**International Islamic University Chittagong**

Department of Computer Science and Engineering

B. Sc. in CSE

Final Exam, Spring-2023

Course Code: **EEE-1121** Course Title: **Basic Electrical Engineering**

Time: 2 hours 30 minutes Full Marks: 50

The figures in the right-hand margin indicate full marks

## Part A

[Answer the questions from the followings]

| | | | | | |
|---|---|---|---|---|---|
| 1. | a) | What is a waveform? Demonstrate some waveforms with proper diagram. | C01 | Ap | 3 |
| 1. | b) | Find the phase angle between $i_1 = -4 \sin(377t + 25°)$ and $i_2 = 5 \cos(377t - 40°)$, does $i_1$ lead or lag $i_2$? | C03 | E | 3 |
| 1. | c) | Find the rms value of the signal shown in below Fig. 1(c) | C03 | An | 4 |

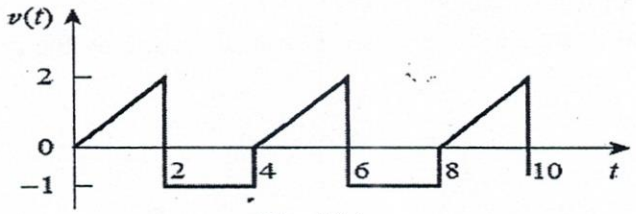


Fig. 1(c)

| | | | | | |
|---|---|---|---|---|---|
| 2. | a) | Refer to Fig. 2(a) below, determine *v(t)* and *i(t)*. | C04 | An | 5 |

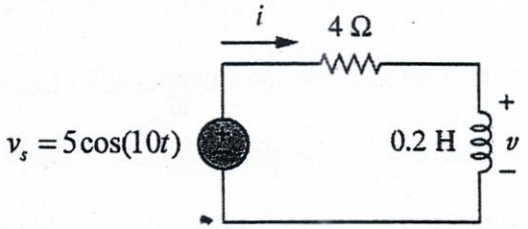


Fig. 2(a)

OR

Solve for **I** in the following circuit of Fig. 2(a-or)

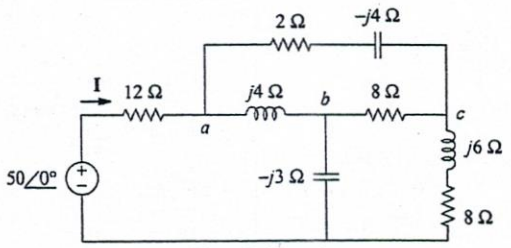


Fig. 2(a-or)

| | | | | | |
|---|---|---|---|---|---|
| 2. | b) | The voltage across 1 μF capacitor is v = 30 sin 400t. What is the sinusoidal expression for the current. Sketch the v and i curves. | C03 | An | 5 |

OR

What is the voltage and current relation in a capacitive circuit? Explain your answer mathematically.

## Part B

[Answer the questions from the followings]

| | | | | |
|---|---|---|---|---|
| 3. a) | Design a High pass filter with proper circuit diagram and exlpain its output characteristics | C04 | C | 5 |
| 3. b) | Given that R=20k , C=120pF sketch the phase plot for both high-pass and low-pass filter and determine the magnitude and phase of $A_v=(V_O/V_i)$ at f=0.5 $f_c$ | C04 | An | 5 |
| 4. a) | What is the significance of power factor in electrical systems and why is it important to maintain a high power factor? | C01 | E | 3 |
| | OR | | | |
| | Calculate the instantaneous power and average power absorbed by a passive linear network if: v(t)= 80 cos(10t+20°) and i(t)= 15 sin(10t+60°). | | | |
| 4. b) | Explain what does the power triangle represent and how is it related to the concepts of real power, reactive power, Apparent power? | C03 | U | 3 |
| 4. c) | In the following circuit calculate the average power absorbed by the resistor and inductor. | C03 | An | 4 |

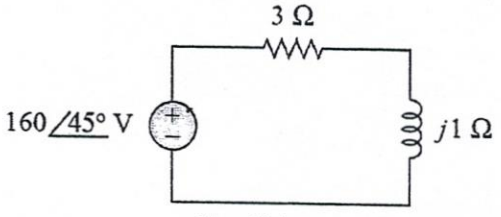


Fig. 4(c)

| | | | | |
|---|---|---|---|---|
| 5. a) | Write about three phase system. Also mention the advantages of implementing three phase electrical power system. | C01 | Ap | 3 |
| 5. b) | Given that $V_{bn}=220\angle 40°$ Find $V_{an}$ and $V_{cn}$ assuming a negative phase sequence | C03 | Ap | 3 |
| | OR | | | |
| | Illustrate four different configurations of three phase balanced system. | | | |
| 5. c) | Calculate the line and phase currents from the given system below: | C03 | An | 4 |

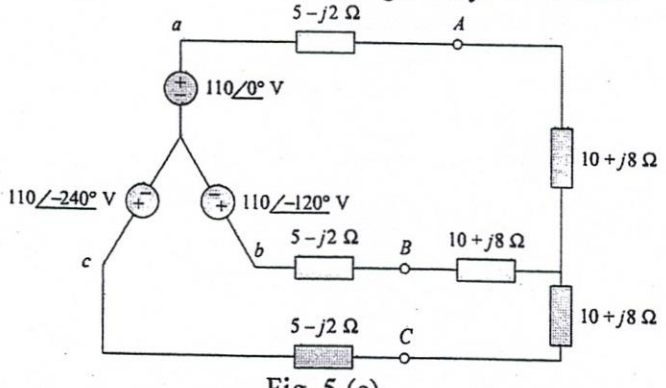


Fig. 5 (c)

OR

A balanced *abc*-sequence Y-connected source with Van=100∠10° is connected to a Δ-connected load (8+j4) Ω per phase. Calculate the phase Currents.