20CAP19B

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MCA DEGREE EXAMINATION DECEMBER 2022
(Third Semester)

Branch – **COMPUTER APPLICATIONS**

DISCIPLINE SPECIFIC ELECTIVE – II INTERNET OF THINGS

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1. Which of the following is not a fundamental component of an IoT system?
   (i) Sensors (ii) Connectivity and data processing
   (iii) User interface (iv) Transformer
2. Which of the following is false about IoT devices?
   (i) IoT devices use the internet for collecting and sharing data
   (ii) IoT devices need microcontrollers
   (iii) IoT devices use wireless technology
   (iv) IoT devices are completely safe
3. Total elements in the Open IoT Architecture is ____
   (i) 5 (ii) 6 (iii) 7 (iv) 8
4. Which one of the following protocols is lightweight?
   (i) IP (ii) HTTP (iii) MQTT (iv) CoAP
5. Identify the language preferred for IoT analytics.
   (i) Python (ii) PHP (iii) C++ (iv) HTML

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6. a) Summarize the four Industrial Revolutions.
   OR
   b) Enumerate the characteristics of FoG computing.
7. a) How sensors and actuators interact with the physical world? Explain.
   OR
   b) Give a brief account of three classes of Constrained Node defined by RFC 7228.
8. a) Summarize the MQTT message types with its description.
   OR
   b) State the differences between structured and unstructured data.
9. a) Discuss the Common Challenges in OT Security.
   OR
   b) Brief on the components of smart city traffic architecture.
10. a) Write about the characteristics of Python.
    OR
    b) What is the Raspberry Pi? How is Rasberry Pi different from a desktop computer? Explain.

Cont...

SECTION -C (30 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 6 = 30)

11. a) Discuss about IT and IoT networks.

OR

b) Explain the seven layers of the IoT Reference Model.

12. a) With the energy type, state the classifications of actuator.

OR

b) Discuss about LoRaWAN Architecture.

13. a) Compare and contrast CoAP and MQTT.

OR

b) With a neat sketch, describe the components of HDFS.

14. a) Explain the concept of mission continuum and lists the various elements needed to ensure the public safety mission.

OR

b) With diagram, explain the four main layers of IoT integrated for smart cities.

15. a) Explain the steps involved in the IoT system design methodology.

OR

b) Write about the domain model of IoT System for Weather Monitoring.

Z-Z-Z

END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MCA DEGREE EXAMINATION DECEMBER 2022
(First Semester)

Branch – **COMPUTER APPLICATIONS**

LINUX ARCHITECTURE AND PROGRAMMING

Time : Three Hours | Maximum : 50 Marks

SECTION – A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 × 1 = 5)

1 With ____ first line of every shell script begins.
(i) & (ii) #
(iii) $ (iv) !

2 Which command is used to check filesystem usage in a system?
(i) fu (ii) du
(iii) df (iv) dd

3 How to run a process in the background of Linux process management?
(i) & (ii) ?
(iii) * (iv) |

4 Which of the following commands are commonly used to back up Linux systems?
(i) restore (ii) tar
(iii) tape (iv) cpio

5 You want to discover the sizes of several dot files in a directory. Which of the following commands might you use to do this?
(i) ls - la (ii) ls – p
(iii) ls - R (iv) ls – d

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a) Analyze the Structure of LINUX.
(OR)
b) Write a shell script to count number of lines present in a text file.

7 a) Differentiate Linux File System from Windows-based File System.
(OR)
b) Explain about Editing files with vim and vi.

8 a) Describe Listing process with System monitor.
(OR)
b) List out various Operators for test expression.

9 a) Write down the role of system administrator.
(OR)
b) Explain about setting permissions with Access Control Lists.

Cont...

10 a) Describe how to partition a disk with multiple partitions.

(OR)

b) Discuss about starting the OpenSSH-server service packages.

SECTION -C (30 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 6 = 30)

11 a) Examine the history of Linux.

(OR)

b) Explain the Connecting and Expanding commands.

12 a) Discuss about Listing Files and Directories.

(OR)

b) Explain how to find the location of files stored in database.

13 a) Explain about Killing and Renicing processes.

(OR)

b) Analyze the Looping statements used in Shell Scripts.

14 a) Evaluate the administrative commands, Configuring files and Log files with suitable example.

(OR)

b) Explain about how to create a User Account in Linux.

15 a) Interpret the various Supported filesystem in Mounting file system.

(OR)

b) Enumerate the Server Administration process with suitable example.

Z-Z-Z END

22CAP102/ 20CAP02

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MCA DEGREE EXAMINATION DECEMBER 2022
(First Semester)

Branch – **COMPUTER APPLICATIONS**

HYBRID DATABASE MANAGEMENT SYSTEM

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1 Identify the major role of the Database Administrator.
(i) Schema and physical-organization modification
(ii) Schema definition
(iii) Integrity-constraint specification
(iv) All of these

2 Which among the following SQL statements is used for Transaction Control?
(a) Commit (b) Roll Back (c) Save Point (d) Set Transaction.
(i) (a) & (d) (ii) (a) (b) & (d)
(iii) (a) (c) & (d) (iv) (a) (b) (c) & (d)

3 Which among the following is an example of machine-generated unstructured data?
(i) Sensor Data (ii) Web Log Data
(iii) Radar or Sonar Data (iv) Financial Data

4 In MongoDB, object ID for the given string 4c291856238d3b19b2000001, the first 8 bit numbers such as 4c291856 represents _____ .
(i) Process ID (ii) Machine ID
(iii) 4-byte Timestamp (iv) Counter

5 In MongoDB, the $inc operator is used to perform _____ operation over a numeric value.
(i) increment (ii) decrement
(iii) add (iv) All of these

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL questions carry **EQUAL** marks (5 x 3 = 15)

6 a With a proper diagram, describe the three levels of data abstraction that exist in the database system.

OR

b Elaborate on the usage of the referential integrity constraint concept in detail by considering customer billing applications.

7 a Tabulate any three differences between the primary key and foreign key.

OR

b State the two main components of SQL Triggers. Write the appropriate syntax for creating a trigger.

8 a Elaborate any three important characteristics of the HBase columnar database.

OR

b Highlight any three contemporary applications of spatial data.

9 a Briefly deliberate any three MongoDB command-line utility tools.

OR

b Create two documents representing two users, Smith and Jones. Write a query to verify that the documents have been saved.

Cont...

10 a List out the various update operator and array operators available in MongoDB.

OR

b Illustrate the various steps required to perform the map-reduce process available in the aggregation method.

SECTION -C (30 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks (5 x 6 = 30)

11 a List out the components of ER diagram and describe the purpose of each symbol used in the ER diagram. Construct an ER diagram to store data in your college's library.

OR

b Elucidate the basic system architecture of a database management system using a neat block diagram.

12 a Consider two tables Employee table and Salary table, perform outer join operations over these two tables and present the appropriate input and output table for the same.

OR

b Illustrate how BCNF (Boyce- Codd normal form) could be implemented over an Employee database. Construct the table with the required fields to portray the BCNF concept.

13 a Briefly explore the two major categories for sources of big structured data in detail.

OR

b If you need real-time capabilities, what are the requirements of the infrastructure to support the system's capability to ingest data, process it, and analyze it in real-time?

14 a Discuss about the dramatic difference in query response by listing, while you run the query with explain() method of MongoDB.

OR

b With a proper block diagram, describe MongoDB's key features such as horizontal and vertical scaling techniques of argumenting.

15 a Draw the order state transition of atomic document processing. Using the findAndModify() method, write a piece of code to prepare the order of checkout.

OR

b With a proper block diagram explain the aggregation framework pipeline and list out the various Aggregation pipeline operations.

Z-Z-Z END

22CAP103

PSG COLLEGE OF ARTS & SCIENCE
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MCA DEGREE EXAMINATION DECEMBER 2022
(First Semester)

Branch – **COMPUTER APPLICATIONS**

DATA STRUCTURES AND ALGORITHMS

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1 Which of the following is not a linear data structure?
(i) Array (ii) Stack
(iii) Tree (iv) Queue

2 The main distinguishable characteristic of a binomial heap from a binary heap is that
(i) the location of child node is not fixed
(ii) it does not allow union operations that could easily be implemented in binary heap
(iii) the heap structure is not similar to complete binary tree
(iv) it allows union operations very efficiently

3 Which algorithm is used to solve a maximum flow problem?
(i) Prim's algorithm (ii) Ford-Fulkerson algorithm
(iii) Kruskal's algorithm (iv) Dijkstra's algorithm

4 Which approach is based on computing the distance between each pair of distinct points and finding a pair with the smallest distance?
(i) Brute force (ii) Exhaustive search
(iii) Divide and conquer (iv) Branch and bound

5 What are splay trees?
(i) self adjusting binary trees (ii) self adjusting binary search trees
(iii) tree with probability distributions (iv) tree with strings

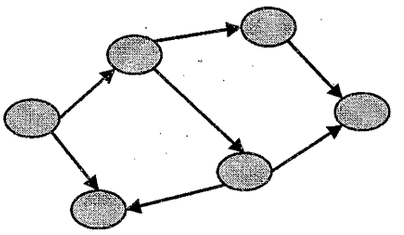
SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a Explain Stack ADT and its operations.
OR
b Find the minimum and maximum height of any AVL-tree with 7 nodes? Assume that the height of a tree with a single node is 0.

7 a Outline the purpose of d-heaps.
OR
b Discuss about binomial queue.

Cont...

8 a Write the topological sorting for the DAG given below.



OR

b Explain Network flow problem with an example.

9 a Explain Greedy Strategy.

OR

b Explain Approximate Bin Packing.

10 a Discuss Splay operation.

OR

b Explain Treaps and its operations.

SECTION -C (30 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 6 = 30)

11 a List the steps involved in insertion and deletion into a Doubly Linked list.

OR

b Elucidate binary search tree ADT.

12 a Create a procedure to insert a node into the binomial heap.

OR

b Differentiate between skew heap and leftist heap.

13 a Is it possible to find all pairs of shortest paths using Dijkstra's algorithm? Justify.

OR

b Write the Kruskal's algorithm for Minimum Spanning Tree. Analyze its complexity.

14 a Write Huffman code algorithm and derive its complexity.

OR

b Compare divide and conquer strategy with dynamic programming.

15 a Create the red-black tree that results after successively inserting the keys 41,38,31,12,19,8 into an initially empty red-black tree.

OR

b Criticize the application of k-d Trees.

Z-Z-Z END

22CAP104

PSG COLLEGE OF ARTS & SCIENCE
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MCA DEGREE EXAMINATION DECEMBER 2022
(First Semester)

Branch – **COMPUTER APPLICATIONS**

COMPUTER NETWORKS

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1 Routing process is managed by _____ layer.
(i) Physical (ii) Data Link
(iii) Network (iv) Transport

2 A 16-bit number local to a host in TCP is called as _____.
(i) Socket (ii) Session
(iii) Protocol (iv) Port

3 Dividing the packet as small packets is known as _____.
(i) Segmentation (ii) Fragmentation
(iii) Partition (iv) Division

4 The process of data communication that can be done simultaneously in both ends is called as _____.
(i) Simplex (ii) Half Duplex
(iii) Full Duplex (iv) Prolix

5 _____ is performed at the receiver with the help of the training sequence transmitted in the midamble of every time slot.
(i) Equalization (ii) Hopping
(iii) Demodulation (iv) Synchronization

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a Compare LAN and MAN networks.
OR
b Organize the five basic functions of e-mail systems.

7 a Justify the use of Berkeley Sockets.
OR
b Prepare a basic note on the TCP Service Model.

8 a Explain about the Choke Packets concepts in Congestion Control Algorithm.
OR
b Produce the salient features of Open Shortest Path First Gateway Protocol.

Cont...

9 a State about Time Division Multiple Access in detail.

OR

b Classify the difference between Circuit and Packet Switching.

10 a Explain about Forward CDMA Channel.

OR

b Illustrate in brief about Reverse CDMA Channel.

SECTION -C (30 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 6 = 30)

11 a Classify the layers and its functions in the OSI Reference Model.

OR

b Elucidate about the usage of the World Wide Web.

12 a Compare the difference between Connection Establishment and Connection Release.

OR

b Develop a concept analysis on TCP Connection Management Modeling.

13 a Survey on Quality of Service need for network layer.

OR

b How Internet Control Protocols plays a vital role in data transfer? Explain.

14 a Survey about the Frequency Division Multiple Access.

OR

b Interpret the necessity of Wireless Data Service in data communication.

15 a Elaborate about GSM with neat diagram.

OR

b Design and develop any one of the Wireless Technologies in Industrial Application.

Z-Z-Z

END

20CAP17

PSG COLLEGE OF ARTS & SCIENCE
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MCA DEGREE EXAMINATION DECEMBER 2022
(Third Semester)

Branch – **COMPUTER APPLICATIONS**

PYTHON FOR MACHINE LEARNING

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1 Data Analytics uses _____ to get insights from data.
(i) Statistical figures (ii) Numerical aspects
(iii) Statistical methods (iv) None of the mentioned above

2 How is a code block indicated in Python?
(i) Brackets (ii) Indentation
(iii) Key (iv) Variables

3 Identify the kind of learning algorithm for "facial identities for facial expressions".
(i) Prediction (ii) Recognition patterns
(iii) Recognizing anomalies (iv) Generating patterns

4 Linear-regression models are relatively simple and provide an easy-to-interpret mathematical formula that can generate _____.
(i) Predictions (ii) Conclusion
(iii) Interpretation (iv) None of the mentioned above

5 Decision tree is a _____ algorithm.
(i) Supervised learning (ii) Unsupervised learning
(iii) Both (iv) None of these

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6. a What is an Open Source tools? Explain.
(OR)
b What do you mean by Data Science? Discuss the applications.

7. a What are all the Control flow in PYTHON? Explain.
(OR)
b Explain the Pandas to the rescue principles.

8. a What do you mean by Recognizing Patterns? Explain.
(OR)
b Explain the Training and Testing in detail.

9. a What are the various Cluster Validation?
(OR)
b Define the Naïve Bayes classifier with example.

Cont....

10. a What is mean by Hierarchical Clustering? Explain.

(OR)

b Explain the Support Vector Machines model.

SECTION -C (30 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 6 = 30)

11. a What are the characteristics of Data Scientist? Explain the Data Science Team.

(OR)

b Detail discussion about the Iterative process of Data Science.

12. a Demonstrate the data types in PYTHON with example.

(OR)

b Elaborate on Indexing and Slicing in PYTHON.

13. a Explain the Feature Selection in Machine Learning in detail.

(OR)

b Define and elaborate K-Fold Cross validation in Machine Learning.

14. a Explain the Classification with KNN in detail.

(OR)

b What is a Classification? Explain the Classification with Logistic Regression in detail.

15. a How to use the Hierarchical Clustering in action? Explain.

(OR)

b Explain about Support Vector Machines and Kernel Methods.

Z-Z-Z END

PSG COLLEGE OF ARTS & SCIENCE
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Branch – **COMPUTER APPLICATIONS**

R PROGRAMMING

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1 Which of the following is not a basic data type in R?
(i) Numeric (ii) Character
(iii) Data frame (iv) Integer

2 Which of the following R code extracts the second column for the following matrix?
> x <- matrix(1:6, 2, 3)
(i) x[2,] (ii) x[1, 2] (iii) x[, 2] (iv) x[1 1 2]

3 To extract a sublist, we use _____ brackets.
(i) Flower (ii) Square (iii) Double (iv) Single

4 Data frames can be converted to a matrix by calling data _____.
(i) as.matr() (ii) as.mat() (iii) as.matrix() (iv) as.max()

5 Which of the following is used for reading tabular data?
(i) read.csv (ii) dget (iii) readLines (iv) writeline

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a Write a R code segments to create vectors of objects by concatenating things together logical, character and complex types.

OR

b Mention the procedure to load a .csv file in R.

7 a What is the use of subset() function and sample() function in R ? Give suitable example.

OR

b What is Data Frame? Explain.

8 a From the below data-set, write a R program to extract only those values where Age>60 and Sex="F".

Age	Sex	Coverage	Cost
47	F	10	8.93
52	F	10	10.46
57	F	10	14.38
62	F	10	20.44
67	F	10	27.38
72	F	10	39.83
47	F	20	13.87
52	F	20	16.92
57	F	20	24.77

OR

b Write a R program to create three vectors a,b,c with 3 integers. Combine the three vectors to become a 3×3 matrix where each column represents a vector. Print the content of the matrix.

Cont...

9 a What is a Lazy Evaluation? Give an example.

OR

b Differentiate between lapply and sapply.

10 a Mention the functions that are used for debugging in R.

OR

b Define the ways of using graphics parameters.

SECTION -C (30 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 6 = 30)

11 a Write a R program to read data from a large data file. How to write into a data file?

OR

b Write a R program to read a text file and display line by line. How to read through an URL connection?

12 a Describe some functions available in "dplyr" package with an example.

OR

b How to remove rows with value NA in R? Discuss.

13 a An Armstrong number is a number that is equal to the sum of the cubes of its own digits. For example, 370 is an Armstrong number since 370 = 3*3*3 + 7*7*7 + 0*0*0.
Write a program to find a given number is Armstrong or not.

OR

b Discuss the scoping rules of R in detail with appropriate examples.

14 a What is debugging? Enumerate the debugging tools in R with examples.

OR

b Discuss in detail the 'apply' family of functions in R with appropriate examples.

15 a Describe the high level and low level plotting commands in detail.

OR

b Mention the methods to interact with graphics, and the ways of using graphics parameter list. Discuss.

Z-Z-Z END