

University of Asia Pacific
Department of Computer Science and Engineering
Mid-Semester Examination Fall-2022
Program: B.Sc. in CSE

Course Title: Structured Programming

Course No. CSE 103

Credit: 3.00

Time: 1.00 Hour.

Full Mark: 60

There are **Four** Questions. Answer **three** questions including Q-1 and Q-2.

1. a. What will be the value of the variables a, b, and c at the end of executing the following segment of a program: [6]

```
int a, b, c;  
a = 10;  
b = 40;  
c = a--;  
b = ++c;  
printf("%d %d %d", a, b, c);
```

- b. Write a C program that will take length of three sides of a triangle as input. The program will check whether it is possible to make a right angled triangle or not. Otherwise, it will write "not possible". Recall that for a right angle triangle: $(a)^2 + (b)^2 = (c)^2$ where c is the largest side [14]

Sample output 1:

Sample output 2:

Enter side1: 3
Enter side2: 5
Enter side3: 4

Yes possible

Enter side1: 5
Enter side2: 4
Enter side3: 3

Yes possible

2. a. What is the output of the following nested loop:: [6]

```
for (i = 1; i <= 2; i++){  
    for (j = 0; j < 3; j++){  
        printf("%d %d", i, j);  
    }  
}
```

- b. Write a C program that prints all numbers between 1 to n which are divisible either by 5 or by 7. Here n will be input to your program. [14]
3. Write a program in C to find the max and min value of a given array. [20]
For example,
`int arr [4][3]={{1,2,3},{2,3,4},{3,4,5},{4,5,6}};`
Here,
max is 6 and min is 1;

OR

4. Write down a function that will take three integers as parameters and will determine and return the largest among the three. In your main function, take three integers as input and use this function to determine maximum of three. Finally, in the main function print the maximum value. [20]

University of Asia Pacific
Department of Computer Science and Engineering
Mid-Semester Examination Fall-2022
Program: B.Sc. in CSE

Course Title: CSE 105

Course No. Discrete Mathematics

Credit: 3.0

Time: 1.00 Hour.

Full Mark: 60

There are **Four** Questions. **Answer three questions including Q-1 and Q-4.**

1. a. Define the following terms: 6
Subset, Power Set, Set Partitions
 - b. Write the following sets in the roster form: 6
 - i) $V = \{x : x \text{ is a 2-digit number such that the sum of digits is } 10\}$
 - ii) $S = \{x \mid x \in \mathbb{Z}, x + 2 < 9\}$
 - c. Write the following sets in Set-Builder Form or Rule form: 8
 - i) $G = \{6, 7, 8, 9, 10, 11\}$
 - ii) $I = \{64, 125\}$
-
2. a. Consider the following five relations on the set $A = \{1, 2, 3, 4\}$: 10
 $R1 = \{(1, 1), (1, 2), (2, 3), (1, 3), (4, 4)\}$
 $R2 = \{(1, 1)(1, 2), (2, 1), (2, 2), (3, 3), (4, 4)\}$
 $R3 = \{(1, 3), (2, 1)\}$
 $R4 = \emptyset$, the empty relation
 $R5 = A \times A$, the universal relation
Determine which of the relations are reflexive, symmetric, antisymmetric, transitive.
 - b. Each of the following defines a relation on the positive integers \mathbb{N} : 10
 - i) $x = 2y + 1$
 - ii) m / nDetermine which of the relations are: reflexive; symmetric; antisymmetric; transitive.

OR

3. a. Let functions f, g, h from N into N be defined by $f(n) = n + 2$, $g(n) = 2^n$, $h(n) = \text{number of positive divisors of } n$. Decide which functions are: 10

- i) one-to-one (injection);
- ii) onto (surjection);
- iii) one to one correspondence (bijection).

- b. Let a and b be positive integers, and suppose Q is defined recursively as follows: 10

$$Q(a, b) = 0 \quad \text{if } a < b$$

$$Q(a - b, b) + 1 \quad \text{if } b \leq a$$

Find:

- i) $Q(12, 15)$;
- ii) $Q(120, 100)$.

4. a. Formulate the logical expression for the following statement: 10

- i) "You can purchase this book if you have \$20 or \$10 and a discount coupon."
- ii) "You can attend the final exam if you have at least 70% attendance or 50% attendance along with a sick leave approved by your advisor"

- b. Construct truth tables for the following logical expressions: 10

$$(P \wedge Q) \Leftrightarrow (P \vee \neg R)$$

University of Asia Pacific
Department of Computer Science and Engineering
Mid-Semester Examination, Fall-2022
Program: B.Sc. in CSE (1st Year, 2nd Semester)

Course Title: Electrical and Electronic Engineering I Course Code: EEE 121 Credit Hours: 3.00
Time: 1.00 Hour Full Marks: 60

[There are **four** questions. Answer any **three** including Q-1 & Q-2. Figures in the right margin indicate marks]

1. Using Mesh analysis, calculate the mesh currents for the circuit shown in figure 1. [20]

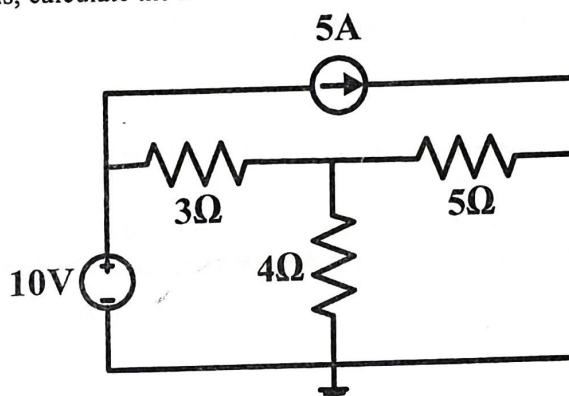


Figure 1

2. Compute the current flowing through 20 Ω resistor of the following circuit using Superposition theorem. [20]

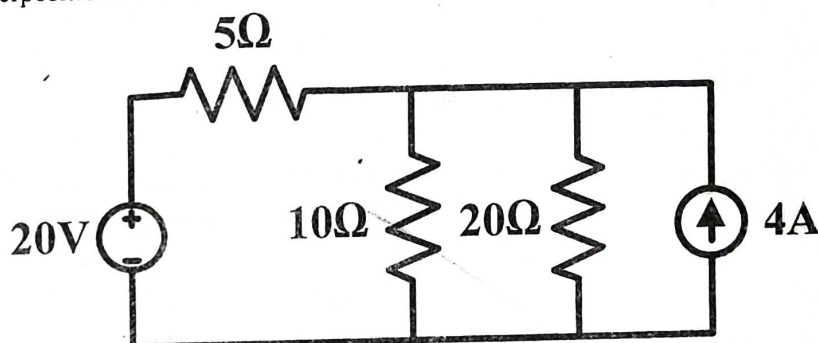


Figure 2

3. For the circuit in figure 3, construct the smallest equivalent circuit [one voltage source and a resistor] with respect to the load resistor R_L . Calculate the power of R_L if $R_L = 16 \Omega$. [20]

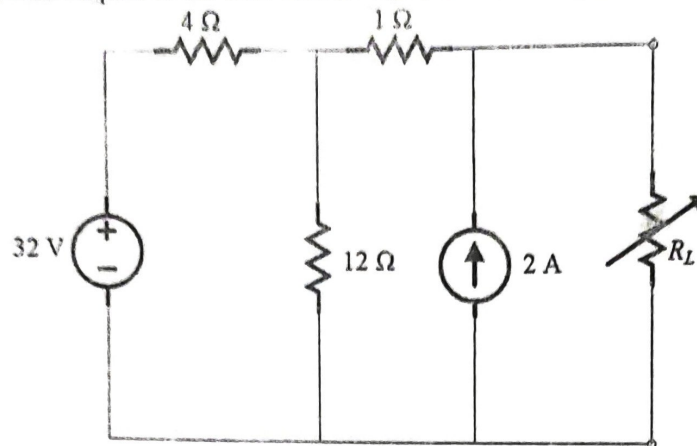


Figure 3

OR

4. For the circuit in figure 3, construct the smallest equivalent circuit [one current source and a resistor] with respect to the load resistor R_L . Calculate the power of R_L if $R_L = 10 \Omega$. [20]

University of Asia Pacific
Department of Basic Sciences and Humanities
Mid-Semester Examination Fall-2022
Program: B. Sc. in CSE

Course Title: Math II: Linear Algebra

Course No. MTH 103

Credit: 3.0

Time: 1.00 Hour

Full Marks: 60

There are **FOUR** Questions. Answer **THREE** questions including Q-1 and Q-4.

1. a. Let $A = \begin{pmatrix} -1 & 2 & -3 \\ 2 & 1 & 0 \\ 4 & -2 & 5 \end{pmatrix}$. Find A^{-1} by using elementary row operations. [12]

- b. Let A and B be two 3×3 matrices such that $|A| = -3$ and $|B| = 4$. Find $|-3A|$, $|2A^2B^{-1}A|$ and $|A^{-2}B^{-1}A^T|$. [8]

2. a. Find A if $(I + 3A^T)^{-1} = \begin{pmatrix} 3 & 4 \\ -2 & -2 \end{pmatrix}$. [8]

- b. Solve the following system of nonlinear equations for x , y , and z . [12]

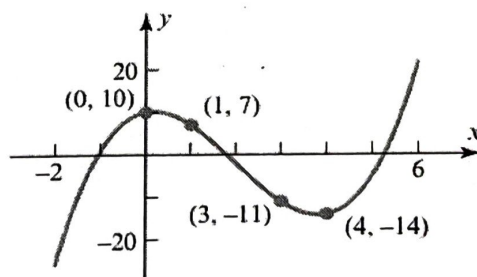
$$x^2 + y^2 + z^2 = 6$$

$$x^2 - y^2 + 2z^2 = 2$$

$$2x^2 + y^2 - z^2 = 3$$

OR

3. Find the coefficients a , b , c , and d so that the curve shown in the accompanying figure is the graph of the equation $y = ax^3 + bx^2 + cx + d$. [20]



4. a. Determine whether $W = \{(a, b, c) : a - b + c = 0\}$ is a subspace of R^3 or not. [8]

- b. Determine whether the polynomials [12]

$$p_1 = 1 - x, \quad p_2 = 5 + 3x - 2x^2, \quad p_3 = 1 + 3x - x^2.$$

are linearly dependent or linearly independent in P_2 . If dependent, write one of the polynomials as a linear combination of others.

University of Asia Pacific
Department of Basic Sciences and Humanities
Mid-Semester Examination Fall-2022
Program: B.Sc. in Computer Science and Engineering

Course Title: Chemistry

Course No.: CHEM 111

Credit: 3.00

Time: 1 Hour

Full Mark: 60

There are **four** questions. Answer **three** questions including Q-1 and Q-2.

1. a. Derive an expression for radius of Bohr orbit of hydrogen atom. 15
b. Calculate the value of l , m and number of electrons of the orbitals when $n = 1, 2, 3$. 05
2. a. Derive Van't Hoff reaction isotherm for the reaction: 12
$$aA + bB + \dots \leftrightarrow lL + mM + \dots$$

b. Show the relationship between K_p and K_c where the reaction is $2SO_2 + O_2 \leftrightarrow 2SO_3$. 08
3. a. Define colligative properties. Derive the Raoult's law from Lowering of vapour pressure. 2+8=10
b. The boiling point of a solution containing 0.20 g of a substance X in 20.00 g of ether is 0.17 K higher than that of pure ether. Calculate the molecular mass of X. Boiling point constant of ether per 1 Kg is 2.16 K. 10

OR

- a. Show the relationship between elevation of boiling point and lowering of vapour pressure. 15
b. The standard free energy change for the reaction $N_2(g) + O_2(g) \leftrightarrow 2NO(g)$ is +173.1 kJ. 05
Calculate K_p for the reaction at 25°C.