

Roll No.

67001-N

**MCA 1st Semester (Bridge Course)
(MCA 2 Year Programme) w.e.f. 2020-21
Examination – December, 2024**

COMPUTER FUNDAMENTALS & PROGRAMMING IN C

Paper : 20BCC11C1

Time : Three Hours]

[Maximum Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (a) What are the limitations of human processing ?
How these can be removed ? $8 \times 2 = 16$
- (b) What are the major secondary storage devices ?
- (c) Explain briefly volatile and non-volatile memory.
- (d) Explain functions of OS in information management.

- (e) What is file pointer ? What information is provided by it ?
- (f) What is the purpose of return statement ?
- (g) Describe fputc() and fgetc() functions.
- (h) What are capabilities of computers ?

UNIT - I

2. (a) What are the essential components of a computer ? Draw the schematic block diagram of a computer showing its essential components. Discuss the function of each unit. 12
- (b) Give a disadvantage for each type of network topology. 4
3. (a) What are high-level languages ? Why are they known as problem oriented languages ? Name some high-level languages. 8
- (b) Explain use of computer in marketing and education. 8

UNIT - II

4. (a) Write a macro that is run using the shortcut Ctrl + F for formatting the files as :
 - (i) Change the left margin of entire files as 2.0 inches.
 - (ii) Change the line spacing to 2 (Double).
 - (iii) Change the format of file in 3 columns. 8
- (b) What do you mean by Mail-Merge in MS-Word ? 8
5. (a) Create a list of 10 best friends. Create a Thank You letter. Use Mail-Merge feature of MS-WORD to create a Thank You letter for each of your friends from the above two files. 12
- (b) Explain the working and importance of Header and Footer in MS-Word. 4

UNIT - III

6. (a) What is the purpose of while and do-while statement ? What is the minimum number of times while and do-while statement will be executed ? 8
- (b) Write a program to find whether the given year is a leap or not. 8

7. (a) Draw a flowchart to print the sum of even numbers of a set of natural numbers. 8
- (b) Explain the terms character set, tokens, constant and variables. 8

UNIT - IV

8. (a) Write a function big to find largest for two numbers and use this function in the main program to find largest of three numbers. 8
- (b) How pointer can be passed on to functions as the variables ? 8
9. (a) What is Structure ? Explain C syntax of structure declaration with example. 8
- (b) What is Pointer ? Explain how the pointer variable declared and initialized. 8

Roll No.

67007-N

**MCA 1st Semester (MCA 2 Year
Programme) w.e.f. 2020-2021
Examination – December, 2024**

DIGITAL DESIGN & COMPUTER ARCHITECTURE

Paper : 20MCA21C4

Time : Three hours]

[Maximum Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit: Question No. 1 is *compulsory*. All questions carry equal marks.

1. (a) What is a Decade Counter ? 8 × 2 = 16
- (b) Differentiate between Edge-triggered and Level-triggered flip-flops.
- (c) What is CISC architecture ?
- (d) What is a bus system ?
- (e) What do you mean Instruction Formats ?

67007-N-1500-(P-4)(Q-9)(24)

P. T. O.

(f) What are Gray Codes ?

(g) What is a Decoder ?

(h) What is Flynn's computer organization ?

UNIT - I

2. (a) What is K-map ? Using K-map, obtain the minimal expression in SOP and POS of the following expression :

$$F = \Sigma_m(0, 2, 4, 6, 7, 8, 10, 12, 14, 15)$$

Implement the same in using universal gate. 10

(b) What are Error-Detecting and Error-Correcting Codes ? Illustrate the significance of each. 6

3. (a) What is Booth's coding ? Perform $(-12)_{10} \times (-8)_{10}$ using this method. 5

(b) What is BCD arithmetic ? Perform the following BCD operations : 6

(i) $(678)_{10} + (432)_{10}$

(iii) $(976)_{10} - (789)_{10}$

(c) Perform the operation $(1001 \times 1110)_2 + (75.45)_8$ and find out the result in an Hexadecimal Number System. 5

UNIT - II

4. (a) What is Multiplexer (MUX) ? How will you design a 64×1 MUX using 8×1 MUX ? Illustrate. 8

(b) What is combinational circuit ? Design a combinational circuit that receives 2-bit binary number input and produces its square at the output. 8

5. (a) What is Master-Slave flip-flop ? Discuss its working and show how the race around condition is eliminated in this flip-flop. 8

(b) What is a counter ? Show that N-bit counter connected to $N \times 2^N$ decoder is equivalent to a ring counter with 2^N flip-flop. Illustrate it with $N = 2$. 8

UNIT - III

6. (a) What is the structure of 8086/8088 Assembly Language program ? Illustrate the purpose of all its elements/structural components. 8

(b) What do you mean by micro-operations ? What are its various types ? Illustrate the implementation of each category of micro-operations through its block diagram(s). 8

7. Explain the following :

(a) Microprogrammed Control Unit 8

(b) Addressing modes 8

UNIT – IV

8. (a) What is Pipelining ? When, where and why is it necessary ? Also differentiate between the Instruction Pipelining and Arithmetic Pipelining. 8
- (b) What are array processors ? How are these designed ? Illustrate. 8
9. (a) What is an Input/Output (I/O) module ? What are the functions performed by an I/O module ? Illustrate the general structure of an I/O module. 8
- (b) What are parallel computers ? What are their structures ? How are these classified ? Discuss. 8

Roll No.

67005-N

**MCA 1st Semester (MCA 2 Year
Programme) w.e.f. 2020-21
Examination – December, 2024**

COMPILER DESIGN

Paper : 20MCA21C2

Time : Three hours]

[Maximum Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. Compulsory question :

- (a) What is bootstrapping ?
- (b) What do you understand by cross compiler ?
- (c) What are the *two* types of conflicts in shift reduce parsing ? Give example.
- (d) Define left recursion. Is the following grammar left recursive : $E \rightarrow E+E \mid E^*E \mid a \mid b$?

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P. T. O.

- (e) What is hashing ? Discuss.
- (f) Differentiate between Abstract Syntax tree and DAG representation of intermediate code.
- (g) Explain the algorithm for basic block identification.
- (h) What is code optimization ? Illustrate with example.

UNIT - I

2. (a) What is system software ? Explain working of system software tool. Give any *five* example of system software tools.
- (b) What is loader ? Differentiate between direct linkage and reallocating loader scheme with an example.
3. (a) Explain any *four* components available as integral part of system programming environment.
- (b) What is self-relocating program ? Explain with appropriate example.

UNIT - II

4. (a) Describe the mathematical model used for creating finite automata.
- (b) What functions are performed by code Optimizer and code generator during synthesis phase ? Discuss.

67005-N-1300-(P-4)(Q-9)(24) (2)

5. (a) Consider the production :

S → aAb
A → cd/C

Show that recursive descent parsing fails for input string "acdb", also explain Recursive Descent Algorithm.

(b) Why it is important to perform operator precedence during compiler processing.

UNIT - III

6. (a) Give the general structure of activation record. Explain the purpose of each component.
- (b) What do you mean by attributed grammars ? Discuss the translation scheme for Converting an infix expression to its equivalent postfix form.
7. (a) Explain the use of symbol table in compilation process. List out the various attributes for implementing the symbol table.
- (b) Describe how three address code can be represented as triples.

UNIT - IV

8. (a) Explain various code optimization techniques. Discuss the strategies for loop optimization and dead code elimination.

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P. T. O.

(b) How register allocation and assignment is performed during code generation ? Explain.

9. (a) Explain the different storage allocation strategies.

(b) What are major sources of optimization in a given code ? Discuss.

Roll No.

67004-N

**MCA 1st Semester (MCA 2 Year
Programme) w.e.f. 2020-2021
Examination – December, 2024**

OBJECT ORIENTED PROGRAMMING USING JAVA

Paper : 20MCA21C1

Time : Three hours]

[Maximum Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (a) What is Final keyword ? 8 × 2 = 16
- (b) What is Object reference variable ?
- (c) What is byte and character ?
- (d) What is Iterator ?
- (e) What is console output ?
- (f) What is synchronization ?

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P. T. O.

(g) What is Frame ?

(h) What is thread priority ?

UNIT - I

2. (a) What do you mean by Java Program Structure and java's class library ? Explain with example. 7

(b) How Internet is play role in the Java application ? Explain with example. 5

(c) What is Automatic Garbage College ? Explain with example. 4

3. Explain the following with example : $4 \times 4 = 16$

(a) Array

(b) String Buffer class

(c) Control statement

(d) Variable and Data Types

UNIT - II

4. (a) What is Interface ? How Interface replaced with Multiple Inheritance in Java ? Explain Nested Interface with example. 12

(b) How is Access Specifier used in Package ? Explain with example. 4

5. What is Package ? What are types of Package ? Explain by taking two users define Package then import these Packages in java file. 16

67004-N-1350-(P-3)(Q-9)(24) (2)

UNIT - III

6. How Multithreading is main component of Java language ? What are commonly Constructors used in Multithreading ? Explain with example. 16

7. Explain the following with example : $6 + 5 + 5$

(a) Exception Handling

(b) I/O Basic and I/O Classes

(c) Stream Benefits

UNIT - IV

8. (a) What is Applet ? What basic Applet Applet Architecture ? Explain the life cycle of Applet with example. 10

(b) How are AWT classes used ? Explain any three inbuilt AWT classes. 6

9. Explain the following with example : $6 + 6 + 4$

(a) Layout managers and Menus

(b) AWT control and Text Output

(c) Window fundamentals

67004-N-1350-(P-3)(Q-9)(24) (3)

Roll No.

67006-N

**MCA 1st Semester (MCA 2 Year
Programme) w.e.f. 2020-21
Examination – December, 2024**

COMPUTER GRAPHICS & MULTIMEDIA

Paper : 20MCA21C3

Time : Three hours]

[Maximum Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (a) Name any Graphics standards used for maintain Graphics quality.
- (b) Briefly discuss any *two* functions used to set area fill attributes.
- (c) What do you mean by rigid body transformations ?
- (d) Write down any *four* characteristics of quadric surfaces used 3D object representations.

67006-N-1400-(P-4)(Q-9)(24)

P. T. O.

- (e) Write down the rotation matrix about z-axis used in three dimensional Computer Graphics.
- (f) Explain how Diffuse reflection illumination method works to illuminate the required images ?
- (g) Pictorially represent the architecture followed by most of the Multimedia systems.
- (h) Write down any *four* characteristics of messages created for mobiles.

UNIT - I

- 2. (a) How graphics output is decided by the phosphorus persistence value ? Explain.
- (b) Illustrate Bresenham's approach to draw a line with positive slope less than 1 based on decision parameter value.
- 3. (a) How character attributes can be set to make graphics more effective and efficient ?
- (b) Differentiate between boundary fill and flood fill algorithms with proper examples.

UNIT - II

- 4. (a) Elaborate the 2D rotation matrices used for rotation around pivot point and origin with example.

- (b) Explain how 3D objects can be represented as meshes and curved lines with their respective characteristics.
- (a) Write down the Cohen Sutherland line clipping algorithm. Also mention its advantages and disadvantages.
- (b) Describe how natural objects are represented in 3D graphics (Bezier Curve) better than in Euclidean geometry.

UNIT - III

- 6. (a) Define composite transformation. Discuss any *two* scenarios where composite transformation can be of great help. Write down the composite transformation matrix used in both 2D and 3D Graphics.
- (b) Why and how Back face detection method works as Object space method on the given graphics image ?
- 7. (a) State the relevance and importance of vanishing point in perspective and parallel projection in 3D viewing with an apt example.
- (b) Compare the color models : XYZ, RGB, YIQ and CMY in terms of their properties and functions.

UNIT – IV

8. (a) Detail out what challenges multimedia system faces while handling the following heterogeneous data types as one umbrella : text, image, audio, video and animation.
(b) Differentiate between message and hypermedia message components of multimedia data.
 9. (a) "Quality of Multimedia majorly depends on the effectiveness of Compression & Decompression approaches." Comment
(b) Write down salient features of distributed multimedia systems required to deploy major functionalities in working domain.
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Roll No.

67008-N

**MCA 1st Semester (MCA 2 Year
Programme) w.e.f. 2020-2021
Examination – December, 2024**

ADVANCE DATA STRUCTURES USING C++/JAVA

Paper : 20MCA21C5

Time : Three hours]

[Maximum Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (a) What are Euler graphs ? $2 \times 8 = 16$
(b) What is Prim's algorithm ?
(c) What is Divide and Conquer method ?
(d) What is topological sort ?
(e) What is threaded binary tree ?
(f) What do you mean by non-deterministic algorithms ?

- (g) What are minimal spanning tree ?
(h) What do you mean by Recurrences ?

UNIT - I

2. (a) What is meant by Strassen's method ? How is it significant ? Illustrate.
8

- (b) What do you understand by complexity of algorithms ? What is the importance of algorithm and data structure in computer science ? Explain. 8
3. Explain the following :

- (a) Recurrence Tree Method 8
(b) Substitution Method 8

UNIT - II

4. (a) What are AVL trees ? What are their applications ? How are these implemented ? Illustrate. 8

- (b) What is binary search ? Determine its complexity and write down an algorithm for binary search technique. 8

5. Explain the following :
(a) B-tree and their implementation using C++/Java. 8
(b) Concept of heap and heap operations. 8

67008-N-1400-(P-3)(Q-9)(24) (2)

UNIT - III

6. (a) How is DFS traversal different from BFS traversal ? Discuss their pros and cons. 8
(b) What is a spanning tree ? How Kruskal's algorithm results in a minimum-cost spanning tree ? Illustrate. 8

7. Explain the following :

- (a) Ford-Fulkerson algorithm 8
(b) Max flow - Min cut theorem 8

UNIT - IV

8. (a) What is Knuth-Morris-Pratt algorithm ? How is it significant ? Explain. 8
(b) What is 0/1 Knapsack problem ? How Greedy method can be applied to solve the Knapsack problem ? Justify. 8

9. Explain the following :

- (a) NP Complete problems 8
(b) 8-Queens problem 8

67008-N-1400-(P-3)(Q-9)(24) (3)

Roll No.

67003-N

**MCA 1st Semester (Bridge Course) (MCA
2 Year programme) w.e.f. 2020-2021
Examination – December, 2024**

VISUAL BASIC & DATABASE SYSTEMS

Paper : 20BCC11C3

Time : Three Hours]

[Maximum Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all. Question Number 1 will be *compulsory*. In addition to *compulsory* question, student will have to attempt *four* more questions selecting *one* question from each Unit. All questions, carry equal marks.

1. (a) What is VB(IDE) Integrated Development Environment ?
(b) Discuss about built in functions in VB.
(c) Discuss Arrays in VB.

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P. T. O.

(d) What is RDO ?

(e) Define ER Modelling.

(f) Explain the applications of Database system.

(g) Define Database Languages.

(h) Define the uses of Join dependencies.

UNIT - I

2. (a) Explain in detail the uses of List Box, Combo Box, Image Box and frames in VB through suitable example.

(b) Explain the following in detail :

(i) Variable and Constants in VB.

(ii) Arithmetic operations and String operations in VB.

3. (a) Explain VB as Event-driven & Object-based language. Explain about some of the event supported by VB object ? Also describe the role of event processor in VB.

67003-N-650-(P-4)(Q-9)(24) (2)

(b) Explain different Looping Statements in VB through suitable example.

UNIT - II

4. (a) What is Dialog Boxes and Menu ? Describe the methodology to create a menu using Visual Basic.

(b) What is the significance of a form in Visual basic (VB) ? Explain how to create an MDI application in VB. Also Difference between SDI and MDI in detail.

5. What is database programming ? What are Data Controls and Data-Bound controls ? How we connect a VB form to Database by using DAO ? Explain in detail.

UNIT - III

6. (a) What is relational calculus ? Explain the different variants of relational calculus with example.

(b) What is relational algebra ? Explain projection and join operation of relational algebra with suitable examples.

67003-N-650-(P-4)(Q-9)(24) (3) P. T. O.

7. (a) What is relational model ? What is integrity rule in relational model ? Also explain the advantages and disadvantages of relational model in detail.
- (b) What is Data Model ? Differentiate the different data models used in database management system.

UNIT – IV

8. Explain the following in detail :
- (a) Various methods of Concurrency control
- (b) Dealing with deadlocks
9. What is Normalization ? Explain with examples the various types of normal forms in detail.

Roll No.

67104-N

**MCA 3rd Semester (MCA 2 Year
Programme) w.e.f. 2021-22
Examination – December, 2024**

COMPUTER VISION ELECTIVE 1 (i)

Paper : 21MCA23DA1

Time : Three hours]

[Maximum Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

- 1.** (a) How do active contours contribute to shape modelling and recognition ? $8 \times 2 = 16$
(b) What are thresholding techniques and how are they used to segment images ?
(c) What is the Generalized Hough Transform (GHT) and how does it differ from the standard Hough Transform ?

67104-N-250-(P-4)(Q-9)(24)

P. T. O.

- (d) Provide examples of real-world applications where the Hough Transform is used for image analysis.
- (e) What is motion in the context of computer vision ?
- (f) Explain the triangulation method used in motion estimation.
- (g) Explain some applications of computer vision in agriculture and environmental monitoring.
- (h) How is computer vision applied in surveillance systems ?
2. (a) What are edge detection techniques and how are they used to identify object boundaries in images ? 8
- (b) How are size filtering techniques applied to extract objects of interest from images ? 8
3. Explain the process of skeletonization in image processing. How does thinning help in extracting the essential features of shapes ? Discuss algorithms for skeletonization and their applications. 16

UNIT - I

UNIT - II

4. Give examples of real-world applications where Hough Transform is used for object detection and recognition. How does Hough Transform contribute to solving practical problems ? 16
5. Describe the speed problem associated with traditional Hough Transform for circle detection. How does it affect the efficiency of circle detection algorithms ? 16

UNIT - III

6. Discuss methods for 3D object recognition in computer vision. How do techniques like feature matching and geometric hashing identify objects in 3D scenes ? 16
7. (a) Discuss spline-based motion representation techniques. How do spline curves model smooth and continuous motion trajectories ? 8
- (b) Describe different projection schemes used in 3D vision systems. How do techniques like perspective projection and orthographic projection represent 3D scenes ? 8

UNIT - IV

8. Discuss the role of computer Vision in in-vehicle vision systems. How do such systems locate roadways, road markings, road signs and pedestrians ? 16

9. (a) Discuss the Chamfer matching technique for object tracking and recognition. 8
- (b) Explain how computer vision is used in creating a photo album application. 8
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Roll No.

67103-N

**MCA 3rd Semester (MCA 2 Year
Programme) w.e.f. 2020-21
Examination – December, 2024**

ANDROID MOBILE APPLICATION DEVELOPMENT

Paper : 21MCA23C3

Time : Three hours]

[Maximum Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. Compulsory Questions :

$8 \times 2 = 16$

- (a) What is Content Provider ?
- (b) What is DDLs ?
- (c) What is ADK ?
- (d) What is Intent ?
- (e) What is a Map Activity ?

- (f) What is Map View ?
 (g) What is an Android Shadow ?
 (h) What is a Serialization ?

UNIT - I

2. (a) How Android Operating System is important ?
 What are different types of Android Application ?
 Explain with example. 10
 (b) How Infrastructure and Managing Resources are works ? Explain with example. 6

3. Explain the following with example : $4 \times 4 = 16$

(a) Application Model

(b) Concurrency and Resource Management

(c) Mobile Device Profiles

(d) Mobile Software Engineering

UNIT - II

4. (a) What is Android Application Architecture ? How it works ? Explain with example. 8

(b) What is role of Android Framework ? Explain GUI and MVC Architecture with example. 8

5. Explain with example : $4 \times 4 = 16$

(a) Packaging and deployment

(b) Applications with multiple screens

67103-N-1100-(P-4)(Q-9)(24) (2)

- (c) Location based services
 (d) Traditional programming model

UNIT - III

6. (a) What is purpose of a content provider in Android and provide an example of a scenario where it might be used ? 8
 (b) What is Life Cycle for an application ? Explain Blank UI, Folding and Unfolding a scalable UI with example. 8

7. Explain the following with example : $4 \times 4 = 16$

(a) Map View and Map Activity

(b) Sensors and Near Field Communication

(c) Building Client Server Applications

(d) Google Maps Activity

UNIT - IV

8. (a) What do you know the process of publishing an Android app to the Google Play Store ? Explain the steps involved and any requirements that developers need to meet. 10
 (b) What is Flutter ? Explain the Android features and UI with example. 6

67103-N-1100-(P-4)(Q-9)(24) (3)

P. T. O.

9. (a) What is Bluetooth ? How Camera and Sensor integration with Bluetooth ? Explain Sending SMS, Phone Calls and Runtime Environment for Applications with example. 10

(b) What are Callbacks ? Explain Concurrency, Serialization and Application Signing with example. 6

Roll No.

67107-N

**MCA 3rd Semester (MCA 2 Year
Programme) w.e.f. 2021-2022
Examination – December, 2024**

NETWORK PROGRAMMING ELECTIVE-II (i)

Paper : 21MCA23DB1

Time : Three hours]

[Maximum Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (a) How to change the password in UNIX
OPERATING SYSTEM ? $8 \times 2 = 16$
- (b) How many types of files are there in UNIX ?
- (c) How to display the contents of a file ?
- (d) What is the role of server ?
- (e) What are the basic operations of Server Socket ?

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P. T. O.

- (f) Distinguish between absolute URL and relative URL.
- (g) What is retransmission in networking ?
- (h) What is difference between IPv4 & IPv6 ?

UNIT - I

- 2. (a) What is OSI model and how it communicates data in networks ? 8
- (b) What are the functions of a transport layer in networking ? How it provides logical communication between application processes running on different hosts ? 8

- 3. (a) Describe the OSI reference model and UNIX Standards. 8
- (b) Write briefly about the TCP and UDP connection establishment, format and Buffer sizes. 8

UNIT - II

- 4. (a) Explain with diagrams the following I/O models provided by UNIX : 16
- (i) Blocking I/O model
- (ii) Non Blocking I/O model
- (iii) Signal driven I/O

- 5. (a) How do I open a socket ? 8
- (b) What is a DLL and what their usages and advantages ? 8

UNIT - III

- 6. (a) What are the different layers of WAP architecture ? 8
- (b) What is a firewall ? How do you set it up ? 4
- (c) Difference between RMI and CORBA. 4

- 7. (a) Define in brief, "Wireless Application Environment (WAE)". 8
- (b) Explain in detail the various aspects of security. 8

UNIT - IV

- 8. (a) Consider the TCP Echo Server and TCP Echo Client application and discuss what happens to the client when the server process crashes ? 8
- (b) What is the difference between client-side and server-side programming language ? 8

- 9. (a) Describe the getaddrinfo function as applicable to IPv6. Write briefly about IPv4 socket options. 8
- (b) Explain the purpose and syntax of select system call. What conditions cause select to return "ready" for sockets ? 8

Roll No.

67108-N

**MCA 3rd Semester (MCA 2 Year
Programme) w.e.f. 2021-22
Examination – December, 2024**

**NATURAL LANGUAGE PROCESSING & SPEECH
RECOGNITION ELECTIVE II (ii)**

Paper : 21MCA23DB2

Time : Three hours]

[Maximum Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Unit. Question No. 1 is compulsory. All questions carry equal marks.

1. Compulsory Question :

- (a) Elaborate five phases of NLP.
- (b) What are advantages of automata ?
- (c) What is minimum edit distance ?
- (d) What is prosody in TTS ?
- (e) Define human speech recognition.

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P. T. O.

- (f) What is the use of symbol table in context-free grammar?
- (g) Discuss the principles of compositionality in semantic.
- (h) Where is matrix factorization used?

UNIT - I

2. What is lexicon? How lexicon free finite state transducers processing is done?
3. How terms are extracted from token? Explain the concept in context of raw text extraction and tokenization.

UNIT - II

4. What are latent semantics? How latent semantics are analyzed? Discuss.
5. What is phoneme? Discuss various phonological rules and how text to phones mapping is done for TTS.

UNIT - III

6. What is tagging? Explain stochastic part-of speech tagging and transformation based tagging with appropriate example.
7. Explain rules and tree formation for context free grammar. How sentence level construction is specified? Discuss.

67108-N-350-(P-3)(Q-9)(24) (2)

UNIT - IV

8. What is parsing in context-free grammar? Explain the concept of feature structures, their unification and feature structures in grammar.
9. What is syntax-driven semantic analysis? How semantic analysis is integrated into the early parser?

67108-N-350-(P-3)(Q-9)(24) (3)

Roll No.

67101-N

**MCA 3rd Semester (MCA 2 Year
Programme) w.e.f. 2021-2022
Examination – December, 2024**

DATA MINING & BIG DATA ANALYSIS

Paper : 21MCA23C1

Time : Three hours]

[Maximum Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (a) Define Data Mining Systems along with its core components.
(b) State Apriori principle followed in Association mining.
(c) Define supervised and unsupervised learning ? Give *one* example for each.
(d) List down any *four* desirable characteristics of clustering methods.

- (e) Explain the variety and veracity characteristics of Big data.

- (f) Differentiate between Hadoop environment and Hadoop ecosystem.

- (g) Briefly explain the working of YARN, as a heart of complete Hadoop ecosystem.

- (h) Write down any *four* features of Big R making it most appropriate choice for handling big data.

UNIT - I

2. (a) How orientation, focus, type of users, schema used, size of query and data operations differs OLTP from OLAP ?

- (b) Define Data Objects. Differentiate between different types of data objects along with *two* examples for each.

3. (a) Elaborate the concept of Candidate set generation (Apriori algorithm). Performance evaluators and frequent sequential patterns related to Association mining.

- (b) What do you mean by association rules ? Explain different types of association rules generated after implementing Pattern mining.

67101-N-1000-(P-4)(Q-9)(24) (2)

UNIT - II

4. (a) Elaborate the working of Decision Tree Induction algorithm, making it greedy and non back tracking classifier.

- (b) Explain how different classifiers can be evaluated by using accuracy and specificity by using Confusion matrix.

5. (a) Describe how K Mean (Partitioning) Clustering detects the outliers and create clusters.

- (b) Differentiate between DIANA and AGNES techniques following hierarchical concepts to generate clusters with the help of labeled diagrams.

UNIT - III

6. (a) Explain how Structured, Semi structured and Unstructured data along with their respective characteristics and examples (*One* for each type).

- (b) Elaborate different phases of Big data analytics life cycle, making it appropriate for batch as well as stream processing.

7. (a) Differentiate between data analytics performed by using Hadoop and different Unix tools.

- (b) Elaborate how data compression and serialization plays a vital role in big data analytics with appropriate examples.

67101-N-1000-(P-4)(Q-9)(24) (3)

P. T. O.

UNIT – IV

8. (a) Describe the following concepts : Job scheduling and shuffling with respect to Map Reduce with their respective importance in processing big data.
(b) Why Pig is considered as an integral component of Hadoop ecosystem ? Explain the same in terms of its architecture.
 9. (a) Elaborate the architecture of HBase and what important role does Region servers play in it.
(b) Define collaborative filtering and explain its types. How it enhance the data analytics process ?
-

Roll No.

67105-N

**MCA 3rd Semester (MCA 2 Year
Programme) w.e.f. 2021-22
Examination – December, 2024**

**SOFTWARE TESTING & QUALITY ASSURANCE
ELECTIVE 1 (II)**

Paper : 21MCA23DA2

Time : Three hours]

[Maximum Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Unit. Question No. 1 is compulsory.

1. Explain the following in brief :

- (a) Test drivers
- (b) Testing tools
- (c) Regression testing
- (d) Capability maturity models
- (e) Quality management

67105-N-1000-(P-3)(Q-9)(24)

P. T. O.

- (f) Database testing
- (g) Goals of software quality assurance
- (h) FTR

UNIT - I

2. (a) What is Software testing ? How is testing important in software life cycle ? Discuss the objectives of software testing in detail.

(b) Explain the following in detail :

(i) Software testing guidelines

(ii) Customizing the software testing process

3. What is White box testing and Black box testing ? Explain the main techniques for performing black box testing.

UNIT - II

4. (a) What is Software Testing Strategy ? Explain the characteristics of a good software testing strategy in detail.

(b) Explain the following in detail :

(i) Test data generator

(ii) Debuggers

67105-N-1000-(P-3)(Q-9)(24) (2)

5. (a) What is Software Metrics ? Enumerate the qualities of good software metrics. How the software metrics can help in software management ? Explain in detail.
- (b) Explain integration, System, Alpha and Beta testing in detail.

UNIT - III

6. Explain the following in detail :

(a) Testing Web Application

(b) Rational Rose and its Features

7. What is object oriented testing ? Explain the various object-oriented testing strategies and issues in detail. Also explain path testing and class testing.

UNIT - IV

8. What is Software Quality Assurance (SQA) ? Explain the components, importance and essence of SQA in detail.

9. (a) What are ISO quality standards ? Explain ISO 9000 certification and their relevance in detail.

(b) What is Software Quality ? What are the important software quality attributes ? Also explain the software quality challenges in detail.

67105-N-1000-(P-3)(Q-9)(24) (3)

Roll No.

67102-N

**MCA 3rd Semester (MCA 2 Year
Programme) w.e.f. 2021-2022
Examination – December, 2024**

**ARTIFICIAL INTELLIGENCE & COMPUTATIONAL
INTELLIGENCE**

Paper : 21MCA23C2

Time : Three hours]

[Maximum Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. Compulsory Questions :

- (a) How problem can be defined as state space ?
- (b) How candidate analysis is done in expert system ?
- (c) What is skolemization ?
- (d) How reasoning is done with semantic network ?
- (e) What is content addressable memory ?

67102-N-1150-(P-4)(Q-9)(24)

P. T. O.

- (f) Why GA is used rather than traditional search methods ?
- (g) Define hedge with example.
- (h) How learning can be applied in pattern recognition ?

UNIT - I

2. What is heuristic function ? Discuss how heuristic function helps during search procedure ? On the basis of heuristic function, how best first and A* algorithms are different from each other. Explain with example.

3. What is prototype ? Discuss the purpose of prototyping ? How a prototype is constructed in expert system ? List out the steps of prototype construction in detail.

UNIT - II

4. (a) What is knowledge engineering ? Explain the activities and views related to knowledge engineering ? Also discuss the role of knowledge acquisition in KE.

- (b) What is conflict resolution ? Discuss various strategies for conflict resolution.

67102-N-1150-(P-4)(Q-9)(24) (2)

5. (a) What is truth Maintenance System ? Compare justification based, assumption based and logic based truth maintenance system with each other.
- (b) What is probabilistic reasoning ? How probability can be determined with uncertain knowledge ? Discuss.

UNIT - III

6. (a) Discuss the working principle and architecture of McCulloch-Pitts neural network with diagrammatic notation and appropriate example.
- (b) What is selection in Genetic algorithm ? Describe various selection methods used in GA.

7. (a) What is perceptron ? Discuss the operational characteristics, elements and training algorithm for single output unit of perceptron.
- (b) What is optimization ? How optimized result can be achieved on the basis of Ant Colony optimization method ?

UNIT - IV

8. (a) What is fuzzy logic ? Explain component architecture of fuzzy logic with diagrammatic representation ?
- (b) What is fuzzy inference system ? Discuss the construction, working and methods of FIS.

67102-N-1150-(P-4)(Q-9)(24) (3) P. T. O.

9. (a) Discuss the architecture, components and steps of design of Fuzzy control system.
- (b) What is Information retrieval ? How computational intelligence is used in IR ?

Roll No.

67197-N

**MCA 4th Semester 2 yr. Course
Examination – December, 2024**

MACHINE LEARNING OF PYTHON PROGRAMMING (I)

Paper : 21MCA24DB1

Time : Three Hours]

[Maximum Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all by selecting *one* question from each Unit and Question No. 1 which is *compulsory*. All question carry equal marks.

1. Compulsory question : **8 × 2 = 16**

- (a) What are Kernel functions ?
- (b) What are multiple plots ?
- (c) What are Vectorized functions ?
- (d) What is NumPy ? State its relevance.
- (e) What do you mean by Pandas ?

(f) What are Fractals ?

(g) What is unsupervised learning ?

(h) What is Factor analysis ? State its significance.

UNIT - I

2. (a) What is machine learning ? How a learning system can be designed ? Discuss the concept of learning association in context of machine learning.

(b) What do you mean by logistic regression ? How does it work ? Illustrate its relevance by giving suitable example.

3. Differentiate the following :

(a) SVM and Decision Trees.

(b) Overfitting and Underfitting.

(c) Finite and Infinite Hypothesis

5

5

6

8

4. What do you mean by reinforcement learning ? How is it different from supervised learning ? How does it work ? What is the relevance of Q-Learning in it ? Illustrate.

5. Explain the following :

(a) Dimensionality Reduction and its essence.

(b) Random forest trees and its relevance

8

8

67197-N-250-(P-3)(Q-9)(24) (2)

UNIT - III

6. (a) Provide the syntax and use of the following :

(i) Loops and Iterations

4

(ii) Lists and Strings

4

(b) What is Python ? What are its salient features ? Why is Python suitable for Machine Learning ? Illustrate.

8

7. Illustrate the purpose and usage of the following :

(a) Arrays and Matrices.

5

(b) Modules and Packages.

6

(c) Exception Handling.

5

UNIT - IV

8. (a) What do you mean by 2D and 3D visualization ? How are these significant in Machine Learning ? How does Python implement the same ? Illustrate.

8

(b) What is Matplotlib module ? What is its purpose and use in Python programming ? Illustrate its use through a suitable Python program segment.

8

9. Explain the following :

(a) Database and its usage in Python.

8

(b) Data distribution.

8

67197-N-250-(P-3)(Q-9)(24) (3)

Roll No.

67194-N

**MCA 4th Semester 2 yr. Course
Examination – December, 2024**

CYBER SECURITY & BLOCKCHAIN TECHNOLOGY (i)

Paper : 21MCA24DA1

Time : Three Hours]

[Maximum Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all by selecting *one* question from each Unit and Question No. 1 which is *compulsory*.

1. Compulsory question :

- (a) Define cyber terrorism ?
- (b) How cyber security elements work ?
- (c) What does a packet filter do ?
- (d) How web application security is determined ?
- (e) What is attack vector analysis ?

UNIT - I

- (f) Define salami slicing ?
- (g) How smart contract works ?
- (h) Discuss the creation of sidechain in blockchain.

2. (a) Who are cyber criminals ? Explain different categories of cyber criminals.

- (b) What is network sniffer ? How does a sniffer work ? How does a packet sniffer can be detected ? Discuss the packet sniffer mitigation.

3. (a) What is banner grabbing ? Discuss different types of it. How banner grabbing can be prevented ?

- (b) Compare various port and service tools with each other with their functioning.

UNIT - II

4. (a) What is NAT ? Discuss its different types. Write down the steps to specify the working of NAT.

- (b) What is password manager ? How does it work ? List some of popular password managers.

5. (a) What is web vulnerability ? How it can be exploited ? Discuss the tools used to scan web vulnerabilities.

- (b) What is password cracking ? Discuss the factors on which password cracking depend. Also explain password cracking mechanism in brief.

UNIT - III

6. (a) What is data contamination ? How it can be controlled ? Explain.

- (b) What important role SQL injection plays as cyber crime investigation approach ? Explain the working of SQL injection.

7. (a) What is Spyware ? Discuss its different categories. How spyware is different from virus ?

- (b) Define Digital forensics. Write down the steps of digital forensics.

UNIT - IV

8. (a) Why digital signature are required ? Explain Memory hard algorithm in brief.

- (b) What is Ethereum ? How it is constructed ? Discuss.

9. (a) How optimization can be achieved using Merkle Patricia Tree ? Discuss.

- (b) Discuss the use of blockchain in IoT.

Roll No.

67192-N

**MCA 4th Semester 2 yr. Course
Examination – December, 2024**

IOT & SENSOR NETWORKS

Paper : 21MCA24C2

Time : Three Hours]

[Maximum Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all by selecting *one* question from each Unit and Question No. 1 which is *compulsory*.

1. (a) Define the term "sensor node" in the context of WSNs. $2 \times 8 = 16$
 - (b) How does geographic routing differ from traditional routing in WSNs ?
 - (c) Differentiate IoT privacy and security ?
 - (d) What is the primary purpose of deploying Wireless Sensor Networks ?

(e) How does the "sink node" differ from regular sensor nodes in a WSN ?

(f) What is layered attacker model ?

(g) What is Nimbis ?

(h) What are vulnerabilities in an IoT environment ?

UNIT - I

2. (a) What is IoT ? How did it evolve ? What are the key components of an IoT/M2M system and how they work together ? Illustrate.

(b) How is IP addressing handled in the Internet of Things (IoT) ? What challenges does IoT pose for traditional IP addressing schemes ? Explain.

3. (a) What is the modified OSI model for IoT/M2M system ? Discuss the functions and requirements of each layer.

(b) What is LoWPAN ? What are the key features of LoWPAN ? How does it enable communication among low-power devices in the context of the Internet of Things (IoT) ? Explain.

UNIT - II

4. (a) What is Arduino ? What are the capabilities of Arduino IDE ? How it is used for developing IoT projects ? Discuss.

(b) What do you mean by IoT security tomography ? How is it significant ? Illustrate its relevance.

67192-N-300-(P-4)(Q-9)(24) (2)

5. (a) How does the cloud computing paradigm enhance data collection and storage capabilities, especially in the context of large-scale IoT deployments ? Explain.

(b) How does Nimbis contribute to cloud-based data collection, storage, and computing services for IoT applications ? Explain.

UNIT - III

6. What are Wireless Sensor Networks ? What are the key components and communication principles that form the foundation of Wireless Sensor Networks ? What are the major challenges faced by Wireless Sensor Networks ? Explain.

7. (a) What role do sensors, microcontrollers, and communication modules play in the design of a sensor node ? How are they interconnected to achieve specific sensing and communication tasks ? Explain.

(b) What are the design principles employed in architecting WSNs for optimal performance, scalability, and adaptability to dynamic environmental conditions ? Illustrate.

67192-N-300-(P-4)(Q-9)(24) (3)

P. T. O.

UNIT – IV

8. (a) What are the key considerations in the design of the physical layer and transceivers for Wireless Sensor Networks, particularly in terms of energy efficiency and communication range ? Explain. 8
- (b) How do contention-based and contention-free MAC protocols address the challenges of channel access and energy conservation in WSNs ? Explain. 8
9. (a) How does efficient address management contribute to network scalability and resource optimization ? Explain. 8
- (b) What role do addressing schemes play in the efficient routing and data forwarding within Wireless Sensor Networks ? Explain. 8
-

Roll No.

67191-N

**MCA 4th Semester (2 Yr. Course)
Examination – December, 2024**

ADVANCED SOFTWARE ENGINEERING

Paper : 21MCA24C1

Time : Three hours]

[Maximum Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *four* more questions selecting *one* question from each Unit. Question No. 1 is *compulsory*.

1. Answer the following questions briefly : $8 \times 2 = 16$

- (a) What is software design ?
- (b) What are advantages of CBSE ?
- (c) What COTS myths ?
- (d) Explain working of scrum ?
- (e) Explain sprint cycle in Agile.
- (f) What is the role of Project owner and Scrum master ?

(g) Explain principles of DevOps.

(h) Describe AWS DevOps.

UNIT - I

2. (a) What is Agile software Engineering and Client/Server Software Engineering ? Describe their differences, uses and advantages with suitable examples. 10

(b) Explain component based model and its principles and its uses. 6

3. Explain the following briefly with suitable examples. 6

(a) Testing process for Web applications and its merits. 6

(b) Aspect based software development and its uses. 10

UNIT - II

4. What is Scrum ? How it is useful and used? Explain its process, principles, values with suitable examples in detail. 16

5. Describe the following with examples. 16

(a) Agile risk management and its advantages

(b) Backlog management and its importance

(c) Extreme programming (XP) and advantages

(d) Agile principles and their working

UNIT - III

6. (a) Describe use and role of Agile for configuration management with examples. 8

(b) Explain Scrum of Scrums and its uses, applications and advantages with examples. 8

7. Explain the following with suitable examples : 7

(a) Agile control and its parameters 8

(b) Altern principles and their uses. 8

UNIT - IV

8. Define pipeline and DevOps ? Explain their need, process and applications with examples in detail. 16

9. Explain the following briefly with examples : 8

(a) DevOps and its architecture and applications. 8

(b) DevOps automation and its tools. 8

Roll No.

67193-N

**MCA 4th Semester 2 yr. Course
Examination – December, 2024**

WEB DEVELOPMENT USING .NET FRAMEWORK

Paper : 21MCA24C3

Time : Three Hours]

[Maximum Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all by selecting *one* question from each Unit and Question No. 1 which is *compulsory*. All question carry equal marks.

1. (i) What is Interoperability ? How it is achieved in .NET framework ?
- (ii) Why C# is called also known as free form language ?
- (iii) Differentiate between Class level and Instance level variables with examples.
- (iv) What do you mean by Overriding methods ?

(v) Explain any two components of IDE provided by .NET for developing Windows application.

(vi) Name any two methods associated to DataSet class in reference to ADO.NET.

(vii) What do you mean by dynamic compilation of pages by ASP.NET?

(viii) Define hierarchical data bound controls used in ASP.NET

UNIT - I

2. (i) List any four important services offered by the Framework Base Classes to the users.

(ii) What is Enumeration? How it is useful in C# programming? Give two examples of enum type values.

3. (i) Elaborate the execution model followed by different components of .NET framework for developing Web applications.

(ii) Explain the following: String Builder class, Verbatim string and Immutable strings with one example for each.

UNIT - II

4. (i) Define Overloaded constructor. State rules for declaring and defining any two types of Overloaded constructor.

67193-N-350-(P-4)(Q-9)(24) (2)

(ii) What is Multiple inheritance? Explain the order of execution of Constructors available at different levels of Classes.

5. (i) How further inheritance can be prevented by using Sealed concept at class and method levels?

(ii) Explain how interfaces can be used to implement Multiple Inheritance by extending and implementing it.

UNIT - III

6. (i) What are Win Forms? Explain how standard controls can be added to it.

(ii) Define validation. How user input can be validated in Window applications?

7. (i) Pictorially represent the Dataset object model, mention one functionality associated with each component Dataset.

(ii) Explain how navigation between data records is achieved in ADO.NET.

UNIT - IV

8. (i) Explain the Page rendering phase of ASP.NET page life cycle with its importance.

(ii) Differentiate between authorization and authentication process in reference to ASP.NET.

P. T. O.

67193-N-350-(P-4)(Q-9)(24) (3)

9. (i) Elaborate the purpose of the following controls used in ASP.NET: Data Source and Grid view controls.
- (ii) Define Web services, its components and functions (any four) performed by it in ASP.NET environment.
-