

CARMEL COLLEGE OF ARTS, COMMERCE AND SCIENCE FOR WOMEN
SEMESTER END EXAMINATION, October 2019

Semester III of B. Sc. Subject: Physics (Skill Enhancement Course)

Subject code: PYS 101 Network Analysis

Duration 2 Hrs

Date: 2/11/2019

Total Marks : 60

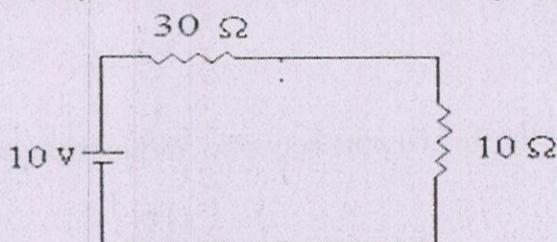
Instructions:

1. All questions are compulsory, however internal choice is available.
2. Figures to the right indicate maximum marks to the question/sub question.
3. Use of non-programmable calculator is permitted.
4. Symbols have their usual meaning unless specified.
5. Draw neat diagrams /circuit diagrams where ever necessary in support of your answers.

Q 1. Answer any five of the following.

2x5=10

- a) What is the principle of non inductive resistance coils?
- b) State Kirchoff's voltage law.
- c) State Thevenin's theorem of circuit analysis.
- d) Draw a graphical sketch of under-damped response across the capacitor in a RLC circuit connected in series with a square wave.
- e) Why double balance is involved in AC bridges?
- f) Find the capacitive reactance of 0.1 microfarad capacitor when an ac current of frequency 1 K Hz is passed through it.
- g) Find the power consumed by 10Ω resistor in the following circuit.



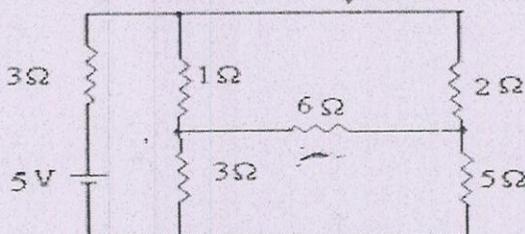
Q 2. Answer any five of the following.

2x5=10

- a) What do you mean by an ideal voltage source and an ideal current source?
- b) Briefly discuss phase relationships between current and voltage in a pure resistance, pure inductance and pure capacitance.
- c) Find the inductive reactance of 0.1 H coil when a current of $10 \sin(314 t)$ is passed through it.
- d) Write transformer formula for an ideal transformer.
- e) What do you mean by rms value of an AC cycle?
- f) Express power factor in terms of average power and effective power. What does the power factor represent?
- g) Draw DeSauty's capacitance bridge and write the condition for balance.

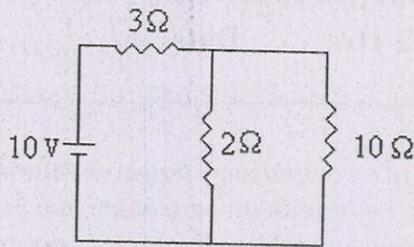
Q 3.

A) Write nodal current equations for the following circuit and solve for any one node voltage.



OR

- A) Write mesh current equations for the following circuit and solve for current through $2\ \Omega$ ohm resistor. 5



- B) Explain how mutual inductance between two coaxial solenoids can be measured.

Q 4.

- A) Derive general expression for transient $V_c(t)$ and total impedance in C-R circuit in series with a dc source. 5

OR

- A) Derive general expression for transient $i(t)$ and total impedance in L-R circuit in series with a ac source. 5

- B) Determine the capacitive reactance, total impedance, maximum voltage and phase angle between voltage and current in a CR circuit consisting of 10 volts rms, 500 Hz source in series with a 10 ohm resistance and 0.1 microfarad capacitance. 5

Q5

- A) For a general linear two port network, Write expressions for Y parameters. 5

OR

- A) For a general linear two port network, Write expressions for h parameters. 5

- B) For a general linear two port network, derive expressions for Z parameters in terms of Y parameters. 5

Q 6.

- A) Derive an expression for resonant frequency of a series resonant circuit. 5

OR

- A) A series resonant circuit consists of 20 Volt ac source, $R=100\ \text{ohms}$, $L=.1\ \text{H}$, and $C=.001\ \mu\text{F}$. Determine the resonant frequency and current at resonant frequency. 5

- B) An amplifier with output impedance of $3.2\ \text{K}\Omega$ is to be feed to a loud speaker of 8 ohms. Calculate the desired turns ratio of an ideal transformer to connect the two systems. 5