

GOVERNMENT OF KARNATAKA
DEPARTMENT OF TECHNICAL EDUCATION
TABLE OF SPECIFICATION
(BLUEPRINT FOR QUESTION PAPER)

Program		Computer Science and Engineering and Allied Programs																		
Course Name		Basics of Digital Logic and Computer Organization																		
Course Code		25CS11I																		
Revised Blooms Taxonomy Cognitive Level				Remember (21%)						Understand(58%)					Apply (21%)					Total Questions
Week No.	CO	Marks	Weightage	1M MCQ	1M FIB	2M	3M	5M	10M	1M MCQ	2M	3M	5M	10M	1M MCQ	2M	3M	5M	10M	
1,2	CO-01	22	15	2	1	2	-	-	-	1	-	2	1	-	-	-	-	-	-	9
3,4,5	CO-02	30	20	2	1	1	-	-	-	1	-	2	2	-	1	-	-	-	1	11
6,7	CO-03	35	23	2	1	1	-	-	-	1	-	1	1	-	1	-	-	-	2	10
8,9,10	CO-04	33	22	2	1	2	-	-	-	-	-	2	2	1	-	-	-	-	-	10
11,12,13	CO-05	30	20	2	1	2	-	-	-	-	-	1	2	1	-	-	-	-	-	9
Total Questions				10	5	8	0	0	0	3	0	8	8	2	2	0	0	0	3	49
Total Marks				15		16	-	-	-	3	-	24	40	20	2	-	-	-	30	150
Overall Breakup Percentage				10		11	-	-	-	2	0	16	27	13	1	0	0	0	20	100
Overall CL Percentage				21						58					21					100

Government of Karnataka
Department of Technical Education
Board of Technical Examinations
Model Question Paper – 01

Course: Basics of Digital Logic and Computer Organization

Course Code: 25CS11I

Time: 3 Hrs

Max Marks: 100

Instructions: For Part-A questions, only the first written answers will be considered for evaluation.

PART A

I. Select the correct answer from the choices given 15x1 = 15

1. Which of the following is a binary number?

- a) 1011 b) 1234 c) 8F d) 29

2. The truth table of a NOT gate has how many inputs?

- a) 0 b) 1 c) 2 d) 3

3. ASCII stands for:

- a) American Standard Code for Information Interchange
b) Automated System for Character Identification and Input
c) Analog Signal Code for Integrated Interfaces
d) Advanced Source Code for Internet Interaction

4. Which of the following is a universal gate?

- a) NAND b) OR c) XOR d) NOT

5. The output of a full-subtractor is:

- a) Difference and borrow b) Sum and carry c) Only borrow d) Only difference

6. A D flip-flop is also called:

- a) Delay flip-flop b) Double flip-flop c) Down counter d) Direct flip-flop

7. The main memory communicates directly with the:

- a) Monitor b) Keyboard c) CPU d) Hard disk

8. The register which holds the address of the next instruction is:

- a) IR b) MAR c) PC d) MDR

9. USB stands for:

- a) Universal Serial Bus b) United System Bus
c) Unique Serial Bridge d) Universal Signal Base

10. Which of the following connects internal components of the computer?

- a) Compiler b) Bus c) ROM d) SSD

11. What is the difference between NAND and NOR gates?

- a) NOR is faster b) NAND inverts OR, NOR inverts AND
c) NAND inverts AND, NOR inverts OR d) Both are same

12. A shift register moves data:

- a) Randomly b) Parallel only c) Bit by bit d) In analog form

13. Why is binary number system used in digital systems?

- a) It is easy to understand for humans b) It reduces memory usage
c) It can be represented using ON and OFF states d) It provides more colors in graphics

14. You want to simulate a circuit that counts from 0 to 7 repeatedly. Which circuit should be used?

- a) Half Adder b) Synchronous Counter c) Demultiplexer d) Decoder

15. You need to invert a signal before sending it to a microcontroller. Which logic gate is appropriate?

- a) AND b) OR c) NOT d) XOR

II. Fill in the blanks by choosing appropriate answer from those given in the bracket:

(one, output, current, real numbers, outputs)

5X1 = 05

1. Floating point representation is used to store ____.
2. The truth table of a logic gate shows all possible combinations of inputs and their corresponding ____.
3. A flip-flop stores ____ bit of data.
4. The Instruction Register (IR) holds the ____ instruction.
5. A printer is categorized as an ____ device.

PART B

III. Answer any FIVE questions:

5X2 = 10

1. Convert the hexadecimal number 2A to its binary equivalent.
2. State the base value of each of the following number systems: binary, octal, decimal, and hexadecimal.
3. State any two Boolean laws used in circuit simplification.
4. List any two examples of sequential circuits.
5. What is the function of the Control Unit in a computer?
6. State the function of the address bus.
7. Name any two types of memory used in a typical computer.
8. List any two commonly used I/O ports.

PART C

VI. Answer any FIVE questions:

5X3 = 15 .

1. Explain the need for data representation in digital systems.
2. Differentiate between binary and BCD number systems with suitable examples.
3. Describe how a NAND gate can be used to build an AND gate.
4. Compare SOP and POS (Product of Sums) expressions with examples.
5. What is a Multiplexer? List the applications of a multiplexer.
6. Explain the Von Neumann architecture and list its key components.
7. Compare the roles of data bus, address bus, and control bus in a computer system.
8. Differentiate between primary, secondary, and tertiary memory with one example for each.

PART D (Section I)

IV. Answer any FIVE questions:

5X5 = 25 0

1. Describe the purpose of BCD (Binary-Coded Decimal) in digital systems. Explain how the decimal number 59 is represented in BCD and compare it with its pure binary representation.
2. Explain the function of basic logic gates (AND, OR, NOT) with their symbols, truth tables, and one practical use for each.
3. Explain the step-by-step procedure to derive a Boolean expression in POS (Product of Sums) form from a given truth table with three input variables A, B, and C with one output Y.

A	B	C	Y
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

4. Describe the applications of Multiplexer and De-multiplexer.
5. Explain the instruction execution cycle in a CPU. What happens during fetch, decode, and execute stages?
6. Explain any three addressing modes used in CPU instruction execution. Give an example for each.
7. Explain memory hierarchy and how CPU interacts with different levels of memory during instruction execution.

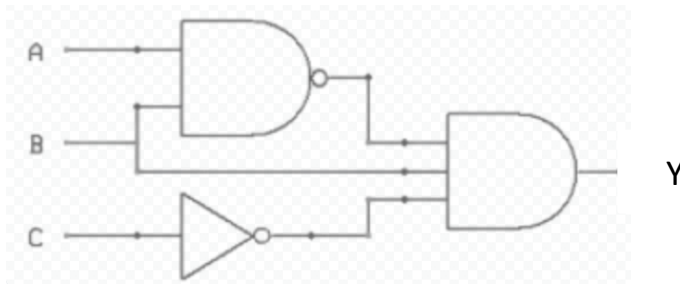
8. Compare parallel and serial bus architectures. Explain one advantage and disadvantage of each with suitable examples.

PART D (Section II)

V. Answer any THREE questions:

10X3 = 30

1. Given a logic circuit explain the procedure to construct its truth table. Apply this procedure to the given circuit diagram and present the complete truth table showing all possible input combinations and corresponding outputs.



2. You've been given a mysterious circuit that encodes or decodes a secret binary message using XOR gates. Your task is to figure out the input, the circuit logic, and the hidden message.
If The binary message $M=11001$ and the secret key $K=10101$ what is the encoded message X
To decode the message, the encoded message X is passed through the same XOR gate with the original key $K=10101$. What is the decoded message M .
3. You are designing the control system of a washing machine. The machine must go through a fixed sequence: Fill → Wash → Rinse → Spin → Stop. Each stage runs for a fixed amount of time and then automatically moves to the next.
 - a) Is this an example of a combinational or sequential circuit? Explain why.
 - b) Name any two digital components used to implement this sequence and describe their roles.
4. Explain the key CPU performance metrics such as clock speed, number of cores, and cache memory. Provide an example for each to show how it affects computer performance.
5. Differentiate between primary, secondary, and tertiary memory. Give two examples of each and their typical applications.

**Government of Karnataka
Department of Technical Education
Board of Technical Examinations
Model Question Paper – 02**

Course: Basics of Digital Logic and Computer Organization

Course Code: 25CS111

Time: 3 Hrs

Max Marks: 100

Instructions: For Part-A questions, only the first written answers will be considered for evaluation.

PART A

I. Select the correct answer from the choices given 15x1 = 15

1. Why do we convert decimal numbers to binary in digital systems?
a) To increase memory usage b) Because binary is easier to visualize
c) Because digital circuits understand only binary d) To avoid use of ASCII
2. Which of the following best describes a synchronous counter?
a) All flip-flops are triggered at different times
b) Flip-flops are connected in series
c) All flip-flops are triggered by the same clock pulse
d) Only one flip-flop is used
3. Why are Boolean expressions simplified before circuit design?
a) To increase size b) To slow down circuit
c) To reduce complexity and cost d) To make it complicated
4. A logic circuit outputs high only when one and only one of two sensors is activated. Which gate should be used?
a) AND b) NOR c) XOR d) NOT
5. The 1's complement of binary number 1100 is _____.
a) 0011 b) 1100 c) 1111 d) 1011
6. You are simulating a flip-flop and observe that the output toggles on every clock pulse when inputs are high. What type of flip-flop are you testing?
a) SR b) D c) T d) JK
7. Which of the following is not a basic logic gate?
a) AND b) OR c) NAND d) NOT
8. How many symbols are used in the octal number system?
a) 4 b) 6 c) 8 d) 10
9. A NAND gate is equivalent to:
a) OR + NOT b) AND + NOT c) XOR + NOT d) NOT + OR
10. Registers are used to:
a) Store large files b) Store addresses permanently
c) Store data temporarily during processing d) Control external devices

11. A half adder is used to perform:

- a) Binary division b) Binary multiplication
- c) Addition of two bits d) Subtraction of two bits

12. A multiplexer is also known as a:

- a) Data distributor b) Data selector c) Comparator d) Decoder

13. The Program Counter (PC) is used to:

- a) Store user passwords b) Count the number of instructions
- c) Store the address of the next instruction d) Store input data

14. The main memory of a computer is also called ____.

- a) Hard disk b) RAM c) ROM d) Cache

15. A device used to store data permanently is ____.

- a) RAM b) Cache c) Hard Drive d) Register

II. Fill in the blanks by choosing appropriate answer from those given in the bracket:

(XOR , same memory, eight, non-volatile, asynchronous)

5X1 = 05

1. A byte consists of ___ bits
2. A logic gate that produces HIGH only when inputs are different is ____
3. A ripple counter is a type of ___ counter.
4. In Von Neumann architecture, both program and data are stored in ____.
5. ROM is a type of ___ memory.

PART B

III. Answer any FIVE questions:

5X2 = 10

1. What is the octal equivalent of binary number 111010?
2. Define Unicode. What is its advantage over ASCII?
3. Define an AND gate with its symbol and basic truth table.
4. Name any two combinational circuits.
5. Expand ALU and state its primary function.
6. Name any two registers used in the CPU.
7. Name the three types of system buses used in computers.
8. What is the function of a GPU?

PART C

IV. Answer any FIVE questions:

5X3 = 15

1. Explain the difference between 1's complement and 2's complement with an example.
2. Describe the structure of a floating-point number in binary, mentioning sign, exponent, and mantissa.
3. Explain the difference between AND, OR, and NOT gates with their truth tables.

4. Describe how a NAND gate can be used to build an AND gate.
5. List any three practical applications of a decoder in digital systems.
6. Describe the fetch-decode-execute cycle of instruction execution in a CPU.
7. Compare CPU and GPU in terms of architecture and typical applications.
8. Explain any three units of memory and arrange them in ascending order of size.

PART D (Section I)

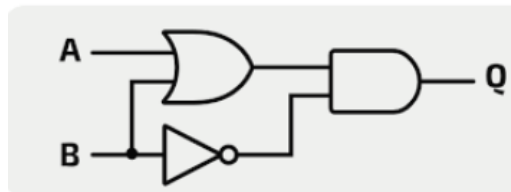
V. **Answer any FIVE questions:**

5X5 = 25

1. Describe the process of performing binary addition in digital systems. Demonstrate with an example of adding two 5-bit binary numbers, 10110 and 00111
2. Explain the step-by-step procedure to derive a Boolean expression in Sum of Products (SOP) form from a given truth table with three input variables A, B, and C.

A	B	C	Y
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	0

3. Derive the truth table for the below circuit.



4. Explain the applications of Encoder and Decoder.
5. What is Instruction Set Architecture (ISA)? Describe different types of instructions used in a typical ISA.
6. Differentiate between primary memory and secondary memory in terms of function, speed, and volatility. Give two examples for each.
7. How do I/O ports and buses facilitate communication between CPU and external devices?
8. Describe how different types of memory are used in a computer system. Give one real-world example for each type.

PART D (Section II)

VI. Answer any THREE questions:

10X3 = 30

1. Which gates would you use to design a circuit for these scenario, justify your selection.
 - a. The output should be 1 only when at least one input is 1.
 - b. The output is 1 only when the two inputs are the same.
 - c. In a control system, you need an output of 1 only when all inputs are 0.
 - d. For a security system, if you want the output to be 1 only when both switches are in the off position.
 - e. Output is 1 if and only if the inputs are different.

2. You are designing a smart home lighting system that operates in four modes:

Mode 0 – All lights OFF

Mode 1 – Bedroom light ON

Mode 2 – Living room light ON

Mode 3 – All lights ON

The system should allow selection between these modes using two control signals (S1 and S0). Propose a suitable digital logic solution that can implement this selection system efficiently. Justify your solution.

3. Explain with block diagram how an 8:1 multiplexer can be constructed using two 4:1 multiplexers.
4. List the major components of the CPU and explain their roles.
5. Identify each of the following components and briefly explain their role in a computer system:

Keyboard, HDMI Port, Monitor, Ethernet Port, Projector, Microphone, PCI and SATA

**Government of Karnataka
Department of Technical Education
Board of Technical Examinations
Model Question Paper - 03**

Course: Basics of Digital Logic and Computer Organization

Course Code: 25CS111

Time: 3 Hrs

Max Marks: 100

Instructions: For Part-A questions, only the first written answers will be considered for evaluation.

PART A

I. Select the correct answer from the choices given 15x1 = 15

1. What is the binary equivalent of decimal 13?

- a) 1101 b) 1010 c) 1110 d) 1001

2. Which encoding system supports more characters than ASCII?

- a) Unicode b) BCD c) Octal d) Binary

3. What does a NAND gate output when both inputs are 1?

- a) 1 b) 0 c) Undefined d) Same as input

4. A Full Adder has how many inputs and outputs?

- a) 3-in, 2-out b) 2-in, 1-out c) 1-in, 1-out d) 2-in, 2-out

5. What type of memory is volatile?

- a) RAM b) ROM c) HDD d) SSD

6. Which code is used to represent numbers and characters in most modern computers?

- a) BCD b) ASCII c) Octal d) Binary

7. The output of an AND gate is 1 only when:

- a) All inputs are 1 b) All inputs are 0 c) Any one input is 1 d) Inputs are different

8. Which of the following is a combinational circuit?

- a) Flip-Flop b) Counter c) Multiplexer d) Shift Register

9. In the Von Neumann architecture, instructions and data share:

- a) Different memory units b) A common bus only c) Separate CPUs d) The same memory and bus

10. An interrupt is a:

- a) Sequential execution block b) Type of software
c) Signal that stops the CPU temporarily d) Memory unit

11. The unit that communicates with input and output devices is:

- a) ALU b) Control Unit c) Memory d) Register

12. What is the main purpose of using logic gates in digital circuits?

- a) Store data b) Perform logical operations c) Measure voltage
d) Transmit sound

13. What is the key difference between combinational and sequential circuits?

a) Input type b) Use of memory c) Power supply d) Number of gates

14. A lamp should turn ON if either switch A or switch B is ON. What logic gate would you use?

a) NOR b) NAND c) AND d) OR

15. A technician is building a data selector that chooses one of 4 input lines based on 2 control bits. Which device is suitable?

a) Encoder b) Flip-Flop c) Multiplexer d) Decoder

II. Fill in the blanks by choosing appropriate answer from those given in the bracket:

(ALU, ASCII, adder, bus protocols, flip-flops)

5X1 = 05

1. The Unicode standard supports more characters than ____.
2. A _____ takes two binary numbers and adds them to produce a sum and carry.
3. A register is made up of a group of ____.
4. The component that executes arithmetic and logical operations is ____.
5. SATA and PCI are examples of ____.

PART B

III. Answer any FIVE questions

5X2 = 10

1. Find the 1's and 2's complement of binary number 00010101.
2. Convert the decimal number 255 to hexadecimal.
3. What is a universal gate? Name any two universal gates.
4. Name any two types of flip-flops used in sequential circuits.
5. Define the term instruction cycle.
6. Name any three basic components of Von Neumann architecture.
7. Name any two examples of output devices.
8. Define interrupt in computer systems.

PART C

IV. Answer any FIVE questions

5X3 = 15.

1. Given a BCD number 01000011, convert it to decimal and explain the process.
2. Describe how digital systems represent negative numbers using binary formats.
3. Explain the significance of Boolean expressions in designing digital logic circuits.
4. Draw the truth table for the Boolean Expression $Y = A \cdot B + \bar{A} \cdot C$ and explain its logic.

5. Define a Register. List the applications of shift registers.
6. Describe how an interrupt is handled by the CPU in a simple computing system.
7. What is the role of the Program Counter (PC) and Instruction Register (IR) during instruction execution?
8. Explain the function of common I/O ports - USB, HDMI, and Ethernet.

PART D (Section I)

V. Answer any FIVE questions:

5X5 = 25

1. Explain the differences between signed magnitude, 1's complement, and 2's complement representations for negative numbers. Illustrate how -25 is represented in an 8-bit format for each method.
2. Explain the step-by-step procedure to derive a Boolean expression in Sum of Products (SOP) form from a given truth table with three input variables A, B, and C and one output Y.

A	B	C	Y
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

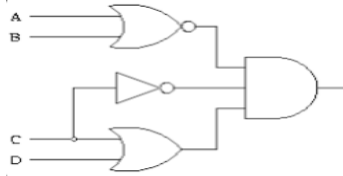
3. Explain the working of NAND and NOR gates with truth tables.
4. Explain the applications of counters in digital systems.
5. Describe the functions of the Control Unit and Arithmetic Logic Unit (ALU) in a CPU. How do they work together?
6. What are specialized processors - GPU, TPU, and NPU? How do they differ from the general-purpose CPU?
7. Describe the types of system buses and their roles in instruction execution.
8. List any three input and three output devices and explain their role in a computer system.

PART D (Section II)

VI. Answer any THREE questions:

10X3 = 30

1. Given a logic circuit explain the procedure to construct its truth table. Apply this procedure to the given circuit diagram and present the complete truth table showing all possible input combinations and corresponding outputs.



2. Your school is building a digital scoreboard for a quiz competition. It should be able to store scores, count rounds, and move data between displays.

Answer the following based on this:

- a) Should the scoreboard use a combinational or sequential circuit to store and update scores? Give one reason for your answer.
 - b) Which digital components are required to build this system (e.g., for storing, counting, and shifting data)? List them and justify your selection.
3. Design a full-adder using two half-adders (block diagram) and an OR gate.
4. A simple computer system is designed to perform basic operations like adding numbers, moving data, and accessing memory. Below are some sample instructions used in the system:
- a. MOV R1, #5
 - b. MOV R2, [1000]
 - c. ADD R3, [R1]
 - d. MOV R4, [R2 + 4]
 - e. MOV R5, R3

Based on these instructions, identify the addressing mode used in each instruction.

5. A user is building a digital storage system for a personal media library. The collection includes:
- a. 500 HD movies, each of 5 GB
 - b. 1,000 songs, each of 8 MB
 - c. 2,000 photos, each of 3 MB

Answer the following:

- a) Calculate the total storage needed for:
 - i) All movies in gigabytes (GB) and then convert to terabytes (TB)
 - ii) All songs in megabytes (MB) and convert to gigabytes (GB)
 - iii) All photos in megabytes (MB) and convert to gigabytes (GB)
- b) What is the total storage required for the entire media library in gigabytes and terabytes?

GOVERNMENT OF KARNATAKA
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TABLE OF SPECIFICATION
(BLUEPRINT FOR QUESTION PAPER)

Program		Computer Science and Engineering and Allied Programs																		
Course Name		Thinking Programming with Python																		
Course Code		25CS21I																		
Revised Blooms Taxonomy Cognitive Level				Remember (21%)						Understand(48%)					Apply (31%)					Total Questions
Week No.	CO	Marks	Weightage	1M MCQ	1M FIB	2M	3M	5M	10M	1M MCQ	2M	3M	5M	10M	1M MCQ	2M	3M	5M	10M	
1,2	CO-01	22	15	2	1	2	-	-	-	-	-	1	1	-	1	-	-	1	1	10
3,4,5	CO-02	30	20	2	1	1	-	-	-	1	-	2	-	-	-	-	-	1	-	8
6,7,8,9,10,11,12,13	CO-03	35	23	2	1	1	-	-	-	1	-	2	1	2	-	-	-	1	1	12
6,7,8,9,10,11,12,13	CO-04	33	22	2	1	2	-	-	-	-	-	1	1	-	1	-	-	1	-	9
12,13	CO-05	30	20	2	1	2	-	-	-	1	-	2	-	1	-	-	-	1	-	10
Total Questions				10	5	8	-	-	-	3	0	8	3	3	2	-	-	5	2	49
Total Marks				15		16	-	-	-	3	-	24	15	30	2	-	-	25	20	150
Overall Breakup Percentage				10		11	0	0	0	2	0	16	10	20	1	0	0	17	13	100
Overall CL Percentage				21						48					31					100

Government of Karnataka
Department of Technical Education
Board of Technical Examinations
Model Question Paper - 01

Course: Thinking Programming with Python

Course Code: 25CS211

Time: 3 Hrs

Max Marks: 100

Instructions: For Part-A questions, only the first written answers will be considered for evaluation.

PART A

I. Select the correct answer from the choices given: 15X1 = 15

1. What is the purpose of decomposition in computational thinking?
 - a) To make the problem more difficult
 - b) To break a problem into smaller, manageable parts
 - c) To find the final answer directly
 - d) To memorize all problem details
2. Which component of computational thinking helps in creating step-by-step instructions to solve a problem?
 - a) Pattern Recognition
 - b) Abstraction
 - c) Algorithm Design
 - d) Decomposition
3. Which of the following is a sorting algorithm?
 - a) Dijkstra's Algorithm
 - b) Bubble Sort
 - c) Linear Search
 - d) Caesar Cipher
4. Which of these is a primitive data type in Python?
 - a) list
 - b) int
 - c) dict
 - d) set
5. What is the symbol used for comments in Python?
 - a) //
 - b) <!-- -->
 - c) #
 - d) /* */
6. Why do we use comments in programming?
 - a) To make the program run faster
 - b) To explain the code and improve readability
 - c) To create variables automatically
 - d) To convert data types
7. Which of the following statements is used to take input from the user in Python?
 - a) get()
 - b) input()
 - c) scan()
 - d) read()
8. Which keyword is used in Python to exit a loop immediately?
 - a) skip
 - b) exit
 - c) break
 - d) stop
9. Which of the following will correctly print the result of 5 multiplied by 3 using string formatting with an f-string?
 - a) print("5 * 3 = {5 * 3}")
 - b) print(f"5 * 3 = 5 * 3")
 - c) print(f"5 * 3 = {5 * 3}")
 - d) print("5 * 3 = " + 5 * 3)
10. What is a syntactical error in Python?
 - a) An error caused by incorrect logic
 - b) An error due to incorrect use of Python grammar or rules
 - c) An error that happens only at runtime
 - d) An error that the user cannot fix

11. What type of error occurs if you forget a colon : at the end of an if statement?
 a) Semantic Error b) Logical Error c) Syntactical Error d) Runtime Error
12. Consider this code snippet:

```
x = 10
y = 0
result = x / y
print("Result is:", result)
```

 What type of error will this code produce when run?
 a) Syntactical Error b) Semantic Error
 c) Runtime Error (ZeroDivisionError) d) No Error
13. Which keyword is used to define a function in Python?
 a) function b) def c) func d) define
14. Which file must be present in a folder for it to be treated as a Python package?(R)CO5
 a) main.py b) package.py c) __init__.py d) start.py
15. What will be the output of the following code?

```
def greet(name="Guest"):
    print("Hello,", name)
greet()
```

 a) Hello, name b) Hello, Guest c) Hello d) Error because no argument was passed

II Fill in the blanks by choosing appropriate answer from those given in the bracket:

(continue, Object-Oriented, Sorting, syntactical, module) **5X1 = 05**

1. _____ is the process of arranging data in a specific order, such as ascending or descending.
2. The programming paradigm that organizes code using objects containing data and methods is called _____ programming.
3. In a while loop, the _____ statement can be used to skip the current iteration and continue with the next iteration of the loop.
4. A _____ error occurs when the Python interpreter cannot understand the code because it violates the rules of the language, such as missing colons or parentheses.
5. A Python file containing functions and variables is called a _____.

PART B

III. Answer any FIVE questions:

5X2 = 10

1. What is decomposition in computational thinking? Explain with one example.
2. Explain what a searching problem is and give one example.
3. What is syntax in programming? Give one example.
4. Name any two types of conditional statements used in Python.
5. Define a syntactical error in Python.
6. Give one example of a semantic error.

7. Name any two types of import statements used in Python.
8. What is a module in Python?

PART C

IV. Answer any FIVE questions:

5X3 = 15

1. Describe sorting problems and explain why sorting algorithms are important, with one example.
2. Explain the difference between variables and constants in programming, with examples
3. Why is it important to follow best programming practices? Explain with examples
4. Explain the purpose of the break statement in loops with the help of an example.
5. What is an f-string in Python? How is it different from using the format() method?
6. Differentiate between syntactical errors and semantic errors in Python.
7. What is the difference between a Python module and a package? Explain with an example.
8. Explain how the from module import function statement works with an example.

PART D (Section I)

V. Answer any FIVE questions:

5X5 = 25

1. Discuss the applications of Computational Thinking in various fields. Give examples to support your answer.
2. You are planning a school event that includes guest speeches, games, and lunch for all students. Apply the steps of Computational Thinking to organize this event effectively.
3. Write a Python code snippet to create two variables, store your name and age in them, and print a sentence introducing yourself.
4. Explain the difference between if-else and if-elif-else statements in Python. Write an example of each to show how they work.
5. Write a Python program that asks the user to enter an integer. If the number is even, print "Even number". If it is odd, print "Odd number".
6. Explain with examples syntactical errors occur in Python.
7. Explain with example semantic errors occur in Python .
8. Create a Python module named greetings.py that contains a function say_hello() which prints "Hello, welcome!". Then, write a script to import this module and call the function.

PART D (Section II)

VI Answer any THREE questions:

10X3 = 30

1. A teacher wants to create a timetable for five classes with different subjects and teachers. Apply the steps of Computational Thinking to plan how you would solve this problem.
2. Explain the structure and working of a for loop and a while loop in Python. Write examples to illustrate each case.
3. Describe different methods of formatting output in Python. Explain string concatenation,

format() method, and f-strings with examples showing how each method works.

4. The following program runs without syntax errors, but the output is incorrect due to a semantic error. Identify the logical mistake, explain it, and rewrite the correct program.

Program to calculate the average of two numbers

num1 = int(input("Enter first number: "))

num2 = int(input("Enter second number: "))

average = num1 + num2 / 2

print("The average is:", average)

5. Define a function assign_priority() for ticketing system which assigns priorities to support tickets based on the issue type (low, medium, high and returns a priority level.

Government of Karnataka
Department of Technical Education
Board of Technical Examinations
Model Question Paper - 02

Course: Thinking Programming with Python

Course Code: 25CS211

Time: 3 Hrs

Max Marks: 100

Instructions: For Part-A questions, only the first written answers will be considered for evaluation.

PART A

I. Select the correct answer from the choices given 15x1 = 15

1. Which of the following is NOT a component of computational thinking?
A) Abstraction B) Pattern Recognition C) Iteration D) Debugging
2. Which of the following best defines an algorithm?
A) A programming language B) A step-by-step solution to a problem
C) A type of loop D) A mathematical symbol
3. Which of the following is a valid variable name in Python?
A) 2value B) value@ C) _value D) class
4. Which function is used to take input from the user in Python?
A) read() B) get() C) input() D) scan()
5. What is the result of bool(0)?
A) True B) False C) 0 D) Error
6. Which data type would you use to store "Hello, World!"?
A) int B) float C) char D) string
7. You are asked to plan a method to find the top 3 scores in a class. What kind of problem is this?
A) Searching B) Sorting C) Optimization D) Cryptographic
8. What is the role of abstraction in algorithm design?
A) Ignoring unnecessary details and focusing on relevant data
B) Executing the program faster
C) Improving syntax
D) Making the program run in reverse
9. What will be the output of: print("Hello" + "World")?
A) Hello + World B) HelloWorld C) Hello World D) Error
10. Which operator has the highest precedence in Python?
A) Addition (+) B) Multiplication (*)
C) Exponentiation (**) D) Modulus (%)
11. Which keyword is used to skip the current iteration in a loop?
A) skip B) continue C) break D) next

12. You are building an ATM system where the user must enter a 4-digit PIN and is allowed a maximum of 3 attempts. Which control structure is most suitable?
- A) for loop
 - B) while loop with a counter
 - C) if statement only
 - D) match-case
13. How do you call a function named say_hello?
- A) call say_hello()
 - B) say_hello()
 - C) def say_hello()
 - D) return say_hello()
14. What happens when break is used in the inner loop?
- A) Only the inner loop exits
 - B) Both loops exit
 - C) The program crashes
 - D) The outer loop restarts
15. In an online shopping system, if the user's cart total exceeds ₹5000, a 20% discount is applied. Otherwise, a 10% discount is given. Which is the best Python construct to implement this?
- A) match-case
 - B) nested loops
 - C) if-else
 - D) try-except

II. Fill in the blanks by choosing appropriate answer from those given in the bracket:

(syntax, recursive, import, Searching,55,)

5X1 = 05

1. _____ problems involve finding a specific item in a dataset (e.g., searching for a name in a directory).
2. The set of rules that define how code is written in a language is called _____.
3. _____ is the output of the following? `print("5" + str(5))`
4. A function that calls itself is called a _____ function.
5. To rename the numpy module as np, you write: _____ numpy as np.

PART B

III. Answer any FIVE questions: 5X2 = 10

1. What is decomposition in the context of computational thinking?
2. Define abstraction in the context of problem-solving.
3. What are tokens in Python programming?
4. Name two loop control statements in Python.
5. Which function in Python helps you display output for debugging?
6. How would you define a syntax error in Python?

7. List two advantages of using functions in Python.
8. Name the two types of functions in Python.

PART C

VI. Answer any FIVE questions:

5X3 = 15

1. Explain algorithmic thinking with a tooth brushing example.
2. Differentiate between abstraction and decomposition with suitable examples.
3. Explain the purpose of using variables in a Python program.
4. Discuss the importance of comments in Python and explain the difference between single-line and multi-line comments.
5. Describe how conditional statements work in Python. Give examples of if and if-else.
6. Explain with example how Python reports a syntax error.
7. How can a programmer systematically detect and fix semantic errors?
8. What is a nested loop in Python? Give one real-life example where nested loops are useful

PART D (Section I)

IV. Answer any FIVE questions:

5X5 = 25

1. List and explain different types of problems that require algorithmic thinking. Provide one example for each.
2. Explain any two programming paradigms and compare their key features with suitable examples.
3. Explain the concept of type casting in Python. What is the difference between implicit and explicit type conversion? Provide examples.
4. Write python equivalent expressions for following
 - i. $f = a^3 + b^3 + 3ab(a + b)$
 - ii. Check if a number is positive
 - iii. $S = a^3 + b^3 + 3ab(a + b)$
 - iv. Calculate the average of three numbers a, b, and c
 - v. Total Cost = Quantity × Unit Price – Discount
5. Describe the concept of debugging. What tools or strategies can a programmer use to identify and fix logical or semantic errors in a Python program?
6. The following Python code is meant to print all even numbers from 1 to 10. However, it contains some errors.

```
for i in range(1, 10)
    if i % 2 = 0:
        print i
    else
        continue
```

- a. Identify and explain all syntax and logical errors in the code.
 - b. Rewrite the corrected version.
7. Explain the purpose of the return statement in Python functions. How is it different from print()? Write an example to illustrate.
 8. Explain different ways to import and use built-in or user-defined modules in Python. Give examples for each.

PART D (Section II)

V. Answer any THREE questions:

10X3 = 30

1. Identify the tokens in the following Python statement and explain each of them with its category

```
if total_price >= 500.0:
    discount = total_price * 0.1 # Apply 10% discount
```

2. Create a program to manage airline ticket bookings based on the passenger's selected class: "economy", "business", or "first".
 - a. Prompt the user to input details such as name, age, destination, and class preference (economy, business, or first).
 - b. Validate inputs (e.g., ensure the name contains only letters, age is a positive integer, and class selection is valid).
 - c. Display appropriate error messages for invalid entries and allow the user to re-enter the data.
3. Create a Python program for a school that wants to automate the grading process based on a student's marks in three subjects:
 - Mathematics
 - Science
 - English

Grading Policy:

Average Marks	Grade
≥ 90	A
$75 \leq \text{average} < 90$	B
$50 \leq \text{average} < 75$	C
< 50	F

Follow best programming practices (variable naming, indentation, and comments).

4. The following program is written to convert a temperature from Celsius to Fahrenheit and Kelvin and display the result. The code is written in a single block:

```
celsius = float(input("Enter temperature in Celsius: "))
fahrenheit = (celsius * 9/5) + 32
kelvin = celsius + 273.15
print(f"Temperature in Fahrenheit: {fahrenheit:.2f} °F")
print(f"Temperature in Kelvin: {kelvin:.2f} K")
```

Rewrite this program using a **modular approach** by defining and using appropriate **functions** for:

- a. Accepting input
 - b. Converting Celsius to Fahrenheit
 - c. Converting Celsius to Kelvin
 - d. Displaying the results
 - e. Organizing program flow using a `main()` function
5. Explain the concept of variable scope in Python. How are local and global variables handled inside functions? What is the use of the **global** keyword? Provide examples.

Government of Karnataka
Department of Technical Education
Board of Technical Examinations
Model Question Paper - 03

Course: Thinking Programming with Python

Course Code: 25CS211

Time: 3 Hrs

Max Marks: 100

Instructions: For Part-A questions, only the first written answers will be considered for evaluation.

PART A

Select the correct answer from the choices given 15x1 = 15

1. What is the purpose of using pseudocode in computational thinking?
A) To execute a program B) To install software
C) To plan a solution using simple, readable steps D) To draw complex hardware diagrams
2. What type of problem is “sorting exam scores from highest to lowest”?
A) Searching problem B) Pattern recognition problem
C) Sorting problem D) Decomposition problem
3. Which of the following best defines algorithmic thinking?
A) Writing code without syntax errors
B) Designing a sequence of steps to solve a problem
C) Drawing diagrams to represent data
D) Learning multiple programming languages
4. Which of these is NOT a benefit of using algorithms?
A) Solving problems systematically B) Repeating known solutions
C) Reducing problem size D) Making random guesses
5. Which term refers to finding similarities in problems to reuse solutions?
A) Abstraction B) Pattern Recognition C) Algorithm D) Flowcharting
6. A student designs a step-by-step plan to calculate the average marks of a class. This plan is an example of:
A) Abstraction B) Algorithm C) Debugging D) Simulation
7. Which operator has the highest precedence?
A) + (Addition) B) ** (Exponent)
C) == (Comparison) D) not (Logical NOT)
8. What is a syntax error in programming?
A) Incorrect program logic
B) Violation of language rules (e.g., missing colon or parentheses)
C) A typo in a comment D) Using an undefined variable

9. What is the correct symbol for a single-line comment in Python?
 A) // B) <!-- --> C) /* */ D) #
10. Which of the following is NOT a data type in Python?
 A) int B) float C) real D) str
11. Which function is used to take input from the user in Python?
 A) scan() B) read() C) input() D) get()
12. Which of the following is used for string formatting in Python?
 A) % B) f-strings C) format() D) All of the above
13. Which of the following conditions makes a while loop infinite?
 A) while x > 0: with decreasing x B) while True: with no break
 C) while x != 0: and x = 0 D) while False:
14. How many times will "Hello" print?

```

for i in range(3):
    for j in range(2):
        if j == 1:
            continue
        print("Hello")

```

 A) 2 B) 3 C) 6 D) 1
15. What does the break statement do in a loop?
 A) Skips the next iteration B) Exits the loop immediately
 C) Repeats the loop D) Ends the program

I. Fill in the blanks by choosing appropriate answer from those given in the bracket:

(programming, import, algorithm, true, No,)

5X1 = 05

1. A recipe is a real-life example of a(n) _____.
2. The process of writing instructions for computers to solve problems is called _____.
3. _____ is the output of: if 1 and 0: print("Yes") else: print("No").
4. A while loop becomes infinite if the condition is _____ and there is no break.
5. To use the math module, you first need to _____ it.

PART B

II. Answer any FIVE questions:

5X2 = 10

1. Define algorithmic thinking.
2. Mention any two types of problems where algorithmic solutions are commonly used.
3. Define a variable in programming
4. What is a loop in programming?

5. Name any two tools or techniques used for debugging in Python.
6. What is the difference between compile-time and run-time errors in Python?
7. Define a function in the context of Python programming.
8. What is modular programming?

PART C

VI. Answer any FIVE questions:

5X3 = 15

1. Explain algorithmic thinking with a tea making example.
2. What is the significance of data types in Python?
3. Differentiate between syntax and semantic errors in Python
4. How are constants and variables different? Give examples.
5. Explain the difference between for loop and while loop in Python with example scenarios.
6. Why is testing important after fixing errors in a program?
7. Differentiate between modular programming using functions vs packages.
8. What are the advantages of using built-in modules in Python? Give examples.

PART D (Section I)

III. Answer any FIVE questions:

5X5 = 25

1. Describe the four pillars of computational thinking with suitable examples for each.
2. What are tokens in Python? List and explain different types of tokens with examples.
3. Explain the rules for creating valid variable names in Python with examples.
4. Write Python statements to print the expected output using three different string formatting methods given the following data:

```
name = "Mark"  
subject = "Thinking Programming"  
marks = 95
```

Expected Output : Student Mark has scored 95 marks in Thinking Programming.

5. Explain the different types of flow control statements in Python. Describe their purpose and give one example for each:

6. The following program is supposed to skip the number 4 and 14 and print the rest from 1 to 20. Find and fix the errors.

```
for i in range(1,20):  
    if i = 4:  
        continue  
    print i
```

7. Why are functions needed in Python programming? Explain how to create and call a function with and without arguments. Give examples.
8. What is the significance of using modules and packages in Python? How do they help in large program development?

PART D (Section II)

IV. Answer any THREE questions:

10X3 = 30

1. Identify the tokens in the following Python statement and explain each of them with its category

```
while count < 10:  
    result = result + value_1 - 3
```

2. Create a program that simulates an ATM machine to check:
- If the entered PIN is correct, allow the user to proceed.
 - Validate that the withdrawal amount doesn't exceed the account balance.
 - Ensure that the withdrawal amount is in multiples of a specific denomination (e.g., Rs100).
3. Create a Python program for a bookstore that wants to automate discount calculation based on the total purchase amount.

Discount Policy:

Total Purchase Amount (₹)	Discount Offered
≥ ₹5000	25%
₹3000 to < ₹5000	15%
₹1000 to < ₹3000	5%
< ₹1000	No Discount

Follow best programming practices (variable naming, indentation, and comments).

4. The following Python code calculates the average marks of a student in 3 subjects and prints the corresponding grade:

```
math = float(input("Enter marks in Mathematics: "))
science = float(input("Enter marks in Science: "))
english = float(input("Enter marks in English: "))
average = (math + science + english) / 3
if average >= 90:
    grade = "A"
elif average >= 75:
    grade = "B"
elif average >= 50:
    grade = "C"
else:
    grade = "F"
print(f"Average Marks: {average:.2f}")
print(f"Grade: {grade}")
```

Rewrite the above program using a modular approach by defining and using appropriate functions such as:

- A function to get input from the user
 - A function to calculate average
 - A function to determine grade
 - A main function to organize the program flow
5. Describe the different types of function arguments in Python with suitable examples.
