Programme: MCA   Session: 2022- 2023
Semester: 4th   Max. Time: 3 Hours
Course Title: Wireless Sensor Network and Internet of Things   Max. Marks: 70
Course Code: SBS CS 01 04 27 C 4004

Instructions:

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half

Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks.

Q 1.   **(4X3.5=14)**

    a) What is Smart Grid?

    b) Define PTC Thingworx.

    c) Explain Actuators with the help of diagram.

    d) Explain the concept of interdependencies.

    e) Define "Things" in **Internet of Things(IOT).**

    f) Discuss the Applications of IOT.

    g) What is Sensing?

Q 2.   **(2X7=14)**

    a) What is Mobile WSNs ? also explain the concept of Medium Access Control in Wireless

        Networks.

    b)   What is Routing ? Explain in the context of WSNs.

    c) Explain topology management in Wireless Sensor Network.

Q 3.   **(2X7=14)**

    a) Discuss the different hardware components of wireless sensor network.

    b) Discuss the design principles for wireless sensor network.

    c) Discuss following:

        • Execution Environments

        • Sensor Nodes

Q 4. (2X7=14)

a) What is internet of things? Discuss the concept of machine to machine communications.

b) Discuss various layers in building an IoT application with the help of diagram.

c) Discuss IoT(Internet of Things) ecosystem with the help of diagram.

Q 5. (2X7=14)

a) Discuss various kind of IOT frameworks with the help of suitable example.

b) Discuss the scope of IOT (Internet of things) in agriculture and healthcare with suitable examples.

c) Explain following with suitable examples:

    a. Smart Homes

    b. Connected Vehicles

CENTRAL UNIVERSITY OF HARYANA, MAHENDERGARH (HR)

Term End Examinations June 2023

Programme: Master of Computer Applications(MCA)   **Session: 2022-23**

Semester: 4th Semester   **Max. Time:** 3 Hrs

Course Title: Data Science with R Programming   **Max. Marks: 70**

Course Code: SBS CS 01 04 26 C 4004

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q1.   (4X3.5=14)

   a) Differentiate between unstructured and structured data.

   b) Explain different data modeling techniques.

   c) Write a program that creates a matrix. The rows of the matrix should be the name of the students and columns of the matrix should be marks obtained by the students in Internals and Externals.

   d) Create a vector having some values including NAs. Now count the number of NAs in the vector.

   e) Write an R script to read and write CSV, Text, Excel data sheet

   f) Differentiate between null hypothesis and alternate hypothesis with example.

   g) Explain z-test used for statistical analysis.

Q 2.   (2X7=14)

   a) Explain with example how data serilization is done?

   b) Discuss different data collection strategies.

   c) Elaborate various components of Hadoop Eco-System

Q3.   (2X7=14)

   a) How data frames are created? Explain the any four out of following with respect to Data Frames (DF) using example:

      i.   referencing a column in DF

      ii.   modifying the values in DF

      iii. adding a column in DF

iv.   deleting a column in DF

v.   transposing a DF

b) Explain different data types in R with example.

c) Discuss the following operations with respect to matrices in R:

    i.   creation of matrix

    ii.   accessing the elements of the matrix

    iii. specifying dimensions names

    iv. combining two matrices

    v.   functions on matrices

Q 4.   (2X7=14)

a) Explain following plots in R with example: histogram, box plot, bar plot, pie chart

b) Let A= $\begin{bmatrix} -5 & 2 \\ -7 & 4 \end{bmatrix}$. Find its eigenvalues and eigenvectors w.r.t. each eigenvalue. Also, state the corresponding function in R.

c) Solve the linear equations to find x and y, $141x + 103y = 217$; $103x + 141y = 27$. Also, write an R script for the same.

Q 5.   (2X7=14)

a) Discuss the mathematical aspect behind logistic regression and also write which function of R is used to modeling and prediction.

b) State central tendancy and dispersion in detail with example. Also, highlight the difference between them.

c) Explain Chi-Square test used for statistical analysis with example.

CENTRAL UNIVERSITY OF HARYANA

Term End Examination June 2023

Programme: MASTER OF COMPUTER APPLICATION

Semester: Fourth

Course Title: Distributed and Cloud Computing

Course Code: SBS CS 01 04 14 E 3104

Session: 2022-23

Max. Time: 3 Hours

Max. Marks: 70

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1.   (4X3.5=14)

   a) Define cloud computing.

   b) Explain grid computing.

   c) Describe SaaS and IaaS.

   d) Discuss in brief about various types of cloud services.

   e) List the characteristics of private cloud?

   f) Explain virtualization of CPU.

   g) Describe different levels of virtualization.

Q 2.   (2X7=14)

   a) Compare and contrast on: Grid and Cloud.

   b) Explain in detail about the roots of cloud computing.

   c) Explain the cloud architecture with suitable block diagram?

Q3.   (2X7=14)

   a) Explain Cloud Service Life Cycle in detail?

   b) List out the different classes of virtualization architecture. Discuss in detail about the hypervisor and Xen architecture.

   c) Differentiate public and private clouds in terms of flexibility.

Q 4.   (2X7=14)

   a) What are the critical QoS parameters to consider in a cloud service request?

   b) Discuss how collaboration on Schedules is made easy with Cloud Computing.

   c) Discuss about homomorphic encryption.

Q 5.   (2X7=14)

   a) Write a short note on the Current State of Data Security in the Cloud CryptDb State.

   b) Discuss about cloud computing in a Nutshell System Model.

   c) Elaborate virtual clusters and resource management with suitable examples.

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

   a) Define concept of friend class.

   b) Explain data hiding mechanism.

   c) Write a C++ program to discuss call by reference.

   d) Explain the use of pure virtual function by writing a C++ program.

   e) Discuss different data types in C++.

   f) Demonstrate the usage of file mode parameters (any four).

   g) Differentiate between function overloading and function overriding.

Q 2. (2X7=14)

   a) Discuss dynamic allocation operators with example.

   b) Define copy constructor with its syntax. Explain in detail how copy constructors are used.

   c) Discuss the scope of the class and its data members with suitable program.

Q3. (2X7=14)

   a) Demonstrate multiple inheritance with the help of suitable example.

   b) Discuss the significance of virtual function when base class pointer points to a derived class object? Explain with the help of an example.

   c) Explain destructor and its significance? Write a program to understand in which order destructors are executed.

Q 4. (2X7=14)

   a) State the ambiguities that arises due to function overloading. Explain in detail any one and how it can be resolved?

   b) Discuss how virtual base class overcomes the problem arises in multiple inheritance.

   c) Define friend function with the help of an example.

Q 5. (2X7=14)

   a) Write a C++ program to illustrate non-type parameters.
   b) What is exception handling? Discuss in detail with an example.
   c) Elaborate the following functions : read(), write(), seekg(), tellg(),

CENTRAL UNIVERSITY OF HARYANA

Term End Examinations June/July 2023

Programme: General Elective Course (GEC)　　　　**Session:** 2022-23

Semester: 2nd　　　　**Max. Time:** 3 Hours

Course Title: Fundamentals of Computer Science　　　　**Max. Marks:** 70

Course Code: SBS CS 01 01 01 E 3104

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and students are required to answer any two parts from each question. Each part carries seven marks.

Q1.　　　　　　　　　　　　　　　　　　　　　　　　　(4X3.5=14)

　a) What is Computer? Explain.

　b) Write short note on ALU.

　c) Write any five Characteristics of Computer System.

　d) Explain the Role of OS. Also give Layered Architecture of OS with diagram.

　e) Differentiate between CD and DVD.

　f) What is Control Panel? Explain.

　g) Define Templates and Views.

Q2.　　　　　　　　　　　　　　　　　　　　　　　　　(2X7=14)

　a) Explain about Generations of Computer System with examples.

　b) Explain in detail about Components of Computer System with diagram.

　c) Explain the detailed description of Input and Output devices with example.

Q3.　　　　　　　　　　　　　　　　　　　　　　　　　(2X7=14)

　a) Write about Computer Memory and its types in detail with examples.

　b) Write a detailed description on organization of various storage media with diagram.

　c) Write about Software and its types in detail with examples.

Q4.　　　　　　　　　　　　　　　　　　　　　　　　　(2X7=14)

　a) Define Operating System, its architecture and types with example.

　b) What are the various functions of Operating System? Explain.

　c) What is Booting and its types? Write and explain various steps involved in Booting Procedure.

Q5.   (2X7=14)

 a) Write about various Editing and Formatting features in MS Office Tools.

 b) Write about Macros and Mail Merge. Also write the steps to create them in MS Word Tool.

 c) Write short note on Design and Animations in MS Presentation Tool. Write the steps to add them in Presentation.

CENTRAL UNIVERSITY OF HARYANA

Second Semester Term End Examinations June-July 2023 (Re-Appear)

Programme: MASTER OF COMPUTER APPLICATIONS **Session: 2021-22**

Semester: II **Max. Time: 3 Hours**

Course Title: Theory of Computation **Max. Marks: 70**

Course Code: SBS CS 01 02 08 E 3003

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

    a) Differentiate DFA and NDFA with suitable examples.

    b) Design a modulo 3 machine for binary inputs.

    c) Differentiate Meally and moore mahine with suitable examples.

    d) What is derivation tree?

    e) What is the role of stack in PDA?

    f) Define TM with suitable diagram.
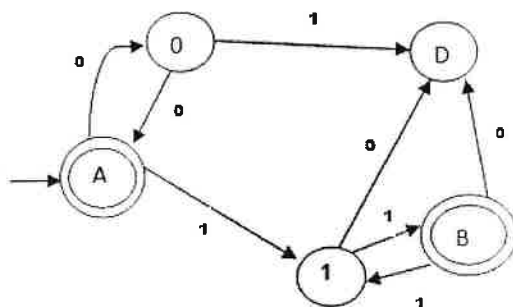
    g) What P and NP class of problems?

Q 2. (2X7=14)

    a) How to reduce the number of states of DFA? Make a minimized DFA for the given machine:
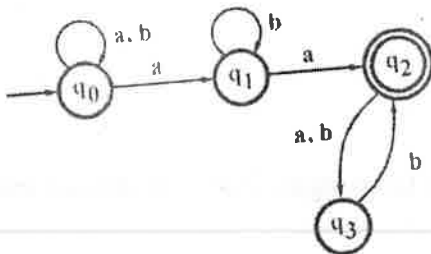
    b) Find a regular expression corresponding to finite automata.

    c) Construct a FSM equivalent to the regular expression **(a+b)*abb + ab***

Q3.   (2X7=14)

   a) What are the various grammars available as per Chomsky classification?

   b) Consider CFG with production

       S→ aB | bA

       A→ a | aS | bAA

       B→ b |bS |aBB

       find LMD, RMD and parse tree for the string   aaabbabbba

   c) Convert the following grammar to CNF -

       S→ aB | bAB

       B→ b |bS |aBB

Q 4.   (2X7=14)

   a) What is Push Down automata? Explain types of PDA with suitable examples.

   b) Construct a PDA accepting { wwR | w ε {a,b}* } by empty stack.

   c) Construct a PDA equivalent to the following CFG:

       S→ aS | aSbS | ε

Q 5.   (2X7=14)

   a) Construct a Turing Machine to recognize the following languages-

       L= { 0^n1^n|n>=1}

   b) Write note on (any One):

       (i) Multi tape TM

       (ii) NP completeness

   C) Explain Recursive & Recursively numerable languages with suitable examples.

Programme:	MCA	**Session: 2022-23**
Semester:	II	**Max. Time: 3 Hours**
Course Title:	Design Analysis of Algorithms	**Max. Marks: 70**
Course Code:	SBS CS 01 02 11 C 3104	

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and students are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) State the best, average and worst case complexities of binary search for successful and unsuccessful search.

b) Solve the recurrence relation using substitution method

$T(n)= \{ T(1)$ if n=1, $aT(n/b)+f(n)$ n>1 $\}$, where a=5, b=4, and $f(n)=cn^2$

c) List the properties of various asymptotic notations.

d) Write Control Abstraction of Greedy method.

e) Distinguish Greedy method and Dynamic Programming.

f) State the principle of optimality. Find two problems for which the principle does not hold.

g) What is a Backtracking and give the 4 – Queens's solution.

Q2. (2X7=14)

a) Give the algorithm for matrix multiplication and find the time complexity of the algorithm using step – count method.

b) Define Asymptotic notation. Differentiate between Big oh and omega notation with example.

c) Solve the following recurrence relation using Master's theorem-

$T(n)= \{ T(1)$ if n=1, $2T(n/2) + nlogn$ if n>1 $\}$

Q3. (2X7=14)

a) What are greedy algorithms? Use an algorithm for greedy strategies for the knapsack to find an optimal solution to the knapsack instance n=7, m=15,(p1,p2....,p7)=(10,5,15,7,6,18,3),and (w1,w2,...w7)=(2,3,5,7,1,4,1).

b) Derive time complexity of job sequencing with deadlines .Obtain the optimal solution when n=5, (p1, p2,...)=(20,15,10,5,1) and (d1,d2,...)=(2,2,1,3,3).

c) Define spanning tree. Compute a minimum cost spanning tree for the graph of figure using prim's and krushkal's algorithm.
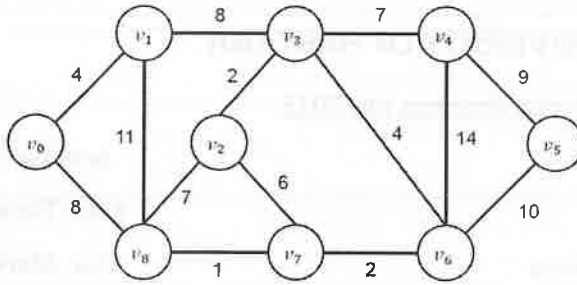
Q 4.   (2X7=14)

   a) Obtain the solution to knapsack problem by Dynamic Programming method n=6, (p1,
      p2,...p6)=(w1,w2,...w6)=(100,50,20,10,7,3) and m=165.

   b) Explain how backtracking is used for solving n- queens problem. Show the state space tree.

   c) Describe the algorithm for Hamiltonian cycles and determine the order of magnitude of the
      worst case computing time for the backtracking procedure that finds all Hamiltonian cycles.

Q 5.   (2X7=14)

   a) What are P and NP classes of problems? Explain NP completeness with suitable examples.

   b) What is SAT problem? Explain its variance in detail.

   c) Write Short note (any two):

      (i)   Graph coloring

      (ii)   Travelling Sales person problem

      (iii)   Vertex cover problem

CENTRAL UNIVERSITY OF HARYANA

Second Semester Term End Examination June 2023

Programme: MASTER OF COMPUTER APPLICATION   **Session:** 2022-23

Semester: Second   **Max. Time: 3 Hours**

Course Title: Database Management system   **Max. Marks: 70**

Course Code: SBS CS 01 02 08 C 3104

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1.   (4X3.5=14)

     a) State various advantages of database management system (DBMS) over file processing system.

     b) Draw ER diagram for Library Management System.

     c) Explain an abelian group with suitable example.

     d) Illustrate serializability of schedules.

     e) Describe normalization and state different advantages of normalization.

     f) Write a short note on geographic information systems.

     g) Write syntax for create, alter, drop and rename table commands.

Q 2.   (2X7=14)

     a) Define an entity set and relationship set. List and explain the symbols used to draw ER Diagram.

     b) Discuss about DBMS architecture and data Independence.

     c) Outline different advantages and disadvantages of a DBMS.

Q3.   (2X7=14)

     a) Given a relation R with 5 attributes ABCDE and the following functional dependencies (FDs): $A \rightarrow B$, $BC \rightarrow E$, and $ED \rightarrow A$. Is R in 3NF? Justify.

     b) Explain 3NF and BCNF with suitable example. What is the difference between them?

     c) What is relational algebra? Explain different relational algebra operations with example.

Q 4.   (2X7=14)

     a) Explain the basic constraints that can be specified in SQL as part of table creation with example.

     b) Define transaction. Explain different states of transaction with a neat transaction state diagram.

     c) What is time stamp? Explain briefly two methods of generating time stamps.

Q 5.   (2X7=14)

a) Discuss about different emerging database technologies.

b) Write short notes on Structured, Semi-structured and Unstructured Data.

c) What are views? Explain how views are different from tables with suitable example.

CENTRAL UNIVERSITY OF HARYANA

Term End Examinations July 2023

Programme: Master of Computer Application (MCA)   **Session:** 2022-23

Semester: 2nd **Max. Time:** 3 Hours

Course Title: Computer Graphics   **Max. Marks:** 70

Course Code: SBS CS 01 02 07 E 3104

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and students are required to answer any two parts from each question. Each part carries seven marks.

Q1.   (4X3.5=14)

    a) Briefly explain about Morphing in Computer Graphics?

    b) Define Interactive Graphics.

    c) Differentiate between VGA and SVGA.

    d) Define Resolution.

    e) What do you mean by Homogeneous Coordinate System?

    f) Write short note on Zooming and Panning.

    g) Write short note on 3-D modelling of objects.

Q2.   (2X7=14)

    a) What is Computer Graphics? Indicate the importance of this discipline in Computer Science by giving suitable examples.

    b) Differentiate between Raster Scan and Random Scan Display system.

    c) Explain about working of Plasma Panel, LCD and LED monitors.

Q3.   (2X7=14)

    a) Explain about DDA Line drawing algorithm. If a line is drawn from (0, 0) to (6, 8) with use of DDA, plot the points needed to generate such line?

    b) Write about Bresenham's Circle drawing algorithm in detail and draw a circle with radius 20 units and center at origin.

    c) Write in detail about Mid-Point Ellipse Drawing Algorithm with suitable example.

Q4.   (2X7=14)

    a) What do you mean by Transformations? Explain 2-D Transformations with diagram.

    b) Discuss Sutherland-Cohen Line Clipping Algorithm with suitable example and diagram.

    c) Explain and differentiate between Boundary Fill and Flood Fill Algorithms with suitable diagram.

Q5.   (2X7=14)

    a) Write and explain various 3-D Display Techniques with suitable example and diagram.

    b) Write Z-Buffer Algorithm for Hidden Surface removal with suitable diagram and example.

    c) What is Shading? Explain any one type of Shading.

Programme: **Master of Computer Application (MCA)**   Session: 2022-23

Semester: 2nd Max. Time: 3 Hours

Course Title: Software Engineering   Max. Marks: 70

Course Code: SBS CS 01 02 10 C 3104

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and students are required to answer any two parts of each question. Each part carries seven marks.

Q 1.   (4X3.5=14)

   a)   State the System Engineering Hierarchy?

   b)   Discuss the need of Software Requirement Specifications (SRS).

   c)   Briefly discuss about the Risk Management.

   d)   What are the phases of Problem solving Loop?

   e)   Explain the agile process for software development.

   f)   What is software crisis? What are the causes and how software engineering deals with it?

   g)   Explain in detail problem analysis and requirements specification.

Q 2.   (2X7=14)

   a)   Explain in the detail software engineering paradigms.

   b)   Why are the important of software process? How to select appropriate process model?

   c)   Explain in detail the various cost estimation models used in software Engineering.

Q3.   (2X7=14)

   a)   Compare various design methodologies used in object-oriented design.

   b)   How SRS is helpful in data design? Describe.

   c)   What do you understand by Quality Assurance? Explain levels of quality assurance.

Q 4.   (2X7=14)

   a)   Compare Data Flow Oriented Design with data structure oriented designs.

   b)   What is software design? How design of software related to evaluation of software?

   c)   Why do we need metrics and measure? What is the difference between Design Verification and Design Validation.

Q 5.   (2X7=14)

   a) Describe the software testing strategies with a suitable example.

   b) What are the different techniques in white-box testing?

   c) Define debugging. Write the general characteristics of bugs and discuss the life cycle of
       debugging task mentoring various steps involved.

Programme: Master of Computer Applications(MCA)   **Session: 2022-23**

Semester: 3rd Semester   **Max. Time:** 3 Hrs

Course Title: Internet and Java Programming   **Max. Marks: 70**

Course Code: SBS CS 01 03 21 C 4004

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q1.   (4X3.5=14)

    a) Discuss features and constructor of URLConnection class.

    b) Explain RARP protocol.

    c) Discuss WORA feature of Java.

    d) Define anonymous array with example.

    e) Differentiate between this( ) and super( ).

    f) Explain with example how exceptions are rethrown.

    g) Discuss abstract method with a program.

Q 2.   (2X7=14)

    a) Elaborate Java socket programming by giving an example.

    b) Explain ARP protocol with a suitable program.

    c) Discuss any two Internet applications with example - E-mail, Telnet, FTP, NFS, Internet traffic management.

Q3.   (2X7=14)

    a) Discuss architecture of JVM in detail.

    b) Demonstrate constructors overloading with the help of suitable example.

    c) Explain primitive data types with example.

Q 4.   (2X7=14)

    a) Write an example how constructor chaining is achieved using super keyword.

    b) Discuss the implementation of Interfaces with a suitable program.

    c) Explain dynamic method lookup in detail.

Q 5.   (2X7=14)

    a) Discuss exception handling by giving example.

    b) Explain different thread transitions in Java.

    c) Describe with a program that how event handling is done.