

International Institute of Information Technology, Hyderabad
(Deemed to be University)

CS6.201: Introduction to Software Systems
IIIT Hyderabad Question cum Answer Booklet
Final Semester Examination

Exam Duration: 2 Hr

Total Marks: 40

Roll No: _____ **Programme:** _____

Room no: _____ **Seat No:** _____

Special Instructions:

1. If the ROLL NO section is blank, you will be awarded ZERO marks. Only use a PEN (blue/black) to answer the questions. If you use a pencil, you will be awarded ZERO marks.
2. Please provide your answers in the same paper. No additional answer sheets will be provided.
3. Please make reasonable assumptions (if required) and clearly state them in your answer.

Marks Table (To be filled by the Evaluator)

Total Marks	Awarded Marks	Remarks	Evaluator
40			

General Instructions to the students

1. Place your Permanent / Temporary Student ID card on the desk during the examination for verification by the Invigilator.
2. Reading material such as books (unless open book exam) are not allowed inside the examination hall.
3. Borrowing writing material or calculators from other students in the examination hall is prohibited.
4. If any student is found indulging in malpractice or copying in the examination hall, the student will be given 'F' grade for the course and may be debarred from writing other examinations.

Best of Luck

Answer in ONE sentence only. Each question carries one mark. [5 Marks]

Q1: Explain the concept of Masking in NumPy.

Q2: Consider below HTML+CSS Script. What the color of the paragraph text and why?

```
<!DOCTYPE html>
<head>
<style>
    .highlight {
        color: green;
    }
</style>
</head>
<body>
    <p class="highlight" style="color: blue;">This is a paragraph.</p>
</body>
</html>
```

Q3: NodeJS is a _____ environment that is built on _____. Choose the right option from the below provided options

- a) Run time, V8 Engine of Google Chrome
- b) Compile time, SpiderMonkey Engine of Mozilla Firefox
- c) Run time, SpiderMonkey Engine of Mozilla Firefox
- d) Compile time, V8 Engine of Google Chrome

Q4: What is a global object in NodeJS called?

Q5: List two methods in NodeJS used for error handling. (Do not write any code. Just provide method name and keywords to be used).

Answer in one or two sentences only. Each question carries two Marks. [20 Marks]

Q6. Using Python, list any two methods used to read from a text file and two methods used to write to a text file. Provide a one-line explanation for each method and what do they return as output.

Q7: Explain the rule for reshaping a NumPy array. In your explanation, provide examples of reshaping operations that will succeed and those that will fail. For each example, specify the size of the array being reshaped and the target shape.

Q8: In case of HTML, what is the difference between attributes - classes and IDs? When would you use each? Can an element have multiple classes or multiple IDs? Justify your answer with an example.

Q9: Given the 2D NumPy array A defined as:

```
A = [[16.2, 20.5, 15.7, 3.1, 14.9],
      [13.3, 1.2, 8.9, 12.5, 19.6],
      [ 4.7, 7.4, 17.3, 5.6, 9.3],
      [10.1, 6.8, 2.5, 18.1, 11.2]]
```

First, slice the array using NumPy to extract the first three rows and the last three columns. Then, apply masking operations in NumPy to modify the sliced array as follows: replace all values that are greater than 15 and less than 18 with **0**, and replace all values that are between 5 and 10 (inclusive) with **-1**. Finally, display the resulting output after the masking operations.

Q10: In case of JavaScript, how are primitive and non-primitive datatypes in JavaScript stored in memory? Give at least one example of both a primitive and a non-primitive datatype.

Q11: Explain CORS and its significance? Provide an example of application would fail without CORS.

Q12: A Retail Company, RetailDB Inc., uses a MongoDB database named **RetailDB** to manage its operations. The database contains three main collections: customers, orders, and products.

- Collection: customers
 - id (unique identifier)
 - name (string)
 - email (string)
 - address (an embedded document with fields: street, city, zip)
 - signUpDate (date)
- Collection: orders
 - id (unique identifier)
 - customer id (refers to a document in customers)
 - orderDate (date)

- items (an array of embedded documents, each containing: product id (refers to a document in products))
- quantity (number)
- priceAtPurchase (number)
- status (string) e.g., "completed", "pending", etc.)
- Collection: products
 - id (unique identifier)
 - name (string)
 - category (string)
 - price (number)
 - stock (number)

Based on the above Data, answer the following questions:

- a. Write a MongoDB `find()` query to retrieve all customers who have signed up in the last 30 days. Assume the current date is available as `new Date()`
- b. Write a MongoDB query (or series of queries) to decrement the stock of a product by the quantity purchased. Assume the product document is identified by a known product id and the purchased quantity is stored in a variable `qtyPurchased`

Q13: Write a BASH Script to check if a number input is a natural number.

Q14: In case of FASTAPI, explain the difference between a query parameter and a path parameter with an example including both.

Q15: Considering JavaScript, answer the following. Please note that the output should exactly match the expected output in each of the subpart, for example 3 and “3” are different, false is not equal to “0”. Fill the blanks with correct answers.

```
a) Let x = 5; x += (x *= 2); console.log(x); _____  
b) console.log('5' + 2 - 1); _____  
c) console.log(false === '0');  
    var a = 1;  
    function endsem() {  
        console.log(a); _____  
        var a = 2;  
        return a;  
    }  
    var output = endsem() + typeof a;  
    console.log(output); _____
```

Answer below in 3-5 sentences only. Each question carries three Marks. [15 Marks]

Q16: Write a Python program that opens a file named `quiz2_marks.txt` in read mode using UTF-8 encoding. The program should read all lines from the file into a list [1]. It must then check each line, and if a line does not contain the string `"great_avg"` (case-insensitive), the program should append the line `"INVALID ENTRY\n"` to the end of the file, ensuring that the original content is not deleted or overwritten [1]. Use a `try-except` block to handle possible exceptions, and ensure file is opened using the `with` statement [1]. *[Hint: You'll need to convert the line to lowercase to make the check case-insensitive].*

Q17: Write a code in NodeJS to import the file system module and read a file's content at the path
“./file.txt”

Q18: Explain INNER JOIN and OUTER JOIN? Provide one example each.

Q19: Consider a relational table called **EMPLOYEE** with field:datatype – (EmployeeID:INT, FirstName:VARCHAR, LastName:VARCHAR, Salary:DECIMAL, Department:VARCHAR). Here EmployeeID is a Unique Identifier(PK). Write SQL queries for following:

- a. Find the second highest salary among employees in the 'HR' department
- b. Which department spends the most money on employee salaries?
- c. Provide the count of employees for a given department.

Q20: Based on the below code, answer the questions that follow:

```
from fastapi import FastAPI
from fastapi.middleware.cors import CORSMiddleware
app = FastAPI()
origins = ["http://localhost:3000", "https://myapp.com"]
app.add_middleware(
    CORSMiddleware,
    allow_origins=origins,
    allow_credentials=True,
    allow_methods=["GET", "POST"],
    allow_headers=["*"],
)
@app.get("/")
def read_root():
    return {"message": "Hello, world!"}
```

- a. Which origins are allowed to access this API?
- b. Can a PUT request be sent from the frontend? Why or why not?
- c. What does `allow_credentials=True` do?