TOTAL PAGES: 2

22CAP101N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MCA DEGREE EXAMINATION DECEMBER 2024
(First Semester)

Branch – **COMPUTER APPLICATIONS**

LINUX ARCHITECTURE AND PROGRAMMING

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 × 1 = 10)

Question No.	Question	K Level	CO
1	What is the default shell in Linux? a)Bash b)Korn c) C shell d)Z shell	K1	CO1
2	How can a variable be assigned in a Bash script? a)variable=value b)variable:=value c)variable:="value" d)variable="value"	K2	CO1
3	How can command output be redirected to a file in shell scripting? a)> b) >> c) | d) &>	K1	CO2
4	Which of the following commands in Linux remove files or directories? a) Ls b) cd c) Rm d) del	K2	CO2
5	A process can be terminated due to _____ a) normal exit b) fatal error c) killed by another process d) all of these	K1	CO3
6	Which command puts a script to sleep until a signal is received? a) Sleep b) Suspend c) Disown d) Break	K2	CO3
7	The encrypted password of a user is stored in _ a) /etc/shadow b) /etc/enpasswwd c) /etc/.passwd d) /etc/passwd	K1	CO4
8	By default, a Linux user falls under which group? a) Staff b) Others c) Same as userid d) System	K2	CO4
9	Host specific configuration files are installed in a) /etc/directory b) /lib/directory c) /root/directory d) /bin/directory	K1	CO5
10	Which command is used to switch to the root user in Linux? a) Su b) Sudo c) Login d) Logout	K2	CO5

Cont...

SECTION - B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Question No.	Question	K Level	CO
11.a.	Explain the difference between a Linux distribution and a Linux flavor.	K2	CO1
	(OR)		
11.b.	Describe the role of the root user in Linux.		
12.a.	Explain the Linux file system hierarchy and describe the purpose of each top – level directory.	K3	CO2
	(OR)		
12.b.	i) Explain the difference between the > and >> operators in Linux. ii) Describe how to use the **cat** command to concatenate two text file.		
13.a.	Describe how to use the **kill** command to terminate a process?	K4	CO3
	(OR)		
13.b.	Write a shell script to monitor disk usage and alert when it exceeds 80%.		
14.a.	Explain the difference between root and sudo users in Linux.	K5	CO4
	(OR)		
14.b.	Set an expiration date for a user account.		
15.a.	Describe how to use the fdisk command to partition a disk.	K6	CO5
	(OR)		
15.b.	Describe the importance of regular system updates for security.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Question No.	Question	K Level	CO
16	Create a new user account on a Linux system and set up their home directory.	K6	CO1
17	Use the command line to navigate to the /etc directory and list all files and sub directories.	K4	CO2
18	i) Write a shell script to automate the process of creating a new user account. ii) Write a shell script to rename all files in a directory to have a .txt extension.	K5	CO3
19	Create a new user account with a home directory and add it to the sudo group.	K4	CO4
20	Create a new disk partition and file system using fdisk and mkfs.	K5	CO5

Z-Z-Z END

TOTAL PAGES : 2

22CAP102N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MCA DEGREE EXAMINATION DECEMBER 2024
(First Semester)

Branch – **COMPUTER APPLICATIONS**

HYBRID DATABASE MANAGEMENT SYSTEM

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	What is a relation in RDBMS? a. Key b. Table c. Row d. Column	K1	CO1
	2	A ____ is an association among several entities. a. Relationship b. Association c. Set d. Combination	K2	CO1
2	3	Which SQL statement is used to retrieve data from a database? a. Update b. Delete c. Insert d. Select	K1	CO2
	4	Identify the error in "alter table students drop column DateOfBirth date;" a. Alter table b. Drop column c. DateOfBirth d. date	K2	CO2
3	5	Which NoSQL database is known for its ability to handle complex queries and data analysis? a. HBase b. Cassandra c. MongoDB d. Couchbase	K1	CO3
	6	Which is not a type of NoSQL? a. HBase b. QBase c. CouchDB d. MongoDB	K2	CO3
4	7	What type of database is MongoDB? a. Relational b. Document – Oriented c. Graph d. Key – Value	K1	CO4
	8	What is the default port for MongoDB server? a. 27015 b. 28017 c. 27017 d. 8080	K2	CO4
5	9	Which file format is used for MongoDB configuration? a. JAON b. YAML c. XML d. INI	K1	CO5
	10	Identify the issue: db.users.find({age:"25"}) a. Incorrect collection name b. Incorrect field name c. Type mismatch in query value d. Missing query operator	K2	CO5

SECTION - B (35 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Explain the history of Database system.	K3	CO1
		(OR)		
	11.b.	Define the union, intersection and difference operations in relational algebra.		

Cont...

2	12.a.	Write a SQL statement to create a table called **employee** with columns **employee_id, name** and **salary.**	K3	CO2
	(OR)			
	12.b.	Write a SQL trigger to update the **last_updated** column whenever a row is updated in the **employees** table.		
3	13.a.	Describe the CAP theorem and its implications for NoSQL database design.	K4	CO3
	(OR)			
	13.b.	Explain the concepts of denormalization in NoSQL databases and its advantages.		
4	14.a.	Explain how MongoDB's replication and sharding features work.	K4	CO4
	(OR)			
	14.b.	Describe how to perform a MongoDB query using the **friend()** method.		
5	15.a.	Describe the difference between a MongoDB collection and a database.	K5	CO5
	(OR)			
	15.b.	Write a MongoDB query to retrieve all documents from a collection where the **title** field constrains the word **MongoDB.**		

SECTION -C (30 Marks)

Answer **ANY THREE** questions
ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	A company wants to design a database to store customer information, orders and products. The database should allow for efficient querying and reporting. i. Identify the entities and attributes in the given scenario. ii. Design an E-R diagram for the company database iii. Explain how you would implement data integrity and security measures in the database.	K4	CO1
2	17	Explain the concept of normalization in data base design. Discuss the benefits and limitations of normalization.	K4	CO2
3	18	Design a NoSQL database schema for a social media application, including user profiles, friendship and posts.	K5	CO3
4	19	Design a MongoDB schema for a simple blog application including posts, comments and users.	K5	CO4
5	20	Design a MongoDB based API for a simple e-commerce application, including endpoints for products, orders and customers.	K6	CO5

Z-Z-Z END

TOTAL PAGES : 2

22CAP103N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MCA DEGREE EXAMINATION DECEMBER 2024
(First Semester)

Branch – **COMPUTER APPLICATIONS**

DATA STRUCTURES AND ALGORITHMS

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Which of the following is not the type of queue? a) Priority queue b) Single ended queue c) Circular queue d) Ordinary queue	K1	CO1
	2	Show which one of the following represents the Postorder Traversal of a Binary Tree? a) left->root-> right b)left->right->root c) right->root->left d) right-> left->root	K2	CO2
2	3	Choose the one that is exactly like a binary heap except that all nodes have 'd' children. a)skew-heap b)leftist-heap c)d-heap d)rightist-heap	K1	CO1
	4	_____ are binary trees with heap order, but there is no structural constraint on these trees and no information is maintained about the null path length of any node. a)skew-heaps b)leftist-heaps c)d-heaps d) Binomial queues	K2	CO2
3	5	Which algorithm is used to find the shortest path in an unweighted graph with all non-negative edge weights? a) Bellman-Ford Algorithm b) Prim's Algorithm c) Kruskal's Algorithm d) Dijkstra's Algorithm	K1	CO1
	6	_____ is a simple path from the source to the sink in a residual network. a) residual graph b) augmenting path c) residual edge d)back edge	K2	CO2
4	7	Which one of the following version, each item must be placed in a bin before the next item can be processed? a) online bin packing b) offline bin packing c) realtime bin packing d) optimal bin packing	K1	CO1
	8	Bellmann Ford Algorithm is an example for _____ a) Linear Programming b) Greedy Algorithms c) Dynamic Programming d) Branch and Bound	K2	CO2
5	9	Find out the correct property of splay tree. a) self adjusting binary search trees b) a tree with strings c) self adjusting binary trees d) a tree with probability distributions	K1	CO1
	10	How much time taken to construct a perfectly balanced 2-d tree? a) O(N) b) O(N log N) c) $O(N^2)$ d) O(M log N)	K2	CO2

Cont...

SECTION - B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Develop an algorithm to insert and delete a node in a doubly linked list.	K4	CO1
		(OR)		
	11.b.	i) Find out the value of a given postfix expression (1) 6 3 2 4 + – * ii) Convert the following infix expression into corresponding postfix equivalent. (A - B) + C * D / E – C (2) iii) Construct the binary tree for the following expression. (4) Exp = ((a + b) – (c * d)) % ((e ^ f) / (g – h)		
2	12.a.	Draw a binary heap tree and write a procedure to insert an element 'X' in to the heap.	K4	CO2
		(OR)		
	12.b.	Describe the operations of binomial queues with example.		
3	13.a.	Construct an acyclic graph and develop a pseudocode that representing course prerequisite structure for a state university using topological sort.	K3	CO3
		(OR)		
	13.b.	Analyze the Prim's algorithm to calculate the edges using minimum spanning tree.		
4	14.a.	Develop an algorithm to find optimal ordering of matrix multiplications.	K4	CO4
		(OR)		
	14.b.	Elucidate the closest-point problem of divide-and-conquer technique.		
5	15.a.	Discuss about the suffix tree and its applications to find the location of a pattern with example.	K6	CO5
		(OR)		
	15.b.	Formulate pairing heap data structure routine to merge two sub-heaps.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Examine the various operations or routines performed on Binary Search Tree with example coding.	K4	CO1
2	17	Illustrate the property and operations of leftist heap with corresponding class skeleton.	K4	CO2
3	18	Design a pseudocode and construct the graph to find the shortest path using Dijkstra's algorithm.	K6	CO5
4	19	Analyze the Huffman's algorithm of a greedy technique used for file compression with example.	K4	CO3
5	20	Elaborate the basic operations that are used to color changes and tree rotations of red-black tree.	K6	CO5

Z-Z-Z END

22CAP104N

PSG COLLEGE OF ARTS & SCIENCE
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MCA DEGREE EXAMINATION DECEMBER 2024
(First Semester)

Branch – **COMPUTER APPLICATIONS**

COMPUTER NETWORKS

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Which one of the following is the standard of WiMax? a) IEEE 802.16 b) IEEE 802.11 c) IEEE 802.17 d) IEEE 802.15	K1	CO1
	2	_____ is the practice of registering a domain only to turn around and sell it off to an interested party at a much higher price even has a name. a) name resolution b) cybersquatting c) reverse lookups d) vacation agent	K2	CO2
2	3	The client stub packs the procedure parameters into a message and makes a system call to send the message. The packing of the procedure parameters is called_____. a) message packing b) playback point c) marshaling d) portmapper	K1	CO1
	4	When persistent timer goes off, the sender may send a 1-byte special segment to the receiver. This packet is called a _____. a) timestamp b) keepalive timer c) persistence time d) window probe	K2	CO2
3	5	A _____ is a signal sent back to the data flow source to alleviate potential congestion in the network. a) choke packet b) jitter c) leaky packet d) flare packet	K1	CO1
	6	Show the one belongs to an unreliable and connectionless datagram protocol. a) IPv6 b) IPv12 c) IPv4 d) IPv3	K2	CO2
4	7	Find out the method generates signals in which the data streams of users are mixed with unique identifier codes. a) FDMA b)TDMA c)SDMA d)CDMA	K1	CO1
	8	Information bearing channels in ISDN are called _____ a) D channels b) Data channels c) B channels d) Voice channels	K2	CO2
5	9	Who developed the standards of GSM? a) ITU b) AT & T c) ETSI d) USDC	K1	CO1
	10	Which band is used to specify the reverse link operation in IS-95? a) 869-894 MHz b) 849-894 MHz c) 849-869 MHz d) 824-849 MHz	K2	CO2

Cont...

SECTION - B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Categorize and express the message formats used by the message transfer agents in an electronic mail system.	K3	CO1
		(OR)		
	11.b.	With neat sketch, explain the architecture of the Web.		
2	12.a.	List and discuss about the transport service primitives and the nesting of segments, packets, and frames with diagram.	K4	CO2
		(OR)		
	12.b.	Illustrate the layout of TCP Segment Header with neat diagram.		
3	13.a.	Apply the packet scheduling algorithm and explain how it allocates router resources among the packets.	K3	CO4
		(OR)		
	13.b.	Make use of Border Gateway Protocol to solve routing policies between autonomous systems and the propagation of routing.		
4	14. a	Explain about the frequency division multiple access method used to control multiplexed channel access.	K5	CO5
		(OR)		
	14.b.	Analyze the functions of circuit switching and packet switching techniques.		
5	15.a.	Discuss about GSM system architecture with neat sketch.	K4	CO3
		(OR)		
	15.b.	Propose the different types of wireless technologies used in industrial applications and list their advantages.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	List and analyze the various layers of OSI reference model with neat diagram.	K4	CO2
2	17	Categorize and explain the various elements of transport protocol in detail.	K4	CO3
3	18	Make use of the distance vector and link state routing algorithm and elaborate the process of routing packets from the source machine to the destination machine.	K4	CO3
4	19	Explain the different kinds of wireless data services in detail.	K5	CO5
5	20	Elaborate the various components of reverse CDMA channel.	K5	CO5

Z-Z-Z END