

**CARMEL COLLEGE OF ARTS, SCIENCE & COMMERCE FOR WOMEN,
NUVEM-GOA
SEMESTER END EXAMINATION, JANUARY 2022**

Semester: III Course name & Code: NETWORK ANALYSIS PYS101:
Total marks: 60 Date: /01/2022 Duration: 2 Hours Total No of pages: 3

Instructions:

- 1) All questions are compulsory, however internal choice is available.
- 2) Figures to the right indicate maximum marks to the question.
- 3) Symbols have their usual meanings unless otherwise stated.
- 4) Draw neat diagram wherever necessary.
- 5) Use of non-programmable calculator is permitted.

Q1. Answer any FIVE of the following questions. (5 x 2 = 10)

- (A) Name two resistance sensors and the physical quantity that affects their resistance.
- (B) How would you convert voltage source into a current source. Draw circuit diagram.
- (C) What is the reactance of a capacitor and inductance when a source of d.c. voltage is connected across it?
- (D) What does a power factor of 1 and 0 indicate.
- (E) What are transformers? Write transformer formula for Ideal transformer.
- (F) What is the importance of Q factor in resonant circuits.
- (G) What is the number of possible combinations generated by four variables taken two at a time in a two port network

Q2. Answer any FIVE of the following questions. (5 x 2 = 10)

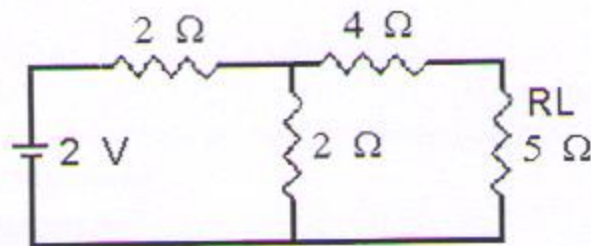
- (A) What is mutual inductance? Express mutual inductance in terms of the self inductance of the two mutually coupled coils.
- (B) What is the efficiency of the circuit under maximum power transfer conditions?
- (C) A series RL circuit has a constant voltage applied at $t = 0$. At what time does voltage across R equals voltage across L.

- (D) Explain the effect of change in frequency of an alternating supply on an inductive reactance and capacitive reactance.
- (E) State the principle used in non-inductive resistance coils.
- (F) Draw the circuit diagram of a general a.c. bridge and state its condition for its balance.
- (G) Express a two port network in terms of Hybrid (h) parameters.

Q.3(A) State and Derive Maximum power transfer Theorem. What is the power supplied by the source when maximum power is dissipated in the load? 5

OR

Q.3(A) State and explain Thevenin's theorem of electrical network. Draw the Thevenin's equivalent circuit for the circuit given below. Hence find the current flowing through the load resistance R_L . 5



Q.3(B) What is meant by average value and RMS value of E.M.F. for an A.C. cycle? Obtain expression for RMS value and average value of a sine wave. 5

Q.4 (A) An alternating e.m.f. is applied to a circuit containing an inductor, capacitor and a resistor in series. Obtain an expression for the impedance and the current through the circuit. 5

OR

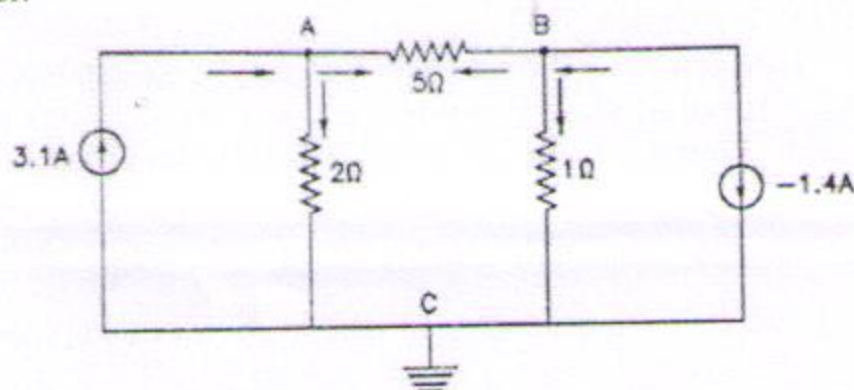
Q.4(A) Obtain an expression for the voltage across a capacitor during charging of a capacitor for a circuit consisting of a capacitor C, resistance R and a d.c. source V in series. 5

Q.4(B) Obtain the expression for apparent power, real power and reactive power using phasor notation for voltages and currents. 5

Q.5.(A) Write the basic equation for a series RLC circuit connected to a dc voltage source. Hence state the conditions for the charging to be dead beat, critically damped and oscillatory. 5

OR

Q.5.(A) Write the node voltage equations and determine the voltage across 5 ohm resistor. 5



Q.5 (B) For a transformer obtain an expression for reflected impedance from the secondary. 5

Q.6 (A) Why is parallel resonant circuit is called an rejector circuit? Resonance takes place at 10 kHz in a series resonant circuit. Its bandwidth is 500Hz. Find its Q-factor and cut off frequencies.

OR

Q.6.(A) Draw the circuit diagram of Wein's bridge and write the condition for balance. In Wein's bridge, $R_1 = R_2 = 1\text{Kohm}$ and $C_1 = C_2 = 1\mu\text{f}$. Find the frequency at which the bridge balances. 5

Q.6(A) For a general two port network, derive expression for hybrid h parameters. 5