WEST BENGAL STATE UNIVERSITY

B.Sc. Honours 6th Semester Examination, 2022

CMSADSE05T-COMPUTER SCIENCE (DSE3/4)

Time Allotted: 2 Hours | Full Marks: 40

The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.

GROUP-A

1. Answer any ***four*** questions from the following: 2×4 = 8

   (a) What do you mean by image resolution? 2

   (b) Differentiate between image enhancement and image restoration. 2

   (c) What do you mean by 8- connected neighbours of a pixel? 2

   (d) What is contrast stretching? 2

   (e) What is the need of compression? 2

   (f) What is image enhancement? Why is it needed? 1+1 = 2

   (g) What is edge in an image? 2

GROUP-B

Answer any *four* questions from the following 8×4 = 32

2. Describe histogram equalization. Obtain histogram equalization for the following image segment of size 5×5. 8

$$\begin{bmatrix} 4 & 4 & 4 & 4 & 4 \\ 3 & 4 & 5 & 4 & 3 \\ 3 & 5 & 5 & 5 & 3 \\ 3 & 4 & 5 & 4 & 3 \\ 4 & 4 & 4 & 4 & 4 \end{bmatrix}$$

3. (a) Write the purposes of image processing. 2+6 = 8

   (b) List the steps involved in digital image processing and explain them in brief.

4. (a) Illustrate Sampling and Quantization of an image. (2+2)+4 = 8

   (b) Discuss image negative transformation.

5. (a) Discuss about spatial domain and frequency domain filtering briefly. 4+4 = 8
   (b) Differentiate between low-pass and high-pass filter.

6. (a) Explain four arithmetic and logical operations on image. 4+4
   (b) Explain the operation of Region growing approach for image segmentations.

7. (a) Write different causes of image degradation. 2+4+2 = 8
   (b) Explain image degradation and restoration model in brief.
   (c) Differentiate between linear and non linear spatial filters.

8. Write short notes on: (any ***two***) 4×2 = 8
   (a) Discrete Fourier Transform
   (b) Edge Detection
   (c) Image watermarking.

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B.Sc. Honours 6th Semester Examination, 2022

CMSADSE04T-COMPUTER SCIENCE (DSE3/4)

Time Allotted: 2 Hours | Full Marks: 40

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GROUP-A

1. Answer any ***four*** questions from the following: 2×4 = 8

   (a) What is sequence file in Hadoop?

   (b) Define the three key design principles of Pig Latin.

   (c) Define the various file formats supported in HIVE.

   (d) What is the difference between analysis and analytics?

   (e) What do you mean by semi-structured data?

   (f) How are views different from materialized view?

   (g) What is YARN?

GROUP-B

Answer any *four* questions from the following 8×4 = 32

2. What is HDFS? What is Name Node and Data Node in HDFS? How NameNode tackle DataNode in HDFS? 2+4+2 = 8

3. (a) Define BIG Data. 2+6 = 8

   (b) Explain the Evolution of Big Data and their characteristics.

4. (a) Illustrate the Hadoop Core Components with neat diagram. 4+4 = 8

   (b) Discuss the Hadoop system and Ecosystem components in four layers.

5. (a) Discuss the NOSQL data stores and their characteristic features. 4+4 = 8

   (b) Illustrate the Key Value pairs in data architectural patterns with an example.

6. (a) Discuss the functions of MongoDB Query Language and database Commands.

   (b) Describe the MapReduce execution steps with neat diagram.

7. What would be the overall goals of big data in E-Commerce? Explain. How Big Data helps to identify risks and reduce fraud in E-Commerce? 3+5 = 8

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WEST BENGAL STATE UNIVERSITY

B.Sc. Honours 6th Semester Examination, 2022

CMSACOR13T-COMPUTER SCIENCE (CC13)

Time Allotted: 2 Hours | Full Marks: 40

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GROUP-A

1. Answer any ***four*** questions from the following 2×4 = 8

   (a) Define the term "Artificial Intelligence".

   (b) What is adversarial search?

   (c) State the difference between tautology and contradiction with an example.

   (d) State the main advantage of any heuristic search algorithm over blind search algorithm.

   (e) What is an "*agent*" in AI?

   (f) What are the various issues in knowledge representation?

   (g) What is inferential knowledge?

GROUP-B

Answer any *four* questions from the following 8×4 = 32

2. (a) What is heuristic search? 2+2+4

   (b) What do you mean by Ridge?

   (c) Explain the concept of Best-First Search with example.

3. (a) Compare Database and Knowledgebase. 3+5

   (b) Consider the following axioms-

   $P, (P \wedge Q) \rightarrow R, (S \vee T) \rightarrow Q, T$

   Prove that R is true by resolution.

4. (a) What kind of knowledge is represented by the semantic nets? 2+(3+3)

   (b) Write short notes on:

   (i) Scripts (ii) Frames

5. (a) What do you understand by a task environment? Differentiate between the following environments with example: 1+2+2

   (i) Fully observable vs. partially observable

   (ii) Discrete vs. continuous

   (b) What is the state-space model of a search problem? Design the state-space model for the 8-Queen problem. 1+2

6. (a) Convert the following sentences into predicate logic expressions and then its clause form: 6

   (i) All people who are smart but not poor are happy.

   (ii) Sam eats everything Mary Eats.

   (iii) Every person in the party loves every child.

   (iv) If it is a bird, it can fly.

   (b) What is Skolemisation? 2

7. Write short notes on the following (any ***two***): 4+4

   (a) MINIMAX algorithm

   (b) A* algorithm

   (c) Water jug problem.

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WEST BENGAL STATE UNIVERSITY

B.Sc. Honours 6th Semester Examination, 2022

CMSACOR14T-COMPUTER SCIENCE (CC14)

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GROUP-A

1. Answer any ***four*** questions from the following: 2×4 = 8

   (a) "Computer graphics is an integral part of designing a video game."– Do you agree? Justify your answer.

   (b) Explain 8-way symmetry of a circle.

   (c) Explain RGB color model.

   (d) Define horizontal as well as vertical retracing.

   (e) What are the applications of computer graphics?

   (f) What is vanishing point?

   (g) What is a pixel?

GROUP-B

Answer any *four* questions from the following 8×4 = 32

2. (a) Explain in detail about DDA line drawing algorithm. 4+1+3

   (b) What do you mean by staircase effects?

   (c) Explain working procedure of Refresh Cathode-Ray Tubes.

3. (a) What are the differences between raster scan display and random scan display? 3+3+2

   (b) What is the relationship between RGB and CMYK colour model?

   (c) What is interlacing?

4. (a) Let R be the rectangular window whose lower-left corner is at $L(-3, 1)$ and upper right corner is at $R(2, 6)$. Use the Cohen–Sutherland algorithm to clip the segments of a line for which one end point is at $A(-4, 2)$ and another is at $B(-1, 7)$. 4+4

(b) For the above-mentioned rectangular window clip the segments of a line for which one end point is at $C(-1, 5)$ and another is at $D(3, 8)$ by using midpoint subdivision process.

5. (a) Find the matrix that represents rotation of an object by 30° about the origin. 2+(3+3)

(b) Perform a 45° rotation of triangle $A(0, 0)$, $B(1, 1)$, $C(5, 2)$ about the origin and about the point $P(-1, -1)$.

6. (a) Explain Window-to-Viewport mapping with a figure.

(b) Compare between point clipping and line clipping.

7. (a) Discuss in detail about Midpoint Circle drawing algorithm. 4+2+2

(b) Differentiate between Flood Fill and Boundary Fill algorithms.

(c) Define Virtual Reality.

8. (a) Prove that two successive 2D rotations are additive: 2+2+4

$$R(\Theta_1) \cdot R(\Theta_2) = R(\Theta_1 + \Theta_2).$$

(b) Suppose that the base of the window is rotated at an angle Θ from the x-axis. What is the window-to-viewport mapping?

(c) Find the form of the matrix for reflection about a line L with slope m and y intercept $(0, b)$.

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