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24522

MCA/M-25

COMPUTER GRAPHICS AND ANIMATION

Paper : MCA-20-42

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all. Question Number 1 is compulsory. In addition to the compulsory question, attempt four more questions, selecting *one* question from each unit. All questions carry equal marks.

Compulsory Question

1. Answer any five of the following questions in brief :

(i) What is the role of display processors in graphics rendering?

(ii) What is the resolution and aspect ratio in display systems?

(iii) Explain the working principle of the polynomial method for circle drawing.

(iv) What will be the x-increment if a line is drawn from (3,4) to (12,8) using the simple DDA algorithm?

(v) Write the matrix for scaling a 2D object by 2 along the x-axis and 3 along the y-axis.

(vi) What is primitive instancing?

(vii) Write the equations for tweening.

UNIT–I

2. Explain in detail the components and functional pipeline of a modern interactive graphics system.

3. Discuss the principles of display technology in CRTs and LCDs, along with suitable diagrams.

UNIT–II

4. Explain and derive Bresenham's circle algorithm to draw a circle with center (0,0) and radius 5. Tabulate each decision step.

5. Compare flood fill and boundary fill algorithms, with suitable diagrams. Also, describe how neighbourhood pixels of the seed pixel are computed.

UNIT–III

6. (a) Derive the matrix for shearing in the x-direction by 2 and apply it to a rectangle with vertices (0,0), (2,0), (2,1), (0,1).

(b) Reflect the point (4,9) about the line $y = 7$. Provide reflection matrices and results.

7. Compare Mid-point subdivision and Liang-Barsky line clipping algorithms.

UNIT–IV

8. Differentiate between :

(a) Shape Grammars and Fractals.

(b) Orthographic parallel projection and Oblique parallel projection.

9. Compare Depth-sorting and Binary Space Partitioning (BSP) tree methods for visible surface detection with a brief explanation of each.

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24521

MCA/M-25

BIG DATA AND PATTERN RECOGNITION

Paper : MCA-20-41

Time : Three Hours]

[Maximum Marks : 75

Note : Students will be required to attempt *five* questions in all selecting *one* question each from Unit-I to Unit-IV. Question No. 1 is compulsory. All questions carry equal marks.

Compulsory Question

1. (a) What do you mean by big data velocity and veracity?

(b) Differentiate between traditional BI and Big data BI.

(c) What is data repurposing? Compare amongst Correct *versus* Correction.

(d) Write a note on Heartbeat Communication & FS image.

(e) What is training data set and test data set in pattern recognition?

(f) Briefly explain two broad pattern recognition paradigms.

(g) What are NoSQL BASE properties coined by Eric Brewer?

(h) Write note on Amazon DynamoDB and Apache Hbase. (15)

UNIT–I

2. (a) What are the different types of data? How do you identify different data characteristics for big data analytics? Differentiate between Data analysis and data analytics.

(b) Elaborate the ICT developments that have accelerated the pace of Big Data adoption in businesses. (8+7=15)

3. What are the important stages of big data analytics life cycle? Outline and explore. (15)

UNIT–II

4. (a) Write the objectives of data governance. Why does data governance matter? Discuss the key concepts for data practitioners and business process owners to adopt big data approach.

(b) Write the potential reasons for big data project failure. Discuss failure standards and legalities. (8+7=15)

5. (a) Differentiate between Map reduce and Apache PIG.

(b) Write the features and potential applications of Mahout. (8+7=15)

UNIT–III

6. (a) Differentiate between Quantitative and Qualitative Analysis.

(b) How Does Pattern Recognition Works? Outline and explain components of typical pattern recognition system. (8+7=15)

7. (a) Differentiate between filter, wrapper and embedded methods of feature selection. How feature selection is different from feature extraction?

(b) Discuss Neural Network approach, Fourier analysis and template matching approach of pattern matching. (8+7=15)

UNIT–V

8. Discuss the key features, pros, cons, examples, and use case for following NoSQL storage types and draw a comparison amongst them. (i) Key Value Store (ii) Column Oriented databases. (15)

9. (a) Differentiate between Schema and Schema-less Databases. How does a schema less database work?

(b) What are CRUD operations? Write the key features of document databases. When should NoSQL be used? (8+7=15)

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MCA/M-25

MOBILE APPLICATION DEVELOPMENT

Paper : MCA-20-43

Time : Three Hours] [Maximum Marks : 75

Note : Question Number 1 is compulsory. Attempt *five* questions in all selecting at least *one* question from each unit. All questions carry equal marks.

Compulsory Question

1. (a) What is Android? Describe its importance and scope in the mobile app development industry.

(b) Describe the use of CheckBox in Android. List its main properties.

(c) Describe the process of signing an Android application.

(d) Name any three types of hardware sensors available in Android.

(e) List any two methods used to draw shapes on a Canvas. (3×5=15)

UNIT–I

2. (a) Explain the Android file structure in detail. 10

(b) Explain the evolution of Android through its versions. 5

3. (a) Explain the Relative Layout and how it differs from Linear Layout with an example. 10

(b) What is the Android Emulator? List its main features. 5

UNIT–II

4. What is SpinnerView and how does it differ from List-View in terms of usability and interface? 15

5. What is an Intent in Android? Discuss the difference between Explicit and Implicit Intents with examples. 15

UNIT–III

6. (a) Explain the lifecycle of a Fragment. How is it different from an Activity's lifecycle? 10

(b) What are Location-Based Services (LBS)? 5

7. (a) Explain the process of playing an audio in an Android application using MediaPlayer. 10

(b) How can NFC be used for communication between Android devices? 5

UNIT–IV

8. (a) Explain how gradients are implemented in Android graphics. Describe LinearGradient. 10

(b) Differentiate between internal and external storage in Android. 5

9. (a) How do you create and manage an SQLite database in Android using SQLiteOpenHelper? Explain with example. 10

(b) What is a Content Provider in Android? Describe its purpose and common use cases. 5

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24514

MCA/M-25

ADVANCED DATA BASE SYSTEMS

Paper : MCA-20-23

Time : Three Hours] [Maximum Marks : 75

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

Compulsory Question

1. Answer the following questions in brief : (5×3=15)

(a) What is data independence? Differentiate between logical and physical data independence.

(b) Explain the difference between CREATE, ALTER, and DROP statements.

(c) Discuss the role of indexes in query optimization.

(d) What is the difference between a serial and a concurrent schedule?

(e) Differentiate between shared-disk, and shared-memory architectures in parallel databases.

UNIT–I

2. (a) What are the roles of DDL, DML, and DCL in a DBMS? Give examples. (8)

(b) Explain the concept of keys in ER models. What are super key, candidate key, and primary key? (7)

3. (a) What is inheritance in EER modelling? How does it affect attribute sharing among entities? (7)

(b) Differentiate between unary and ternary relationships with suitable examples. What is meant by the role name in ER diagrams? (8)

UNIT–II

4. (a) How do you specify constraints like PRIMARY KEY, FOREIGN KEY, and DEFAULT in SQL? (7)

(b) How are transactions managed in PL/SQL? Explain COMMIT, ROLLBACK, and SAVEPOINT. (8)

5. (a) What are the different types of triggers in PL/SQL? Explain each briefly. (8)

(b) Define join dependency and explain the need for 5NF with an example. (7)

UNIT–III

6. (a) What are join algorithms in query processing? Explain sort-merge join with an example. (8)

(b) What are the ACID properties of a transaction? Explain with examples. (7)

7. (a) What is the Two-Phase Locking (2PL) protocol? Explain its types. (8)

(b) Explain the ARIES recovery algorithm and its three phases. (7)

UNIT–IV

8. (a) What is a temporal database? How is time represented in such databases? (7)

(b) What is a deductive database? Explain the role of logic programming in deductive databases. (8)

9. (a) Explain the role of XML in web databases. How is data structured using XML schema? (7)

(b) What are the typical operations supported by OLAP? (8)

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MCA/M–25

INFORMATION SYSTEMS

Paper–MCA–20–45(II)

Time : 3 Hours] [Maximum Marks : 75

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

(Compulsory Question)

1. (a) Define the term "information" in the context of MIS.

   (b) What is Business Intelligence (BI)?

   (c) What are the advantages of database system over traditional file system?

   (d) What is the role of expert systems in decision-making?

UNIT–I

2. (a) Explain the difference between operational, tactical, and strategic information.

   (b) How is feedback used to improve system performance? Discuss.

3. (a) What are the different types of information systems within an organization? Discuss in brief.

(b) How do information systems help in reducing operational costs? Discuss.

UNIT–II

4. (a) What are the main characteristics of a traditional file environment? Why are the problems in a traditional file environment?

   (b) What are some common tools used in Business Intelligence? What are the main goals of Business Intelligence?

5. (a) Define database. What is normalization in database system? What is the need of it? Discuss.

   (b) List and describe the main components of IT infrastructure.

UNIT–III

6. (a) What is an Enterprise Resource Planning (ERP) system? How do enterprise systems integrate business processes?

   (b) What is encryption? What are the differences between symmetric and asymmetric encryption?

7. (a) What is the goal of supply chain management systems? Explain how SCM systems enhance efficiency and reduce costs.

   (b) Give an example of how CRM can personalize customer interactions.

UNIT–IV

8. (a) How are artificial intelligence (AI) and machine learning used in Knowledge Management? Discuss.

(b) What is Decision Support System (DSS)? What are its components? Discuss.

9. (a) What is knowledge management and why is it important for organizations? Discuss.

   (b) What is ESS? How does ESS help in identifying business opportunities and threats?

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MCA/M-25

MACHINE LEARNING

Paper : MCA-20-44(ii)

Time : Three Hours] [Maximum Marks : 75

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

Compulsory Question

1. Answer the following questions in brief :

(a) How does Machine Learning differ from traditional programming?

(b) What are the three main types of Machine Learning?

(c) How do you evaluate the performance of a linear regression model?

(d) Describe the role of the sigmoid function in logistic regression.

(e) Differentiate between exploitation and exploration. (5×3=15)

UNIT–I

2. Write ID3 algorithm and implement it on following dataset to make decision tree by showing all steps.

UNIT–IV

8. What is dimensionality reduction? Why is it important in machine learning? Discuss different dimensionality reduction techniques in detail. 15

9. (a) What is Reinforcement Learning? Explain different components of Reinforcement Learning. 10

(b) Explain the concept of optimal hyperplane in a Support Vector Machine. 5

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MCA/M-25

MACHINE LEARNING

Paper : MCA-20-44(ii)

Time : Three Hours] [Maximum Marks : 75

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

Compulsory Question

1. Answer the following questions in brief :

(a) How does Machine Learning differ from traditional programming?

(b) What are the three main types of Machine Learning?

(c) How do you evaluate the performance of a linear regression model?

(d) Describe the role of the sigmoid function in logistic regression.

(e) Differentiate between exploitation and exploration. (5×3=15)

UNIT–I

2. Write ID3 algorithm and implement it on following dataset to make decision tree by showing all steps.

Dataset : Whether India will win a cricket match

Weather	Toss	Ground	India Wins
Sunny	Yes	Home	Yes
Sunny	No	Away	No
Overcast	Yes	Home	Yes
Rainy	Yes	Neutral	Yes
Rainy	No	Home	No
Overcast	No	Away	Yes
Sunny	Yes	Neutral	No
Rainy	Yes	Home	Yes

15

3. (a) Define supervised learning. Explain how classification works in supervised learning with a suitable example. 10

(b) What is meant by 'hyperspace search' in the context of decision trees? 5

UNIT–II

4. Explain Bayes Theorem and its significance in probabilistic learning. How is the Naive Bayes classifier derived from Bayes Theorem? Discuss the assumptions made by the Naive Bayes algorithm and their implications. 15

5. (a) You are given a dataset containing the number of study hours and marks scored by students. Describe the steps involved in using linear regression to build a predictive model that estimates marks based on study hours. 10

(b) What is a Bayesian Belief Network? Describe its structure and components. 5

UNIT–III

6. What is single linkage clustering? Use the distance matrix in given Table to perform single linkage hierarchical clustering. Show your results by drawing a dendrogram.

Table : Distance matrix

	P1	P2	P3	P4	P5
P1	0.00	0.10	0.41	0.55	0.35
P2	0.10	0.00	0.64	0.47	0.98
P3	0.41	0.64	0.00	0.44	0.85
P4	0.55	0.47	0.44	0.00	0.76
P5	0.35	0.98	0.85	0.76	0.00

15

7. What is clustering in machine learning? Write the K mean clustering algorithm and for the given data, compute two clusters using K-means algorithm for clustering where initial cluster centres are (1.0, 1.0) and (5.0, 7.0). Execute for two iterations.

Record Number	A	B
R1	1.0	1.0
R2	1.5	2.0
R3	3.0	4.0
R4	5.0	7.0
R5	3.5	5.0
R6	4.5	5.0
R7	3.5	4.5

15