MASTER OF COMPUTER APPLICATIONS (MCA_NEW)

ASSIGNMENTS
OF MCA_NEW (2Yrs) PROGRAMME
SEMESTER-III

(January - 2023 & July - 2023)

MCS-224, MCS-225, MCS-226, MCS-227

MCSL-228, MCSL-229

SCHOOL OF COMPUTER AND INFORMATION SCIENCES
INDIRA GANDHI NATIONAL OPEN UNIVERSITY
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Important Notes

1. Submit your assignments to the Coordinator of your Study Centre on or before the due date.
2. Assignment submission before due dates is compulsory to become eligible for appearing in corresponding Term End Examinations. For further details, please refer to Programme Guide of MCA (2Yrs).
3. To become eligible for appearing the Term End Practical Examination for the lab courses, it is essential to fulfill the minimum attendance requirements as well as submission of assignments (on or before the due date). For further details, please refer to the Programme Guide of MCA (2yrs).
4. The viva voce is compulsory for the assignments. For any course, if a student submitted the assignment and not attended the viva-voce, then the assignment is treated as not successfully completed and would be marked as ZERO.

Course Code	**:**	**MCS-224**
Course Title	**:**	**Artificial Intelligence and Machine Learning**
Assignment Number	**:**	**MCA_NEW(III)/224/Assign/2023**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last date of Submission	**:**	**30th April, 2023 (for January session)** **31st October, 2023 (for July session)**

This assignment has sixteen questions of 5 Marks each, answer all questions. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation.

Q1. Differentiate among Descriptive, Predictive and Prescriptive analytics performed under Machine Learning.

Q2. What are Intelligent agents in AI? Briefly discuss the properties of Agents.

Q3. Find the minimum cost path for the 8-puzzle problem, where the start and goal state are given as follows:

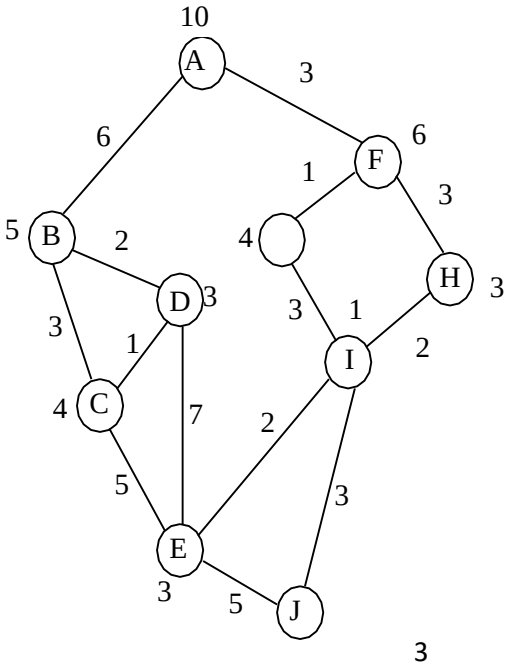
1	2	3
4	8	-
7	6	5

Start State

1	4	7
2	8	6
3	-	5

Goal State

Q4. Consider the following graph. The numbers written on edges represents the distance between the nodes and the numbers written on nodes represents the heuristic value. Find the most cost-effective path to reach from Noda A to node J using A* Algorithm.



Q5. Discuss the transforming an FOPL Formula into Prenex Normal Form with suitable example. Also, discuss Skolomization with a suitable example.

Q6. Explain Forward Chaining Systems and Backward Chaining Systems with a suitable example for each.

Q7. Draw a semantic network for the following English statement:
Shyam struck Neha and Neha's father struck Shyam.

Q8: Write short notes on following
a) Reinforcement Learning b) Ensemble method

Q9. Explain the phases of machine learning cycle

Q10. Explain working of Back Propagation and Convolution Neural Network

Q11. What is pattern search? Discuss the Apriori Algorithm for pattern search.

Q12. Explain Naïve Bayes Classification Algorithm with a suitable example.

Q13. Explain K-Nearest Neighbors classification Algorithm with a suitable example.

Q14. For the given points of two classes red and blue:
Blue: { (1, 2), (2,1), (1,-2), (2,-2)}
Red : { (4,-1), (4,1), (5,-1), (6,1)}

Plot a graph for the red and blue categories. Find the support vectors and optimal separating line.

Q15. Explain PCA with a suitable example.

Q16. Explain A priory Algorithm with a suitable example

Course Code	**:**	**MCS-225**
Course Title	**:**	**Accountancy and Financial Management**
Assignment Number	**:**	**MCA_NEW(III)/225/Assign/2023**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last date of Submission	**:**	**30th April, 2023 (for January session)** **31st October, 2023 (for July session)**

Note: This assignment has five questions. Answer all questions. 20 marks are for viva voce. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation.

Q1. In what way the preparation of the cash flow statement as per the existing AS-3 is different from the converged IND AS-7? Explain briefly the steps to be followed in preparing a Cash Flow Statement. **(6+10 Marks)**

Q2. "Investment alternative yielding the highest discount rate of return is the most acceptable". Will this always be true? Explain. **(16 Marks)**

Q3. What new developments in Accounting have taken place over the past 20-25 years? Examine the main factors which have affected such developments. **(8+8 Marks)**

Q4. What are the objectives of Inventory Management? Explain the A-B-C technique of Inventory management. How is it useful as a tool of Inventory Management? **(4+6+6 Marks)**

Q5. "Assuming wealth maximization to be the objective of Financial Management", explain how the financing, investment and dividend decision of a company can help to attain this objective? **(16 Marks)**

Course Code	**:**	**MCS-226**
Course Title	**:**	**Data Science & Big Data**
Assignment Number	**:**	**MCA_NEW(III)/218/Assign/2023**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last Dates for Submission	**:**	**30th April, 2023 (for January session)** **31st October, 2023 (for July session)**

This assignment has sixteen questions of 5 Marks each, answer all questions. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation.

Q1: Describe data science. What uses does it have? In the context of data analysis, define the terms descriptive, exploratory, and predictive.

Q2: Discuss the need for Statistical Hypothesis Testing with the help of an example.
Explain types of Errors in Hypothesis Testing.

Q3: Why do need Data Preprocessing? Explain different Quality Measures in Data Preprocessing. Discuss the different strategies for Data Handling.

Q4: A class has 25 students. Create a data set of marks of the students in Mathematics out of a maximum of 50 marks. Discuss and draw, which chart will be best for Visualization & Interpretation. Justify your reasons in support of your answer.

Q5: What is the need for Big data? Explain 3 V's. Discuss the master/slave Hadoop architecture with the help of an example.

Q6: Explain the concept of Map-Reduce with the help of an example.

Q7: What is the purpose of using Apache SPARK, HIVE and HBASE, explain with supporting example.

Q8: What isNoSQL database? Discuss how does a Column Database and Document database Work? List and briefly discussGraph database examples.

Q9: Explain the Jaccard similarity of sets with the help of an example. What are the ways offinding similarity between two documents? Also, define the term collaborative filtering.

Q10: Explain Data Stream Bloom filter with the help of an example. Why do we need for Bloom filter? Discuss the working of Bloom filter. Explain the Flajolet-Martin algorithm.

Q11: What is PageRank? Discuss the basic principle of flow model in PageRank. Explain different mechanisms of finding pagerank?

Q12: Explain the process and issues of the following:
Advertising on web, Recommendation system, Mining of social networks.

Q13: Discuss different data structures in R. Write program using R for the following tasks:

(i) Computation of income tax of a vector of size 10, consisting of the total annual income of 10 different persons. The tax computation should be 10%, if annual income is below 5 lakhs and 20% if it is above 5 lakhs.

(ii) Matrix addition, subtraction and multiplication
(iii) Finding inverse of a matrix

Q14: Create a sample data of the marks of 20 students in five different subjects using MSExcel. Discuss the different chart and graphing library packages supported by R programming language. Write programs using R programming language to create four different plots using this data.

Q15: Discuss the function supported in R language to differentiate between linear regression and multiple regression. Write programs using R programming language to support your answer with any sample data.

Q16: Discuss the Classification, Clustering and Association Rules with different examples. Explain, where we can use Random Forest Algorithm? Use R programming language to discuss Random Forest Algorithm.

Course Code	**:**	**MCS-227**
Course Title	**:**	**Cloud Computing and IoT**
Assignment Number	**:**	**MCA_NEW(III)/227/Assign/2023**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last Dates for Submission	**:**	**30th April, 2023 (for January session)** **31st October, 2023 (for July session)**

This assignment has four questions of 20 Marks each, amounting to 80 marks. Answer all questions. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation.

Q1: What is Cloud Computing ? How Cloud Computing differs from Cluster Computing , Grid Computing ? Explain the characteristics of Cloud Computing. Also, give benefits & applications of Cloud Computing.

Q2: Explain the following types of network connectivity in cloud computing:

1. Public Inter cloud Networking
2. Private Inter cloud Networking
3. Public Intra cloud Networking
4. Private Intra cloud Networking

Q3: Explain the importance of virtualization in cloud computing? How security is achieved through virtualization? Emulation and isolation are important features of virtualization. Justify the statement.

Q4: What is an Hypervisor? Compare the functionality of Type-1 and Type-2 Hypervisor with the help of suitable block diagram for each, also give advantages and disadvantages of each.

Q5: What is Tenancy in context of cloud computing ? Compare Multi-Tenancy model and Single Tenancy model of resource sharing. Explain the various ways through which Multi-Tenancy can be implemented.

Q6: Explain the term Resource Provisioning in context of cloud computing. Also, explain the various approaches used for Resource Provisioning. Discuss the problems of Over-provisioning and Under-provisioning.

Q7: Explain the term Internet of Things (IoT).List and explain the various components used to implement IoT. Give characteristics of IoT. Briefly discuss the following types of IoT:

1. Consumer IoT (CIoT)
2. Industrial IoT(IIoT)
3. Infrastructure IoT
4. Internet of Military Things (IoMT)

Q8: What is Edge computing? Discuss the working of Edge computing. Also, describe the relation between Edge computing, Fog computing and Cloud Computing, with the help of a suitable block diagram ?

Course Code	**:**	**MCSL-228**
Course Title	**:**	**AI and Machine Learning Lab**
Assignment Number	**:**	**MCA_NEW(III)/L-228/Assign/2023**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last Dates for Submission	**:**	**30th April, 2023 (for January session)** **31st October, 2023 (for July session)**

This assignment has Six Questions. Answer all the questions. Total marks is 50 and the max marks for each question is mentioned. Your Lab Records will carry 30 Marks (marks for each question is mentioned). Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the programme guide for the format of presentation.

Note: You must execute the program and submit the program logic, sample input and output along with the necessary documentation. Assumptions can be made wherever necessary.

Q1: Implement Water Jug problem in Python. **(7 marks + 5 marks)**

Q2: Discuss Naïve Byes algorithm and write the Python code to demonstrate the execution of Naïve Byes algorithm on the dataset of your choice. **(8 marks + 5 marks)**

Q3. Implement linear regression in Python. Take the data set as input of your choice. **(8 marks + 5 marks)**

Q4. Take a real time example to implement KNN- classification algorithm in Python. **(9 marks+ 5 marks)**

Q5. Take a Data set as per your choice, implment and execute on different inputs of K-Means clustering algorithm **(9 marks+ 5 marks)**

Q6. Implement Apriori Algorithm in Python. Take the data set as input of your choice. **(9 marks+ 5 marks)**

Note: Make necessary assumptions if any.

Course Code	**:**	**MCSL-229**
Course Title	**:**	**Cloud and Data Science Lab**
Assignment Number	**:**	**MCA_NEW(III)/L-229/Assign/2023**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last Dates for Submission	**:**	**30th April, 2023 (for January session)** **31st October, 2023 (for July session)**

The assignment has two parts A and B. Answer all the questions. Each part is for 20 marks. The lab records of the Cloud computing Lab and Data Science lab carries 20 Marks each (total 40 marks). Rest 20 marks are for viva voce. You may use illustrations, diagrams and screenshots to enhance the explanations. Please go through the guidelines regarding assignments given in the MCA(New) Programme Guide for the format of the presentation. If any assumptions are made, please state them.

PART-I: Cloud Computing Lab

Q1. **(10 Marks)**

(a) Use Google Docs and create a word document of your *completed projects and achievements* of the last year and store it on Google Drive and provide permission to ***view*** the document. Share this document with any two hypothetical employing agencies.

(b) Use Google Sheets and create a spreadsheet which contains yearly details of the monthly salaries of 10 different employees in the heading – gross pay, provident fund deductions, income tax deduction and net salary. Find the total tax deducted from the salary of each employee. Also, compute total tax deduction based on yearly Gross Salary and provident fund deductions as per the formula given below. Find the tax due or refund for each employee from this data.

Yearly Salary = Yearly Gross Salary – (2,00,000 or Total Provident fund deduction whichever is low.)

Yearly tax computation:

If yearly salary < 5 lakhs No tax
If yearly salary >= 5 lakhs but < 10 lakhs, then
Tax is 20% on salary above 5 lakhs
If yearly salary > 10 lakhs, then
Tax is (1 lakh + 40% on salary above 10 lakhs)

(c) Use Google Slides and prepare 9 slides on the topic "Cloud Architectures" in a group of 3 students each by sharing the Google Slides in your group in ***edit*** mode. Every group member should make three slides each and contribute to the slides of other group members.

Q2. **(5 Marks)**

Create a list of cloud services provided by ***AWS***. List the steps to set up an Elastic Compute Cloud (EC2) instance. Do these services lower the cost of operation of an organisation? Justify your answer.

Q3. **(5 Marks)**

Use Google App Engine to write a Google app engine program to generate prime numbers up to a number given number *n* and deploy it to Google cloud.

PART-II: Data Science Lab

Q1. **(2+3+5 = 10 Marks)**

The height of 50 adults in the age group 30-40 years, measured in centimetres, is given below. Perform the tasks given in (i) to (iii) using R programming.

164	170	161	158	168	160	172	163	153	162
165	160	168	148	178	154	182	160	189	170
160	145	153	178	179	182	162	171	165	185
171	179	159	158	150	167	162	158	172	164
165	163	167	187	165	175	171	162	165	159

(i) Find the minimum and maximum height.
(ii) Find the percentage of adults, whose height is in between 160 and 170 centimetres.
(iii)Create and draw the frequency distribution with the help of a relevant graph.

Q2. **(10 Marks)**

The following data were collected on the height and weight of 16 students. Use R programming to fit a linear regression line to predict the effect of height on the weight of a student. Also, predict the weight of the student whose height is 160 centimetres:

Student Number	Height (Centimetres)	Weight (Kgs)
1	130	49
2	110	39
3	125	48
4	140	55
5	160	65
6	155	66
7	120	59
8	115	40
9	120	43
10	135	45
11	145	50
12	135	49
13	125	45
14	170	75
15	133	50
16	143	55