Central University of Rajasthan

Center for Distance and Online Education (CDOE)

Dear Learner,

Greetings from the CDOE!

As you are aware, every student enrolled in the ODL Programme is required to write and submit assignments for each course. These assignments form an important component of the continuous assessment and carry **30% weightage** of the overall grade for each course.

Please carefully note the following instructions:

General Instructions

1. Please remember to attach the designated cover page on every assignment you submit. The format of cover page is attached for your reference.
2. All sections of the assignment are compulsory in nature. All questions are to be attempted, except for those where options are provided.
3. Please write the answer mentioning the correct corresponding question number given in the assignment.
4. Please write on continuous pages and number each page.
5. All assignments should be handwritten. Typed or printed assignment will not be accepted.
6. it is strongly recommended to keep a copy (photocopy or scanned) of the assignment sent by you for your record.
7. **The last date for submitting assignments is 10.06.2026.** Submission of assignments is required to appear in the End Semester Examination.
8. Assignments can be deposited at CDOE, Curaj or sent through post to **Director, Centre for Distance and Online Education (CDOE), Room 102, Administration Building, Central University of Rajasthan, Bandarsindari, District: Ajmer – 305817, Rajasthan**.

Director

Centre for Distance and Online Education (ODL & OP)

राजस्थान केन्द्रीय विश्वविद्यालय
Central University of Rajasthan

Assignment

Open and Distance Learning Programme

Learner's Name : .....

Enrollment Number : .....

Academic year and Session : .....

Programme Name and Code : .....

Course Code : .....

Course Title : .....

.....

Learner's Signature

Centre for Distance and Online Education (CDOE)

Room 102, Administration Building, Central University of Rajasthan

N.H. 8, Bandarsindari, District: Ajmer – 305817, Rajasthan

Website: www.curaj.ac.in | Email: cdoe@curaj.ac.in | Phone : 01463 257 556

Central University of Rajasthan

Centre for Distance and Online Education

Open and Distance Learning Programme

Assignment

Programme Name: M.Sc (Computer Science) **Programme Code: ODLMSCS**

First Semester

Instructions:

1. In the M.Sc (Computer Science) programme, two assignments have been planned for the continuous evaluation of the learner in each course.
   [Note : for course title " Advanced Python Programming" , Assignment 2 will be practical]
2. The learner can appear in the term-end examination of the concerned course only after completing both assignments and submitting them within the stipulated time period.
3. Each assignment carries 15 marks. Thus, a total of 30 marks are allocated for assignments for each course.
4. The assignments must be written in the learner's own handwriting. Typed or printed assignments will not be accepted.
5. The learner should complete the sessional assignments within the stipulated time and send them by post or submit them in person at the following address:

Address for Submission of Sessional Assignments:

Director, Centre for Distance and Online Education (CDOE), Room - 102, Administration Building, Central University of Rajasthan, Bandarsindari, Jaipur – Ajmer highway, District - Ajmer – 305817, Rajasthan.

Title of the Course: Introduction to Artificial Intelligence
Course Code: 6.0 ODLCSC01
Assignment: 01

Maximum Marks: 15

Short Answer type Questions: (attempt all Questions) **(Word Limit: 60 - 80)**

Q. 01 What is Artificial Intelligence? [1]

Q. 02 Define state space in AI. [1]

Q. 03 What are the applications of AI in real life ? [1]

Q. 04 What is a greedy best-first search algorithm ? [1]

Q. 05 State Bayes' Theorem. [1]

Long Answer type Questions: (attempt all Questions) **(Word Limit: 300 - 400)**

Q. 01 Differentiate between **Informed** and **Uninformed** Search techniques. [5]

Q. 02 Explain the working of **A* Search Algorithms**. [5]

I. Define the evaluation function.
II. Explain admissibility and optimality.
III. Give one example where A* is preferred over other algorithms.

Assignment: 02

Maximum Marks: 15

Short Answer type Questions: (attempt all Questions) **(Word Limit: 60 - 80)**

Q. 01 What is the goal of the **Minimax Algorithm**? [1]

Q. 02 Define branching factor in search algorithms. [1]

Q. 03 What is a **Hidden Markov Model** (HMM)? [1]

Q. 04 Define hill climbing and mention one drawback. [1]

Q. 05 Define uncertainty in AI. [1]

Long Answer type Questions: (attempt all Questions) **(Word Limit: 300 - 400)**

Q. 01 Compare the following search strategies based on time complexity , space complexity, completeness, and optimality : [5]

I. Breadth First Search (BFS)
II. Depth First Search (DFS)

Q. 02 Explain **Alpha-Beta Pruning** in adversarial search. [5]

I. How it improves efficiency of Minimax
II. Provide an example tree illustration
III. Discuss time complexity improvement.

Title of the Course: Advanced Algorithms
Course Code: 6.0 ODLCSC02
Assignment: 01

Maximum Marks: 15

Short Answer type Questions:(attempt all Questions) **(Word Limit: 60 - 80)**

Q. 01 Define the **Divide and Conquer** strategy. [1]

Q. 02 What is the key idea behind **Dynamic Programming**? [1]

Q. 03 What is a randomized algorithm for primality testing? [1]

Q. 04 State fractional Knapsack problem.. [1]

Q. 05 Define **backtracking**. [1]

Long Answer type Questions: (attempt all Questions) **(Word Limit: 300 - 400)**

Q. 01 Compare the following algorithm design paradigms: [5]

I. Divide and Conquer
II. Greedy Method
III. Dynamic Programming

Q. 02 Explain the **0/1 Knapsack problem** and its solution using **Dynamic Programming**. [5]

OR

Show the process of quick sort by taking an example. Derive and solve recurrence equations for the best-case behaviour of the quick sort.

Assignment: 02

Maximum Marks: 15

Short Answer type Questions: (attempt all Questions) **(Word Limit: 60 - 80)**

Q. 01 What is the order of a B-Tree? [1]

Q. 02 What is the maximum number of children a node can have in a B-Tree of order m?[1]

Q. 03 Define time and space complexity. What do you understand by the Best-case and Worst-case complexity of an algorithm? [1]

Q. 04 What do you mean by string-matching? [1]

Q. 05 What is a feasible solution? [1]

Long Answer type Questions: (attempt all Questions) **(Word Limit: 300 - 400)**

Q. 01 Compare **Backtracking** vs **Branch and Bound.** [5]

Q. 02 Solve the following recurrence relation using the **Master Theorem**:

$T(n) = 8T(n/2) + n^2$ [5]

AND

Obtain a set of optimal Huffman codes for the messages (m1, m2, m3, m4, m5, m6) with relative frequencies (q1, q2, q3, q4, q5, q6) = (45, 13, 12, 16, 9, 5). Draw the decode tree for this set of codes. Also write time complexity for Huffman encoding.

Title of the Course: Advanced Python Programming
Course Code: 6.0 ODLCSC03
Assignment: 01

Maximum Marks: 15

Short Answer type Questions: (attempt all Questions) **(Word Limit: 60 - 80)**

Q. 01 What is **IDLE** in Python? [1]

Q. 02 What is the difference between a class variable and an instance variable? [1]

Q. 03 Given the string text = "Python Programming", what will be the output of the slice text[7:14]? Explain how slicing works. [1]

Q. 04 Define polymorphism. Give a simple example of how the + operator exhibits polymorphic behavior. [1]

Q. 05 What is the primary difference between a **NumPy Array** and a **Pandas Series** regarding the indexing of data? [1]

Long Answer type Questions: (attempt all Questions) **(Word Limit: 300 - 400)**

Q. 01 Create a Python class named Student that includes: [5]

A. A constructor to initialize a name and a list of three marks.
B. A method named calculate_average() that returns the average of the marks.
C. An instance method to display the student's name and their calculated average.

Q. 02 Design a simple management system for a Library by following the requirements below. Ensure your code follows proper Python indentation and naming conventions. [5]

A. Define a class named Book. Implement a constructor to initialize the following attributes: title, author, and a private attribute named __price.
B. Within the Book class, write an instance method (e.g., show_info()) that prints the title, author, and price of the book.
C. Create a subclass named Textbook that inherits from the Book class. Add a new attribute specifically for this subclass called subject.
D. Create an object (instance) of the Textbook class with sample data. Use this object to call the display method created in part (B).

Title of the Course: Internet of Things(IoT)
Course Code: 6.0 ODLCSC12
Assignment: 01

Maximum Marks: 15

Short Answer type Questions: (attempt all Questions) **(Word Limit: 60 - 80)**

Q. 01 What is IoT (Internet of Things)? [1]

Q. 02 What is data aggregation? [1]

Q. 03 What is a Wireless Sensor Network (WSN)? [1]

Q. 04 What is the Zigbee **protocol** used for? [1]

Q. 05 What is **routing** in WSN? [1]

Long Answer type Questions: (attempt all Questions) **(Word Limit: 300 - 400)**

Q. 01 Discuss the architecture and communication protocols of IoT. [5]

A. Components of IoT
B. Explain any two protocols such as MQTT, Zigbee, or RPL
C. Applications of IoT

Q. 02 Discuss various types of sensors used in IoT and their real-world applications. [5]

Assignment: 02

Maximum Marks: 15

Short Answer type Questions:(attempt all Questions) **(Word Limit: 60 - 80)**

Q. 01 What is latency in networks ? [1]

Q. 02 Define QoS (Quality of Service). [1]

Q. 03 What is collision avoidance ? [1]

Q. 04 What is the publish-subscribe model ? [1]

Q. 05 What is multi-hop communication ? [1]

Long Answer type Questions: (attempt all Questions) **(Word Limit: 300 - 400)**

Q. 01 Discuss the multi-layered architecture of IoT and explain the role of key communication protocols at each layer. [5]

Q. 02 Analyze the different routing strategies used in Wireless Sensor Networks (WSN), specifically focusing on data-centric, hierarchical, and location-based approaches. [5]

Title of the Course: Distributed Systems

Course Code: 6.0 ODLCSC15

Assignment: 01

Maximum Marks: 15

Short Answer type Questions: (attempt all Questions) **(Word Limit: 60 - 80)**

Q. 01 Define a Distributed System. Explain its key characteristics with suitable example.[2]

Q. 02 What is inter-process communication (IPC) ? [2]

Q. 03 Explain the concept of Remote Procedure Call (RPC) and its basic operation steps. [2]

Q. 04 What is a Thread, and how does it differ from a process? [2]

Q. 05 Define Concurrency Control in distributed file systems. [2]

Long Answer type Questions: (attempt all Questions) **(Word Limit: 300 - 400)**

Q. 01 Explain the various Architectural Models of Distributed Systems in detail. [5]

Assignment: 02

Maximum Marks: 15

Short Answer type Questions: (attempt all Questions) **(Word Limit: 60 - 80)**

Q. 01 Define Virtualization and its importance. [2]

Q. 02 What is deadlock detection in distributed systems ? [2]

Q. 03 Explain distributed file systems and their features. [2]

Q. 04 Explain Sun NFS architecture. [2]

Q. 05 Discuss concurrency control and recovery. [2]

Long Answer type Questions: (attempt all Questions) **(Word Limit: 300 - 400)**

Q. 01 Compare the NTFS, ext2, and ext3 file systems and discuss their key Characteristics, Advantages, and Limitations. [5]