties of ideal voltage and current sources ?

   (b) A moving coil instrument has resistance of 2 Ω, reads up to 250 V when a resistance of 5000 Ω is connected in series with it. Find current range of instrument when it is used as ammeter with coil connected across a shunt resistance of 2 mΩ.

   (c) A series R-L-C circuit has R = 10 Ω, L = 0.1 H, C = 8 μF. Calculate half power frequencies for the circuit.

   (d) Find current in 2 Ω.
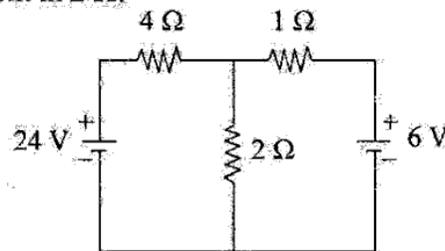

   (e) What is the significance of phasor and vector in circuit analysis ?

   (f) Define coefficient of coupling.

   (g) If in a single phase transformer core, hysteresis and eddy current losses are 80 W and 50 W at normal voltage and frequency then calculate losses when voltage and frequency are increased by 20%.

   (h) What is magnetomotive force and write its unit.

   (i) How will you change the direction of rotation of DC motor ?

   (j) What do you understand by active and reactive powers ? Why reactive power is not present in DC circuits ?

SECTION—B

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

   (a) State Norton's Theorem. Find current across 15 Ω by using Norton's Theorem.
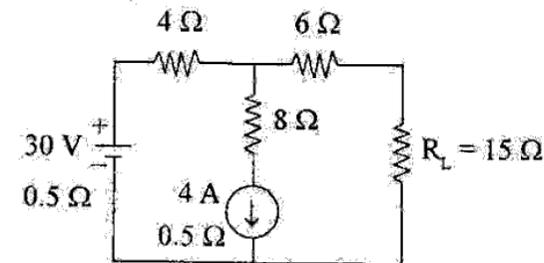
   (b) (i) Derive Bandwidth for series resonance.

       (ii) If two alternating currents represented by $i_1 = 7 \sin wt$ and $i_2 = 10 \sin [wt + \pi/3]$ are fed into a common conductor, then find equation for resultant current and its rms value.

   (c) A star connected system has impedance as $Z = 8 + j6\ \Omega$ in each phase. It is fed from 400 V 3-phase ac supply. Find active and reactive powers. If power measurement is done by two wattmeter method then calculate readings of each wattmeter. Also draw connection diagrams for this power measurement.
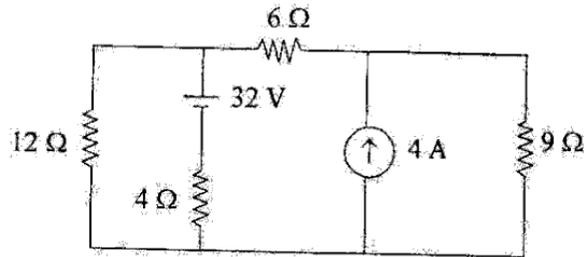
(d) Explain the need of earthing electrical devices. What are the important safety issues ?

(e) Discuss principle of operation of synchronous motor with diagram. Draw characteristics for DC series motor.
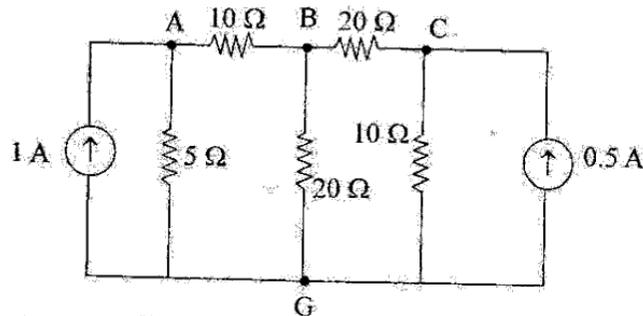
SECTION—C

Note : Attempt **all** the questions.

3. Attempt any **two** parts :   (5×2=10)

   (a) Find current in 6 Ω using Thevenin's theorem.

   (b) Find current in each branch by using nodal analysis. Also calculate total power loss.

   (c) Deduce delta connected system from star connected system.

4. Attempt any **two** parts :   (5×2=10)

   (a) What are causes and disadvantages of low power factor ?

   (b) A metal filament lamp, rated at 750 W, 100 V, is to be connected in series with a capacitor across 230 V, 50 Hz supply. Calculate the value of Capacitor.

(c) Two impedances $Z_1 = 5 + j10\ \Omega$ and $Z_2 = 10 - j15\ \Omega$ are connected in parallel. If total current is 20 A then find : (i) current taken by each branch, (ii) power factor, (iii) power consumed in each branch.

5. Attempt any **two** parts :   (5×2=10)

   (a) Explain the construction and working of Electrodynamic type instrument with diagram.

   (b) Explain construction, working and torque in energy meter with neat sketch.

   (c) A 3-phase load consisting of resistance 25 Ω, inductance of 0.15 H and capacitor of 100 μF is connected to 400 V, 50 Hz. Calculate line current, power factor, total power (i) when connected in star, (ii) when connected in delta.

6. Attempt any **two** parts :   (5×2=10)

   (a) Describe the analogies between electric and magnetic circuits in brief.

   (b) Explain eddy current loss and its remedy in magnetic circuit.

   (c) The efficiency of a 400 kVA, single phase transformer is 98.77% at full load 0.8 p.f. and 99.13% at half load unity p.f. Find Iron and Cu losses at half load.

7. Attempt any **two** parts :   (5×2=10)

   (a) Explain any one method of starting single phase induction motor with neat diagram.

   (b) Explain working of 3 phase Induction Motor. Also draw torque-slip characteristic showing operating regions.

   (c) A 4 pole dc generator with wave connected armature has 41 slots and 12 conductors/slots. Armature resistance and shunt field resistance are 0.5 Ω and 200 Ω. Flux per pole is 125 mWb. Speed N = 1000 rpm. Calculate the voltage drop across terminals. The load resistance is 10 Ω.