

Reg No.: TVE23MCA-2052

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0520MCA102052303
Second Semester MCA (Two Years) (R, S) Examination May 2024

Course Code: 20MCA102

Course Name: ADVANCED DATABASE MANAGEMENT SYSTEMS

Max. Marks: 60

Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks.

Marks

- | | | |
|----|---|-----|
| 1 | Explain the various levels of data abstraction in a concise manner using a diagram. | (3) |
| 2 | Demonstrate the extended ER feature specialization. | (3) |
| 3 | List down inference rules for functional dependency. | (3) |
| 4 | Define Join Dependency and Fifth Normal Form (5NF). | (3) |
| 5 | Describe various types of locks used in concurrency control methods. | (3) |
| 6 | Explain the properties of transactions. | (3) |
| 7 | Illustrate static hashing. | (3) |
| 8 | Differentiate fixed and variable length record organization. | (3) |
| 9 | Explain CAP theorem. | (3) |
| 10 | Discuss various methods to fragment data in a distributed database. | (3) |

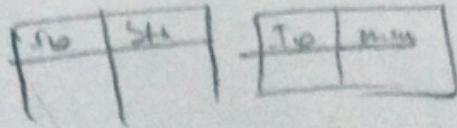
PART B

Answer any one question from each module. Each question carries 6 marks.

Module I

- 11 a Design an Entity Relationship Diagram for a car race database with the following (4) requirements.

For each car we keep its registration number (unique), engine type, colour and model. Each driver has unique ID, name, DoB, and age which is derived from DoB. Drivers use cars to enter races, each race has some attributes such as the race number (unique), race type, the number of rounds, and date. Each driver can enter many races and can use the same car or different one in each race. Thus



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the same car can participate in many races. In the design, we want to capture which car is used by which driver and in which race.

- b) Convert ER diagram constructed in above question to relational schema. (2)

OR

- 12 Demonstrate Select, Project, Union, Intersection and Join operations in relational algebra. (6)

- 13 Consider the following relation. (6)

RegNo	Sname	Cid	Cname	Mark	Grade
1	Ivan	101	DBMS	80	A
1	Ivan	102	OS	70	B
2	Dave	101	DBMS	60	C
2	Dave	102	OS	95	S
3	Smith	103	OOP	95	S
4	Dan	103	OOP	72	B
4	Dan	102	OS	83	A

Some of the functional dependencies present in this relation are $\text{RegNo} \rightarrow \text{Sname}$, $\text{Cid} \rightarrow \text{Cname}$, $\text{Mark} \rightarrow \text{Grade}$, $\{\text{RegNo}, \text{Cid}\} \rightarrow \text{Mark}$.

Decompose this relation into 3NF relations. Justify your answer.

OR

- 14 Define 4NF. Give a relation which is not in 4NF and convert it into 4NF. Justify your example. (6)

Module III

- 15 Explain any problems that may occur if concurrent execution of transactions is not controlled. Use proper examples. (6)

OR

- 16 How Concurrency can be controlled using Time Stamps? Explain the wait/die, wound/wait schemes for concurrency control. (6)

Module IV

- 17* Demonstrate various RAID levels with diagram. (6)

OR

- 18 Explain B Tree and B+ Tree index structures. (6)

Module V

- 19* a Explain MongoDB sharding. (3)

- 19* b Explain MongoDB Replication. (3)

OR

- 20 a Explain Arrays and multisets in object based database with example. (3)

- b Explain Object Identity and Reference types in object based database with example. (3)

Course Code: 20MCA104

Course Name: ADVANCED COMPUTER NETWORKS

Max. Marks: 60

Duration: 3 Hours

PART A*Answer all questions, each carries 3 marks.*

Marks

- 1 With figures, explain the basic topologies used in computer networks. (3)
- 2 Calculate the propagation time and transmission time for a 5Mbytes message if the bandwidth of the network is 1Mbps. Assume that distance between the sender and receiver is 12000km and light travels at 2.4×10^8 m/s. (3)
- 3 Compare Frequency Division Multiplexing with Time Division Multiplexing (3)
- 4 With figure explain how Go-Back N ARQ works. (3)
- 5 Differentiate between virtual circuit and datagram approach used in packet switching. (3)
- 6 Explain distance vector routing used in packet routing. (3)
- 7 Write short note on Ethernet along with its frame format. (3)
- 8 Explain how token passing mechanism works in IEEE 802.5 standard. (3)
- 9 Explain how Simple Network Management Protocol manages devices in a network with figure. (3)
- 10 Why gateways are used in computer networks? list its features. (3)

PART B*Answer any one question from each module. Each question carries 6 marks.***Module I**

- 11 With figure explain the responsibilities of various OSI protocol layers. (6)

OR

- 12 Write short notes on the following protocols used in computer network (6)
- a) ARP b) ICMP c) POP3 d) SMTP

Module II

- 13 Elucidate TCP header structure and major transport layer services. (6)

OR

- 14 Explain congestion control. What are the factors which causes it? Explain each categories of congestion control in detail. (6)

Module III

- 15 a) Express how address depletion faced by classful addressing is overcome by classless addressing. (4)
b) A block of address is granted to a small organization. One of the address is 205.16.37.39/28. Find the starting and ending address given to organization (2)

OR

- 16 With suitable diagram explain IPv4 datagram packet format. (6)

Module IV

- 17 a) Explain briefly on error detection code technique checksum used in data communication. (3)
b) For this given data 11001100 10101010 11110000 11000011, perform check sum operation at sender site and receiver site and verify the data at receiver site. (3)

OR

- 18 Explain Carrier Sense Multiple Access with collision detection algorithm in detail. (6)

Module V

- 19 Explain Bluetooth technology with its architecture. (6)

OR

- 20 Explain various functions and protocols used by network management system. (6)

Course Code: 20MCA172

Course Name: ADVANCED OPERATING SYSTEMS

Max. Marks: 60

Duration: 3 Hours

PART A*Answer all questions, each carries 3 marks.*

Marks

- | | | |
|-----------|---|-----|
| <u>1</u> | Differentiate between distributed operating system and real time operating systems? | (3) |
| <u>2</u> | Explain different states of a process with a neat diagram. | (3) |
| <u>3</u> | List out the requirements of Mutual Exclusion algorithms. | (3) |
| <u>4</u> | Write Rickart-Agarwala Algorithm. | (3) |
| <u>5</u> | Define a distributed file system. Explain its services? | (3) |
| <u>6</u> | Differentiate between load balancing and load sharing. | (3) |
| <u>7</u> | Discuss any two interconnection networks for multiprocessor systems. | (3) |
| <u>8</u> | Differentiate between UMA and NUMA architecture of multiprocessor Systems. | (3) |
| <u>9</u> | Differentiate between serial log and log equivalence. | (3) |
| <u>10</u> | What are the basic synchronization primitives for concurrency control algorithms in database systems? | (3) |

PART B*Answer any one question from each module. Each question carries 6 marks.***Module I**

- | | | |
|-----------|---|-----|
| <u>11</u> | What is meant by distributed operating systems? Explain in detail any three issues in distributed operating systems | (6) |
|-----------|---|-----|

OR

- | | |
|-----------|------------------------------------|
| <u>12</u> | Write short notes on the following |
| | a. Monitor |
| | b. Serializer |

Module II

- 13 Explain any six Design Principles for Secure Systems. (6)

OR

- 14 Explain Access Matrix Model with its access control list method implementation. (6)

Module III

- 15 Explain Sender Initiated Algorithm and Receiver Initiated Algorithm. (6)

OR

- 16 Explain different algorithms for implementing distributed shared memory (6)

Module IV

- 17 Write short notes on the following. (6)

- a. Swap Instruction
- b. Fetch-and-Add Instruction

OR

- 18 a. Illustrate Virtualization in Operating Systems. (6)

- b. Explain different type of hypervisors

Module V

- 19 Explain two Phase Locking (2PL) with example. Write down the major problems with 2 PL (6)

OR

- 20 Elaborate on the Optimistic concurrency control algorithms. (6)

Course Code: 20MCA192**Course Name: IPR AND CYBER LAWS**

Max. Marks: 60

Duration: 3 Hours

PART A*Answer all questions, each carries 3 marks.*

Marks

- | | | |
|----|--|-----|
| 1 | Categorize various patent applications. | (3) |
| 2 | Explain the importance of IP in terms of different people in the society | (3) |
| 3 | What is the role of copyrights in IT Industry? | (3) |
| 4 | How we can protect the Trademark? Explain the different steps. | (3) |
| 5 | Define the term Design as per Design Act section 2(d) | (3) |
| 6 | Explain the term geographical indications by giving suitable examples. | (3) |
| 7 | Define Hyperlinking and Deep Linking. | (3) |
| 8 | Explain the new trends in Cyber Laws. What is the relevance of these Laws? | (3) |
| 9 | Define a "secure system" as per the IT Act 2000. | (3) |
| 10 | Explain about offenses committed by intermediaries. | (3) |

PART B*Answer any one question from each module. Each question carries 6 marks.***Module I**

- 11 Write short notes on
- | | | |
|-----|--------------------------------------|-----|
| I. | International Treaties related to IP | (6) |
| II. | Importance and features of WIPO | |

OR

- | | | |
|-------|---|-----|
| 12 a) | Describe the procedure for registration of patents. | (3) |
| b) | Draw the flowchart that illustrate the procedure for Patent application | (3) |

Module II

- 13 Explain about the different steps involved in copyright registration in India. (6)

OR

- 14 Explain the trademark registration process with a neat diagram. (6)

Module III

- 15 Explain about GI registration in India with a neat diagram. (6)

OR

- 16 Draw & explain the flowchart that illustrate the design application up to acceptance. (6)

Module IV

- 17 Explain cybersquatting with examples. Explain how cybersquatting can be recognized. (6)

OR

- 18 Explain the role of Cyber laws in IPR. (6)

Module V

- 19 What are the different types of Cybercrimes? Explain in detail about Cyber terrorism. (6)

OR

- 20 Explain the different sections in the IT Act 2000 related to women and children. (6)
