Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

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MCA (Sem.–1)

TECHNICAL COMMUNICATION

Subject Code : PGCA-1905

M.Code. : 79039

Date Examination : 23-06-2025

Time : 3 Hrs. Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying TEN marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. **Write short notes on :**

   a) Email

   b) Communication

   c) Listening

   d) Workshop

   e) Presentation

   f) Précis'

   g) Newsletter

   h) Report writing

   i) Non-Verbal Communication

   j) Hearing

SECTION - B

2. What is a communication process? What is the role of feedback in this process?

3. What are the essentials of communication?

4. Write a Paragraph on 'Online resources and E-learning'.

5. Write a letter to a dealer complimenting about the product you purchased from him.

SECTION – C

6. What is an interview? What should be done in order to project a positive image for an Interview?

7. What are the Research Papers, Dissertation, Thesis and Technical Reports?

8. What are the important presentation techniques to be followed while undertaking a presentation?

9. What do you understand by Resume writing? Draft a sample resume of a fresh graduate.

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Total No. of Questions : 09

MCA (Sem.–1)

PROGRAMMING IN PYTHON

Subject Code : PGCA-1951

M. Code : 79036

Date of Examination : 16-06-2025

Time : 3 Hrs. Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C, have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying TEN marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. **Write short notes on/Fill in the blank :**

   a) What is the difference between immediate and script mode in Python?

   b) What is the difference between Generator function and Normal function?

   c) What are lambda functions in Python?

   d) Define implicit conversion.

   e) Mention the types of arguments in Python.

   f) Explain input command in Python with example.

   g) What is the need of learning Python and its importance?

   h) How to make a Python class member variable hidden from outside the class?

   i) Explain the use of break and continue statements with examples.

   j) List any four file operations.

SECTION - B

2. Describe shift and logical operators used in Python.

3. Write a Python program to print sum of first 60 non-prime numbers.

4. Explain the following: (i) Tuple assignment (ii) comments (iii) Statements in Python.

5. Write the syntax of while loop and use the same to classify whether a given number is Prime or not.

SECTION - C

6. Explain about fruitful functions with suitable examples.

7. What is the object oriented features supported by Python? Explain in detail.

8. What type of parameter passing is used in Python? Justify your answer with sample programs.

9. Write a python program to read line by line from a given files-file1 & file2 and write into file3.

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MCA (Sem.–1)

ADVANCED DATA STRUCTURES

Subject Code : PGCA-1952

M.Code : 79037

Date of Examination : 18-06-2025

Time : 3 Hrs. Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying TEN marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. **Answer the following :**

   a) Why is probabilistic analysis important?

   b) What is the worst case time complexity of quick sort?

   c) What is hashing?

   d) What are the properties of a good hash function?

   e) What is the worst case time complexity of bucket sort algorithm?

   f) List the properties of AVL tree.

   g) What do you mean by minimum spanning tree?

   h) What is maximum flow? Explain.

   i) How do you compute string length?

   j) What is string concatenation?

SECTION-B

2. a. The keys 12, 18, 13, 2, 3, 23, 5 and 15 are inserted into an initially empty hash table of length 10 using open addressing with hash function h(k) = k mod 10 and linear probing. What is the resultant hash table?

   b. What is perfect hashing? Explain.

3. a) Show the red-black trees that result after successively inserting the keys 4,3,11,12,18,9 into an initially empty red-black tree.

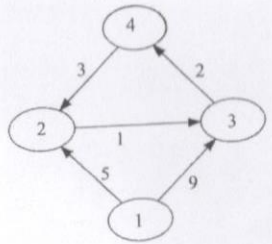
   b) Explain the importance of disjoint sets data structure.

4. What is a heap? Differentiate between min-heap and max-heap? How are they created? Explain with the help of examples.

5. What is amortized analysis? What are the different types of amortized analysis? Explain in detail.

SECTION-C

6. Calculate all pairs shortest path using Floyd Warshall algorithm for the following problems.



7. What is the basic principle of Rabin-Karp algorithm? Explain in detail with the help of an example.

8. Write an algorithm for Boyer-Moore algorithm. Also perform detailed analysis of this algorithm.

9. What is prefix function in Knuth-Morris-Pratt algorithm? Explain in detail. Also explain the time complexity of Knuth Morris Pratt algorithm.

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MCA (Sem.–1)

ADVANCED DATABASE MANAGEMENT SYSTEM

Subject Code : PGCA-1953

M. Code : 79038

Date of Examination : 20-06-2025

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying TEN marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. **Write short notes on:**

   a. Define Database.

   b. Data Models

   c. Cardinality of Relation

   d. Referential Integrity Constraints.

   e. Week Entity

   f. Projection Operation

   g. Distributed Database Storage

   h. NoSQL Databases

   i. Temporal Databases

   j. Distributed DBMS Commit Protocols.

(5)

SECTION - B

2. What is the purpose of database management system and its applications? Discuss in detail.

3. What is ER data model? Explain ER diagram with suitable example and their terminology.

4. What is the process of normalization? Explain first three normal forms.

5. What is the use of relational algebra also discussing different operator?

SECTION - C

6. Discuss the architecture of a DBMS and differentiate between centralized and client-server architectures.

7. What are the concepts and use of multidimensional databases in data analytics?

8. What are spatial databases and their data structure and method of storage?

9. What are the types of XML databases? What is an XML schema type?

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M.C.A. (Sem.–2)

WEB TECHNOLOGIES

Subject Code : PGCA1909

M.Code : 79615

Date of Examination : 19-05-2025

Time : 3 Hrs. Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying TEN marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. **Write briefly :**

   a) HTML

   b) Footer tag

   c) Table tag

   d) Color coding

   e) Ordered list

   f) Align attributes

   g) BGCOLOR

   h) COLSPAN

   i) Frame

   J) Testing and Debugging

SECTION-B

2. Write a note on Internet Domains and Internet Server Identities.

3. Explain with example any 5 text formatting tags.

4. Define list. Differentiate between ordered and unordered lists.

5. Discuss the use of alt, width, height and border attributes.

SECTION-C

6. Explain in detail various ways of linking a document.

7. What is JavaScript? List its advantages. How it is used in web pages?

8. Explain the use of JavaScript in platform independence, testing and debugging.

9. Discuss with example the select and option element and multi choice list element in a form.

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MCA (Sem.–2)

ADVANCED JAVA

Subject Code : PGCA-1918

M.Code : 79617

Date of Examination : 22-05-2025

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying TEN marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. **Define Briefly :**

   a. Servlet

   b. JDK

   c. Cookies

   d. Applet

   e. Struts

   f. Hibernate

   g. Entity Bean

   h. JAR files

   i. RMI

   j. Deployment

SECTION - B

2. Explain the process of reading the servlet parameters.

3. Define JSP. Explain its life cycle.

4. Write a note on implicit objects, object scope and session management.

5. Describe the struts framework in detail.

SECTION - C

6. Explain in detail the basic architecture model of Hibernate.

7. Discuss in detail the Java Beans API and use of JAR files.

8. Write a note on compiling and executing server and the client in RMI.

9. Explain the architecture of CORBA and its services.

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MCA (Sem–2)

DESIGN AND ANALYSIS OF ALGORITHMS

Subject Code : PGCA-1920

M.Code : 79616

Date of Examination : 05-05-2025

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying TEN marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. **Write briefly :**

   a. Are the sub solutions overlapping in dynamic programming approach?

   b. What is asymptotic analysis? Why are asymptotic notations important?

   c. Draw a graph with a cycle but with no Hamiltonian cycle.

   d. What are P and NP problems?

   e. What is the basic principle of divide-and-conquer?

   f. State the general principle of greedy algorithm.

   g. What are the two classes of non-polynomial algorithms?

   h. What do you mean by the running time of an algorithm?

   i. What are the deterministic algorithms?

   j. How is the time complexity measured?

SECTION - B

2. Order the following functions by growth rate: N, $N^{1.5}$, N^{2}, N log log N, N $\log^2$ N, N log (N^{2}), 2/N, 2^{N}, $2^{N/2}$, 37, N^2 log N, N^3. Indicate which functions grow at the same rate.

3. Prove that $f(n) = a_m n^m + a_{m-1} n^{m-1} + \ldots + a_1 n + a_0$ then $f(n) = O(n^m)$.

4. Consider 5 items along with their respective values and weights: I = <I1,12,13,14,15> , w = <5,10,20,30,40> , v= <30,20,100,90,160>

   The capacity of the knapsack W = 60. Find the solution for the fractional knapsack problem.

5. Explain the Big -Oh computation for each of the following control structures:

   a) Sequencing b) If-then-else c) "for" loop

   d) "While" loop e) Recursion.

SECTION - C

6. What is the working principle of Quicksort? What is the significance of the Pivot element? Explain the implementation of the Quicksort algorithm step-by-step using a suitable illustrative example.

7. What is NP Completeness? Is P = NP? Explain.

8. If we are given a directed graph G with n vertices. Explain how you will find out the length of the shortest path between any pair of vertices in G? Justify your answer with an example.

9. Define depth-first search. Write algorithm for DFS, discussing its time complexity. Also, illustrate with some example.

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MCA (Sem–2)

INFORMATION SECURITY AND CYBER LAW

Subject Code :PGCA1932

M.Code : 79619

Date of Examination :29-05-2025

Time : 3 Hrs. Max. Marks :70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B &C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B& C carrying TEN marks each.
4. Select atleastTWO questions from SECTION - B &C.

SECTION-A

1. **Write short notes on :**

   a) What is information system availability?

   b) Define computer worm.

   c) What is a cryptographic algorithm?

   d) Explain token authentication.

   e) What is a zombie?

   f) What is a firewall?

   g) Define E-Governance.

   h) What is network-based IDS?

   i) What is phishing?

   j) Significance of cyber laws.

SECTION-B

2. Analyze the structure and strategic importance of Information Systems.
3. Evaluate the user authentication techniques and their security implications.
4. Examine access control models and their role in information security.
5. Investigate database security challenges and malware protection strategies.

SECTION-C

6. Describe the functioning of Intrusion Detection Systems in cybersecurity.
7. Discuss firewall technologies and their network defense capabilities.
8. Explore cryptographic algorithms and their practical applications.
9. Analyze internet security protocols and the framework of cyber laws.

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Total No. of Questions : 09

MCA (Sem.–02)

LINUX ADMINISTRATION

Subject Code : PGCA-1956

M.Code :79618

Date of Examination: 26-05-2025

Time : 3 Hrs. Max. Marks : 70

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying ~~EIGHT~~ Ten marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. Write short notes on:

   a. How do you create and edit files using the 'vi' editor in Linux?

   b. What are the common file permissions in Linux and how do you set them?

   c. Explain the role of the bootloader in the Linux boot process.

   d. What is the primary purpose of the BIND database file in DNS configuration?

   e. Describe the main configuration steps for setting up an Apache web server.

   f. Why is SMTP important in email communication, and how does it work?

   g. Differentiate between POP and IMAP in email protocols.

   h. How can you install and configure the Dovecot IMAP and POP3 server in Linux?

   i. Discuss the basics of the Samba server and its administration.

   j. What tasks are involved in creating a share using Samba?

SECTION - B

2. Describe the process of managing packages and users in a Linux system. Explain the steps involved in getting, unpacking, configuring, compiling and installing a package. Discuss the challenges and best practices in package management.

3. Discuss the role of user and group commands in Linux. Explain how to create, modify and manage users and groups. Provide examples of common user and group management tasks and the associated command-line tools.

4. Explore the vi text editor in-depth. Explain its various modes, common commands, and advantages in text editing. Provide practical examples of using vi for file editing and manipulation and discuss how it compares to other text editors.

5. Explain the process of file permissions management and manipulation in Linux. Discuss the various permission types (read, write, execute) and how they are assigned to files and directories. Provide practical examples of changing and managing file permissions for different scenarios.

SECTION - C

6. Describe the process of setting up a DNS server, including the installation, configuration, and use of the BIND database file. Explain the importance of DNS in internet communication and the role it plays in resolving domain names. Provide practical examples of DNS configuration.

7. Discuss the fundamentals of the HTTP protocol in web communication. Explain the key concepts behind HTTP requests and responses. Provide insights into how the Apache HTTP server works, along with detailed steps for its installation, startup and shutdown.

8. What are the mechanics of SMB and how does it facilitate file and print sharing between computers?

9. Explore the basics of POP and IMAP in email protocols. Explain their differences and how they affect email retrieval. Describe the installation and configuration of the UWIMAP and POP3 servers in a Linux environment. Discuss the importance of email servers in managing messages.

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Total No. of Questions : 09

MCA (Sem.–3)

E-COMMERCE AND DIGITAL MARKETING

Subject Code : PGCA-1921

M.Code : 90807

Date of Examination: 30-06-2025

Time : 3 Hrs. Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying TEN marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. **Write short notes on:**

   a) Define the Viral marketing.

   b) What is keyword search?

   c) Describe the importance of SMM.

   d) Explain the Email marketing.

   e) What is Mobile marketing?

   f) Name the privacy issues in E-marketing.

   g) Define the Hypertext publishing.

   h) What is the role of smart cards for e-commerce?

   i) What is affiliate marketing?

   j) What is On-page SEO?

SECTION-A

2. What is the framework of E-commerce? What are the technical aspects of e-commerce?

3. Define the e-business and describe the application parts of e-commerce for the business organisations.

4. What is the process of online payment system? Discuss the types of traditional methods of payment. What are the barriers for e-payment system?

5. Describe the concept and applications of EDI. What are the limitations of EDI? What is the role of EDI for e-commerce?

SECTION-B

6. What is digital marketing and what are the different components of online marketing?

7. What is the role of online marketing? Discuss the role of web analytics for digital marketing.

8. Describe the search engine optimization and how its different from SEM? What are the strategies of SEO?

9. Discuss the content marketing strategy. What is the role of content marketing for website planning?

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MCA (Sem.–3)

ADVANCED COMPUTER NETWORKING

Subject Code : PGCA1925

M.Code : 90798

Date of Examination : 03-07-2025

Time : 3 Hrs. Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION -B & C carrying EIGHT marks each.
4. Select at least TWO questions from SECTION - B & C.

SECTION - A

I. **Write short notes on :**

a) Define Bandwidth.

b) Write about Fiber optics.

c) Discuss Hamming code.

d) Name any two routing algorithms.

e) Write about DNS.

f) Define Mobility.

g) What is the use of WLAN?

h) Compare Adhoc vs. cellular networks.

i) Discuss CDMA.

j) What is system capacity?

SECTION - B

2. Discuss in detail the Reference model used in computer networks.

3. **Define the following :**

a) Data Flow testing

b) Sliding window protocol.

4. Write in detail about Medium Access Sub-Layer. Why ALOHA is used?

5. Explain the elements of transport layer. What is crash recovery in networks?

SECTION - C

6. Explain the steps of wireless system design for cellular systems.

7. Discuss in detail the cellular and mobile networks.

8. a) Write a note on advantages of Adhoc Network.

b) Give the introduction of Routing Protocols.

9. Discuss the network architecture of Adhoc networks.

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Total No. of Pages : 02

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MCA (Sem.–3)

THEORY OF COMPUTATION

Subject Code : PGCA1927

M.Code : 90800

Date of Examination : 16-06-2025

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying TEN marks each.
4. Select at least TWO questions from SECTION - B & C.

SECTION - A

I. **Write short notes on :**

a) GNF

b) Right context

c) NDFA

d) Grammar

e) TM

f) Transition Table

g) Null Productions

h) Yield

i) Type-1 grammar

j) Mealy

SECTION - B

2. **Construct a Moore machine equivalent to the Mealy machine M defined as follows :**

Present State	Next State			
	a = 0		a = 1	
	state	output	state	output
→ q_1	q_1	1	q_2	0
q_2	q_4	1	q_4	1
q_3	q_2	1	q_3	1
q_4	q_3	0	q_1	1

3. Describe pumping lemma for regular set with the help of an example.

4. Prove that P + PQ*Q = a*bQ* where P = b + aa*b and Q is any regular expression.

5. Explain the concept of ambiguity with the help of example.

SECTION - C

6. Design PDA for $\{wcw^T \mid w = \{a,b\}^*\}$.

7. Write a note on halting problems and tractable and intractable problems.

8. Design Turing Machine of $\{0^n1^n \mid n >= 1\}$

9. Discuss the procedure how to covert parse tree into PDA.

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MCA (Sem.–3)

SOFTWARE PROJECT MANAGEMENT

Subject Code : PGCA1930

M.Code : 90801

Date of Examination : 23-06-2025

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying TEN marks each.
4. Select at least TWO questions from SECTION - B & C.

SECTION - A

1. **Write short notes on :**

   a) Justify the role of Software Engineering in software industry.

   b) What do you understand by Stakeholder management as a phase in Software Project Management?

   c) Pictorially represent the working of spiral model as evolutionary process model.

   d) Write down the working principle of extreme programming used in Software Project Management.

   e) Why SRS is called as the 'Only Legal Document' in whole software cycle?

   f) Draw a state transition diagram while considering any illustration of your choice.

   g) Define the term Work Breakdown Structures (WBS) in planning phase.

   h) List down any four risks that can cause the software crisis.

   i) Brief out any one approach that can be used to schedule the project with relevant example.

   j) Elaborate how risks can be evaluated.

SECTION - B

2. a) What are the various activities in software project management? Explain.

   b) Discuss in detail about team structure.

3. Elaborate how detailed COCOMO works differently than intermediate COCOMO.

4. Differentiate the working of iterative and incremental models to perform Software Project management.

5. Explain different types of software requirements collected at SRS phase with apt examples.

SECTION - C

6. What are various software quality parameters? Explain the role of quality metrics and IS09126 standard in software quality management.

7. a) What is the difference between an SCM audit and a technical review? Can their function be folded into one review? What are the pros and cons?

   b) Explain Oldman Hackman job characteristic model. Elaborate with example.

8. What are the various contracts? Discuss various stages in any contract placement. Also discuss various aspects of contract management with the help of suitable example.

9. a) You are an engineer involved in the development of a financial system. During installation, you discover that this system will make a significant number of people redundant. The people in the environment deny you access to essential information to complete the system installation. To what extent should you, as a systems engineer, become involved in this? Is it your professional responsibility to complete the installation as contracted? Should you simply abandon the work until the procuring organization has sorted out the problem?

   b) A formal technical review is effective only if everyone has prepared in advance. How do you recognize a review participant who has not prepared? What do you do if you're the review leader?

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MCA (Sem.–4)

ADVANCED WEB TECHNOLOGIES

Subject Code : PGCA1958

M.Code : 91856

Date of Examination : 20-05-2025

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying TEN marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. **Write short notes on :**

   a) PHP

   b) Scripting

   c) Strings

   d) Regular expression

   e) Sessions

   f) CMS

   g) Attributes

   h) Node.js

   i) ReactJS

   j) Component API

SECTION - B

2. Explain server side and client side web scripting.
3. Describe the functions of PHP/MySQL.
4. Discuss the OOP concepts used in PHP.
5. Write a note on content management system in detail.

SECTION - C

6. Define XML. Explain its syntax and editors.
7. Explain the use of AJAX in websites with example.
8. What is bootstrap? Explain its components and use.
9. Write a note on component life cycle in react, forms and events.

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Roll No. | | | | | | | | | | | | | Total No. of Pages :02

Total No. of Questions : 09

MCA (Sem.–04)

IOT & BLOCKCHAIN TECHNOLOGY

Subject Code : PGCA 1967

M.Code : 91862

Dtae of Examination: 27-05-2025

Time : 3 Hrs. Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying TEN marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. **Write short notes on:**

   a. Define IoT briefly.

   b. What are communications APIs?

   c. Name two IoT hardware components.

   d. Explain MQTT protocol.

   e. One IoT application in agriculture.

   f. Define blockchain.

   g. What is distributed consensus?

   h. Public vs. private blockchain.

   i. Define smart contract.

   j. One blockchain enterprise application.

SECTION - B

2. Explain the physical design of IoT with emphasis on the "Things" in IoT. Describe various communication models used in IoT architecture.

3. Discuss cloud computing and big data analytics as enabling technologies for IoT.

4. Compare and contrast MQTT and CoAP, ZigBee and Bluetooth communication protocols used in IoT.

5. Explain the solution framework for IoT applications with a case study of smart cities implementation.

SECTION - C

6. Describe the structure of a block in a blockchain and explain the concept of transactions.

7. Explain the process of block mining in Bitcoin and how the P2P network ensures transaction integrity.

8. Discuss the concept of permissioned blockchain model and how it differs from public blockchain.

9. Elaborate on blockchain applications in Supply Chain Financing and Identity Management.

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Total No. of Pages : 02

Total No. of Questions : 09

MCA (Sem.–4)

MACHINE LEARNING AND DATA ANALYTICS USING PYTHON

Subject Code : PGCA-1976

M.Code : 91855

Date of Examination : 06-05-2025

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying TEN marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. Write short notes on :

   a. What is the cost function used in logistic regression? Discuss how it is optimized.

   b. Describe the process of selecting the number of clusters in K nearest neighbours algorithm.

   c. Define any two criteria used for node splitting in decision tree.

   d. Briefly discuss the principle of classification using Naïve Bayes.

   e. Differentiate between classification and clustering in machine learning.

   f. Write a brief note on NumPy arrays.

   g. What is the difference between a list and a tuple in Python?

   h. How do you create a pie chart using Matplotlib?

   i. What is the purpose of plt.grid() in Matplotlib?

   j. Demonstrate how to handle missing data in DataFrames.

SECTION - B

2. What is a well posed learning problem in machine learning? Give examples. Discuss the steps of designing a machine learning system. Explain the three main types of machine learning.

3. Describe the mathematical principles behind linear regression. Explain how it differs from logistic regression and when each is appropriate.

4. Describe the Random Forest algorithm, including how it works, what ensemble learning is and its advantages over a single decision tree.

5. Discuss the need for dimensionality reduction. Describe how Principal Component Analysis is used for this task. List the characteristics of principal components.

SECTION - C

6. Explain Python's core data types. Provide examples of how to use control structures and define functions.

7. Explain the concepts of Pandas Series and DataFrames. Demonstrate how to create, manipulate and analyze data using these data structures.

8. Explain the use of the groupby() function in Pandas. Demonstrate how to read and write data from/to CSV and Excel files.

9. Demonstrate how to create line plots, scatter plots and bar charts using Matplotlib. Explain how to customize plots with labels, titles and legends.

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