Set: 60

North East University Bangladesh
Department of Computer Science and Engineering
Assignment for Semester Final Examination Fall 2020
Program: B.Sc. (Eng.) in CSE
Course: CSE 121(Basic Electrical Engineering)

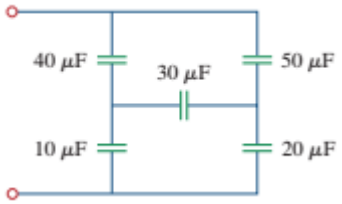
Marks: 20 Total Time: 4 Hours

Instructions: Answer all the questions.
Marks for this test will be provided holistically instead of for parts of the questions. Also marks for this test will vary depending on the viva performance.
Questions MUST be WRITTEN before the answers.
Write your answers neatly with only adequate amount of explanations and diagrams where necessary. If not required avoid unnecessary explanation. Unnecessary materials will gain no marks but can lose marks if it contradicts with actual answers.
In all mathematical questions you must show all the steps.
These questions are automatically selected from pools of questions. As a result there is possibility of same questions appearing multiple times. In such cases you have to answer the questions multiple times.
Try to answer parts of a question together.

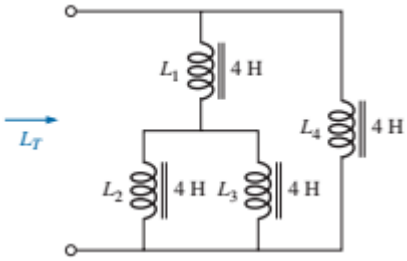
Answer the following questions.

1. In answer script write the statement first and identify if the statements are true or false.
   (a) The frequency of Voltage Signal and Power signal is same.
   (b) Maximum power is transferred to the load when $R_L = 4R_{Th}$
   (c) Inductor can be made by simply coiling up wires.
   (d) Capacitor works as open circuit under DC.
   (e) The natural response of a circuit refers to the behavior of the circuit itself, with no external sources of excitation.
2. Fill in the blanks.
   (a) The unit of capacitance is _____.
   (b) The impulse response is response of a circuit with _____ signal excitement.
   (c) Power factor is the ratio of _____ power to _____ power.
3. Explain how a power triangle can be used to find the power factor.
4. Explain the importance of RMS values.
5. Write down the formula to find the power across a capacitor and an inductor.
6. Explain the difference between reactive power and real power.
7. What is the power factor of pure inductive load?
8. A load Z draws 30 kVA at a power factor of 0.707 leading from a 220-V rms sinusoidal source. What is the reactive Power?
9. What is the energy stored by 3 Farad capacitor if 20 volt is applied across the capacitor?

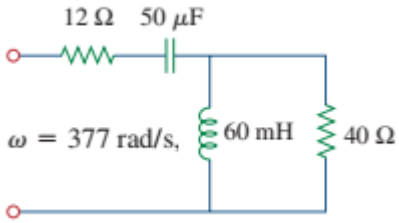
10. Find the equivalent capacitance in the circuit below.



11. Find the equivalent inductance in the circuit below.

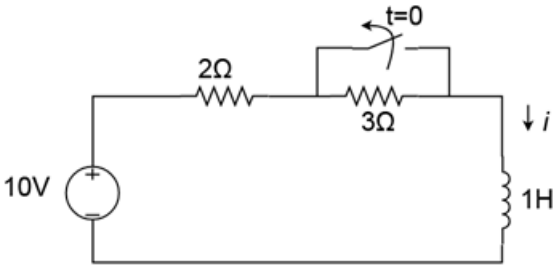


12. Find the equivalent Impedance for the circuit below:



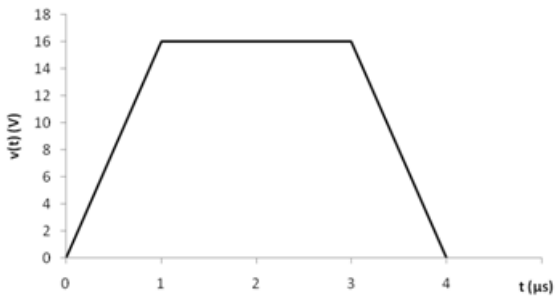
Answer each parts of the following questions

13. (a) Find $i(t)$ in the circuit below for $t > 0$. Assume that the switch has been closed for a long time.



(b) What is the time constant for the circuit above?

(c) The voltage across a 2-mF capacitor is shown in figure below. Determine the current through the capacitor.



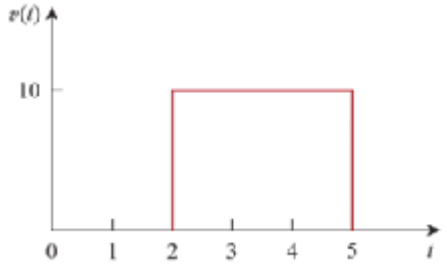
14. (a) Transform the following sinusoids into phasors.
    i. $v = -10sin(30t - 50°)$
    ii. $i = 6cos(60t + 80°)$

    (b) Given that the following currents are entering a node, find the current leaving the node.

$$i_1(t) = 4cos(\omega t + 50°)$$
$$i_2(t) = 5sin(\omega t - 30°)$$

    (c) With proper diagram explain the difference between unit step [u(t)] and unit ramp [r(t)] function.

    (d) Express the voltage pulse in figure below in terms of the unit step. Calculate its derivative and sketch it.



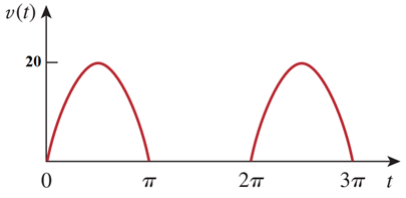
15. Shuvro and Labeed has started an online course on basic electrical engineering. On a course material they reads the following text.

The root mean square (RMS or rms) is defined as the square root of the mean square (the arithmetic mean of the squares of a set of numbers).

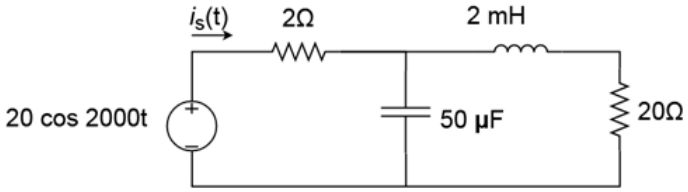
They have encountered some problems related to RMS values. Help them navigate through the problems.

    (a) What is the RMS value of a pure sinusoid that has an amplitude of 220V?

    (b) What is the RMS value of the circuit below?



They have found the following circuit they want to solve. Help them.



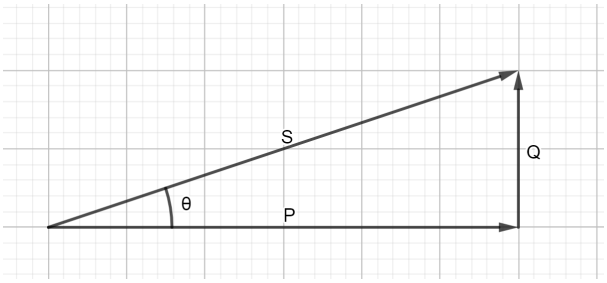
    (c) Convert the circuit into phasor domain and redraw the circuit.

    (d) Find the current marked $I_s(t)$.

    (e) What is the power factor in the circuit as observed by the source.?

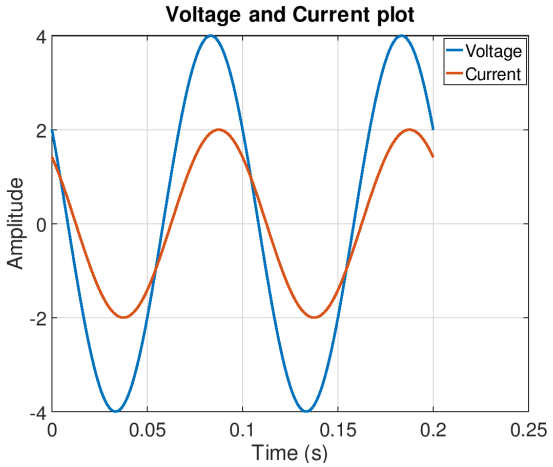
(f) Assuming that the capacitor can be replaced, calculate the capacitacne value that will yield a power factor of 0.95 leading.

Labeed finds the following phasor diagram in a text book.



(g) Calculate the power factor from the above phasor diagram mentioning if the power factor is leading or lagging. Assume that the phasor diagram is drawn to scale.

Shuvro finds the following voltage current graph in a blue-book.



(h) Which signal is leading? Explain with reasons.

—End of Questions—

Submission Instruction

The last date to submit this assignment is January 16, 2020, Saturday, 02:00 PM . No late submissions will be allowed. All the answers must be handwritten and scanned and sent as PDF files. No other file formats will be allowed.

If you have any health condition refraining you from submitting on time, you have to inform me before January 14, 2020, Thursdayfor prior approval for late submission. It will to my discretion to allow you for late submission based on the severity of your condition.

You should only submit the questions from set you are assigned. Submission of any other set as well as copying from other students answers will be heavily penalized.

Use the attached format for front Page. The front page can be printed or handwritten.

The procedure to submit assignments is as follows:

- Prepare your assignment by scanning the handwritten assignments and converting them to PDF. The pages should be in order. No effort will be made to check disordered files or late submissions. All the pages should be in a single PDF file.
- Rename your file as **CSE121Final-2001030200XX.pdf** , where the last 12 digits are your registration number. Any other format of naming will not be allowed and will not be considered for grading.
- Send your assignment to the following address shparvez@neub.edu.bd . There is no need to CC or send any copy to my other email address.
  - The subject line of your email should read as **CSE 121 Final Assignment Fall 2020 by 2001030200XX** . Where the last 12 digits are your registration number. Any other format will eliminate the chance of your email to reach the correct folder of my email. You are suggested to copy the text if necessary.

North East University Bangladesh
Department of Computer Science and Engineering
Assignment for Semester Final Examination Fall 2020
Program: B.Sc. (Eng.) in CSE
Course: CSE 121(Basic Electrical Engineering)

Name: [[Your Name goes Here]]
Reg: [[Your registration number goes Here]]