Session : 2022-23

Dept. of Computer Science &Engg.

SoS, (Engg. & Tech.), GGV, Bilaspur (CG)

CLASS TEST- I (AICTE)

Course: B.Tech. 6th Sem — Subject: Computer Graphics

Max. Time: 01 Hours — Max. Marks: 15

NOTE: Attempt any Five questions (5 x 3 = 15 marks). All are equal marks.

Que. (1)	Que. (2)	Que. (3)	Que. (4)	Que. (5)	Que. (6)	Que (7)
[CO: 1, BLT:3, Max.: 3]	[CO: 2, BLT:4, Max.: 3]	[CO: 2, BLT:4, Max.: 3]	[CO: 1, BLT:6, Max.: 3]	[CO: 2, BLT:4, Max.: 3]	[CO: 2, BLT:4, Max.: 3]	[CO:2, BLT:4, Max: 3

Que. (1): Draw the diagram of CRT tube and describe the every parts of CRT.

Que. (2): What is raster and random scan system? Describe raster scan system with the diagram.

Que. (3): Explain the working of scanner and digitizer with the diagram.

Que. (4): Write the circle generation algorithm.

Que. (5): Draw the circle (radius r =30) by using mid-point circle algorithm.

Que. (6): Explain the Scan line polygon fill algorithm with the diagram.

Que. (7): Explain the Non-Zero winding number rules.

Department of Computer Science and Engineering
SoS(Engg.& Tech.)
Guru Ghasidas Vishwavidyalaya, Bilaspur(CG)
CT-I, [session: 2022-2023]

Sub:- Java [AICTE] Max. Marks: 15
Time:-1 Hour Semester:-VIth

SECTION-A

Note: Attempt all Questions from Section A. Each Question carries Equal marks, i.e.1

Que.1 Choose most appropriate answer. (BTL-1, CO-1,MM-5)

a) For java debugger which development tool kit is used:
(i) javac (ii) java (iii) jdb (iv) jdbg

b) What will be the value of 'ans ' following code

```
public static void calculate()
{
int ans = 42+45-48-5-15+20*2;
System.out.println("Value of ans ="+ans);
}
```

(i.) 78 (ii.) 59 (iii) 21 (iv). None of these

(c) A collection of classes and methods required for implementing basic features of java in
(i.) Networking package (ii) Language Support package
(iii) Utility package (iv) AWT package (v.) None of these

(d) Which of the following is not a Java features?
i) Dynamic ii). portable
iii) Use of pointers (iv). Object-oriented

(e) Why OAK was renamed to Java ?
(i) Because the language was unsuccessful , so they created another version and changed its name to java.
(ii) because the name was not relevant to the language they created
(iii) because there was another language called Oak
(iv) None of these

SECTION-B

Note: Question No.2 is Compulsory. Attempt any one from rest.

Q.2. Answer the Following:
a) Explain Scope of Variable (BTL- 2,CO-2,MM-3)
b) What are the Standard Default value of int and float. (BTL- 2,CO-2,MM-2)
Q.3 Explain any five features of Java. (BTL- 1,CO-2,MM-5)
Q.4 Write Five points on JVM? (BTL-2,CO-2,MM-5)

Department of Computer Science and Engineering, School of Studies of Engineering and Technology, Guru Ghasidas Vishwavidyalaya, A Central University, Bilaspur, Chhattisgarh, India

CT-01 (Session-2022-23)

Subject Name: Artificial Intelligence

Class: B.Tech. 6th CSE [Old/New]

Timing: 1 Hour

Maximum Marks: 15

Note: All Questions are Compulsory and Carry Equal Marks.

Question(1) Describe Intelligent Agents? [BTL-1, Marks-3, CO-2]
Question(2) Produce State Space Representation? [BTL-5, Marks-3, CO-1]
Question(3) Discuss Applications of Artificial Intelligence?[BTL-2, Marks-3, CO-1]
Question(4) Illustrate Production System? [BTL-01, Marks-3, CO-1]
Question(5) Explain Search in Artificial Intelligence? [BTL-4, Marks-03, CO-1] (uniform v/s informed)

B.Tech. (Sixth Semester, New AICTE/ Old CBCS) CT-01, Examination, 10-01-2023
(Computer Science & Engineering Branch)
Subject-Design and Analysis of Algorithm
Time Allowed:- One hour
Maximum Marks:- 15

Note: There are only objective type questions and attempt all questions. All questions carry equal marks i.e. 2.5 marks.

Q1. What is outcome of following given recursive code of program as fig-01-?

```
#include<stdio.h>
int fun(int i)
{
 if ( i>0 )
  {
 return i-fun(--i)+fun(i--);
 return fun(i/2);
 printf("%d\t",i);
 fun(i/2);}
else
   printf("%d\t",i);
return 0;
}
int main()
{
 printf(" %d ", fun(2.5));
 getchar();
 return 0;
}
```

A. 0,0,0,1 B. 3,0,0,1,0 C. 0,0,1,0 D. 0,0,0,0,3

[CO-1, BTL-03, Marks-2.5]

Q2. What is the running time complexity of the following peace of code?

```
int fun(int n)
{
  int count=0;
  for(int i=n; i>0; i/=2)
  for(int j=0; j<i; j++)
   count += 1;
  return count ;
}
```

A. $\log_2 n$ B. $n\log_2 n$ C. n D. n^2 E. None of them

[CO-1, BTL-04, Marks-2.5]

Q3. What is an asymptotically tight solution to the recurrence?

$T(n)=T(\alpha n)+T(1-\alpha)n+n$ where $0<\alpha<1$ and $n>1$

Otherwise $T(n)=1$ when $n\leq 1$

A. $n\log_2 n$ B. n^2 C. lgn D. None of them

[CO-1, BTL-04, Marks-2.5]

Q4. What is the worst case time complexity of following implementation of given algorithm as below?

```
// Returns true if there is a subset of set[] with sun equal to given sum
bool isSubsetSum(int set[], int n, int sum)
{
  // Base Cases
  if (sum == 0)
    return true;
  if (n == 0 && sum != 0)
    return false;

  // If last element is greater than sum, then ignore it
  if (set[n-1] > sum)
    return isSubsetSum(set, n-1, sum);

  /* else, check if sum can be obtained by any of the following
     (a) including the last element
     (b) excluding the last element   */
  return isSubsetSum(set, n-1, sum) ||
         isSubsetSum(set, n-1, sum-set[n-1]);
}
```

A. O(n * 2^n) B. O(n^2) C. O(n^2 * 2^n) D. O(2^n)

[CO-1, BTL-04, Marks-2.5]

Q5. Which of the following option is asymptotically correct about given relation a) and relation b)?

a) (2n)! is theta (n)!

b) log((2n)!) is theta (log(n)!)

A. only a) B. only b) C. Both a) and b) are correct D. Both a) and b) are false

[CO-1, BTL-02, Marks-2.5]

Q6. What is an asymptotically tight solution to the recurrence

$T(n)=T(n/2)+T(n/4)+T(n/8)+n$ where $n>1$

Otherwise $T(n)=1$ when $n\leq 1$

A. O(n) B. $O(n^2)$ C. $O(\lg n^2)$ D. $O(n^2 \lg n)$ E. None of them

[CO-1, BTL-04, Marks-2.5]

Department of Computer Science & Engineering
Guru Ghasidas Vishwavidyalaya (A Central University)

20103058

CLASS TEST-1
(Digital Image Processing)

1. Write down the two basic objective of digital image processing.

2. Write down the different types of images based on Colour, Attribute and Nature. – P

3. Define low level, middle level and high level image processing operations. – C

4. Consider two pixel **p** and **q** whose coordinates are (0,0) and (6,3) . Calculate the De , D_4 and D_8 distance between the pixels **p** and **q**.

5. Consider the following 4X4, 8 level image A and B. Find A+B, A-B, A*B.

A =

1	2	4	3
5	5	6	6
6	7	6	6
6	7	2	3

B =

1	3	5	7
7	7	0	1
3	5	6	7
1	3	5	7

Dept. of Computer Science &Engg.
SoS, (Engg. & Tech.), GGV, Bilaspur (CG)

CLASS TEST- II **(AICTE)**

Course: BTECH 6th Sem **Subject: Computer Graphics**

Max. Time: 01 Hours **Max. Marks: 15 (AICTE) &20 (OLD CBCS)**

NOTE: Que. 1 is compulsory and attempt any Four questions (5 x 3 = 15 marks). All are equal marks.

Que. (1)	Que. (2)	Que. (3)	Que. (4)	Que. (5)	Que. (6)
[CO: 3, BLT:3, Max.: 3 or 2.5]	[CO: 4, BLT:2, Max.: 3 or 2.5]	[CO: 4, BLT:3, Max.: 3 or 2.5]	[CO: 4, BLT:3, Max.:3 or 2.5]	[CO: 2, BLT:2, Max.: 3 or 2.5]	[CO: 4, BLT:2, Max.: 3 or 2.5]

Que. (1): If 3D object coordinates are the following: A(1,1,0), B(4,1,0), C(4,3,0), D(1,3,0), E(1,1,-1), F(4,1,-1) G(4,3,-1) and H(1,3,-1). Rotate the object in 45° of anti-clockwise direction of the X-axis.

Que. (2): What is a windowing? If window size is (10,10) & (50,40) than find the clipping point of the line p1(15,50) & (60,15) and p2(20,20) & (60,35).

Que. (3): What is a segment? Draw the flowchart for deleting the segment.

Que. (4): What is projection? Write the difference of Orthographic projection and Perspective projection with the diagram.

Que. (5): What is Posting and Unposting a segment? Explain it.

Que. (6): Explain the Back-face removal algorithm with the diagram.

Department of Computer Science & Engineering
Guru Ghasidas Vishwavidyalaya ,Bilaspur
CT-2
BTech 6th Sem 2022-23

Subject: MIS **Marks: 15** **Time 10:00AM – 11:00AM** **Date: 22-03-2023**

Note: Attempt any three questions. Each question carries 5 marks.

1. What Decision Support System (DSS)? Write different component of DSS. [BLT-1][CO-2]
2. What is Decision Making Process (DMP)? Explain Steps of DMP. [BLT-1][CO-2]
3. Explain Different type of Decision Making Models. [BLT-2][CO-2]
4. Explain different levels of Decision Support System. [BLT-2][CO-2]

Department of Computer Science and Engineering, School of Studies of Engineering and Technology, Guru Ghasidas Vishwavidyalaya, A Central University, Bilaspur, Chhattisgarh. India

CT-02 (Session-2022-23)

Subject Name:Artificial Intelligence

Class: B.Tech. 6th CSE [Old/New]

Timing: 1 Hour

Maximum Marks: 15

Note: All Questions are Compulsory and Carry Equal Marks.

Question(1) Describe First Order Predicate Logic? [BTL-1, Marks-3, CO-1]

Question(2) Produce Properties required in a Good Knowledge Representation Scheme? [BTL-5, Marks-3, CO-1]

Question(3) Discuss Application Areas of Expert System? [BTL-2, Marks-3, CO-2]

Question(4) Illustrate Life Cycle Development of Expert System? [BTL-01, Marks-3, CO-3]

Question(5) Explain LISP Programming? [BTL-4, Marks-03, CO-2]

Department of Computer Science & Engineering
SoS(Engg.& Tech.)
Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)
CT – II , Session [2022-23]

Class: B.Tech VIth Sem.
Subject : Java

Time : 1hr
Max. Marks: 15

Note: Attempt any three Questions . All question carry equal marks.

Q.1 Name five String Methods and Describe their Function? [CO: 3,BTL: 2:MM:5]

Q.2. Write a Program of Multilevel Inheritance? [CO: 3,BTL: 3:MM:5]

Q.3.Write a Program using the concept of Method Overloading? [CO: 3,BTL: 3:MM:5]

Q4. What do you mean by Interface? Which type of access specifies can be used in interface?can it be instantiated by declaring objects? Is the methods are always abstract in nature in interface? [CO: 3,BTL:1:MM:5]

Q5. What do you mean by API? Name any four different packages and describe their task why they used? [CO: 3,BTL:1:MM:5]

Department of Computer Science & Engineering
School of Studies in Engineering & Technology
Guru Ghasidas Vishwavidyalaya (A Central University)

CLASS TEST-2, March 2023

Subject: Digital Image Processing
Branch: Computer Science & Engineering
Time: 1 hrs.
MM: 15
Note: Attempt any five questions. All question carry equal marks.

1. Consider the following image, what will be the new value of pixel (2,2) if following smoothing filter is applied using 3 X 3 neighbourhood :

a) Median filter

b) Mean filter

c) Max filter

5	4	2	2	5
1	1	0	7	5
5	6	4	3	3
2	7	7	4	0
0	1	0	2	7

2. Find the DFT of following matrix:

2	1	1	1
0	0	0	0
0	0	0	0
0	0	0	0

3. Explain in detail an image degradation model.

4. Find the Histogram Equalization for the following image:

1	3	5
4	4	3
5	2	2

5. Consider an image

1	2	5
5	5	5
5	3	2

Find magnitude and gradient of edge point using sobel edge detector.

6. Write down the difference between Low pass filter and high pass filter.

****

B.Tech. (Sixth Semester, New AICTE/ Old CBCS) CT-02, Examination, 2023
(Computer Science & Engineering Branch)
Subject-Design and Analysis of Algorithm
Time Allowed:- One hour
Maximum Marks:- 15

Note: There are only objective type questions and attempt all questions. All questions carry equal marks i.e. 1.5 marks.

Q1. Let's consider a problem X is NP type and problem Z is unknown. Another problem Y is NP- hard type. Problem X is polynomial time reduction to Z and problem Y is polynomial time reducible to Z. In this scenario now what is class of problems X, Y and Z respectively?

(a) NP, NPH and NPC
(b) NP, NPH and NP
(c) NP, NPH and NPH
(d) NP, NPH and Undecidable
(e) None of the above

Q2. Consider a directed graph with vertex set {a, b, c, d, e, f}. Entry W_{ij} in the matrix W given below is the weight of the edge {i , j}.

W=

	a	b	c	D	e	f
a	0	1	4	∞	-3	2
b	1	0	3	∞	∞	1
c	4	3	0	6	∞	3
d	∞	∞	6	0	7	3
e	-3	∞	∞	7	0	-1
f	2	1	3	3	-1	0

In this graph such that vertex c is a leaf node in the tree T and node b should be predecessor of c. What is the total number of MST and their minimum weight?

(a) 2 and 2
(b) 3 and 3
(c) 2 and 3
(d) 1 and 2
(e) None of the above

Q3. An alphabet consists of the letters a1, a2, a3, a4 and a5. The probability of occurrence is P(a1)=P(a3)=0.2, P(a2)= 0.4, P(C) = 0.2 and P(a4) = P(a5)= 0.1.The Huffman code is?

(a) a1 = 1, a2=01, a3= 000, a4 = 0010, a5=0011
(b) a1=01, a2=1, a3= 000, a4 = 0010, a5=0011
(c) a1=0011, a2=1, a3= 000, a4 = 0010, a5=01
(d) a1=01, a2=1, a3= 000, a4 = 0011, a5=0010

Q4. Breadth First Search (BFS) is started on a binary tree beginning from the root vertex. There is a vertex t at a distance five from the root. If t is the n-th vertex in this BFS traversal, then the maximum possible value of n is _____

(a) 63
(b) 71
(c) 31
(d) 64

Q5. Choose the correct answer for the following statements:

I. The theory of NP -completeness provides a method of obtaining a polynomial time for NP algorithms.
II. All NP-complete problems are NP-Hard

(a) I is FALSE and II is TRUE
(b) I is TRUE and II is FALSE
(c) Both are TRUE
(d) Both are FALSE

Q6. Let suppose a thief stealing a store finds 5 items, the i^{th} item is worth V_i dollars and weight w_i pounds where V_i and W_i are integers given below in table. He/she want to take as valuable a load as possible but he/she can carry at most W pounds in his knapsack for some integer. What is the value of W and V_i to achieve the maximum total value of selected items he can get by dynamic algorithm?

3 10 54

W = 10

5 Item

Item(i)	Value (V_i)	Weight (w_i)
1	15	2
2	10	3
3	9	3
4	20	4
5	18	6

(a) 15 and 9

(b) 9 and 10

(c) 10 and 9

(d) 8 and 9

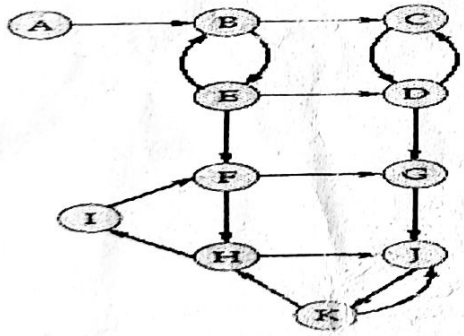
Q7. A priority-Queue is implemented as a Max-Heap. Initially it has 5 elements. The level-order traversal of the heap is given below: 10, 8, 5, 3, 2. Two new elements 1 and 7 are inserted in the heap in that order. The level order traversal of the heap after the insertion of the elements is:

(a) 10,8,7,5,3,2,1
(b) 10,8,7,2,3,1,5
(c) 10,8,7,1,2,3,5
(d) 10,8,7,3,2,1,5

Q8. Let G (V, E) an undirected graph with edge weights. Prim's algorithm can be implemented using the binary heap data structure and Fibonacci heap data structure for sparse graph with time complexity respectively :-

(a) O(VlgV+E) and O(VlgV+E)
(b) O(E+VlgV) and O(VlgV+E)
(c) O(V lgV+E) and O(V lgV)
(d) O((E+V)lgV) and O(V²)

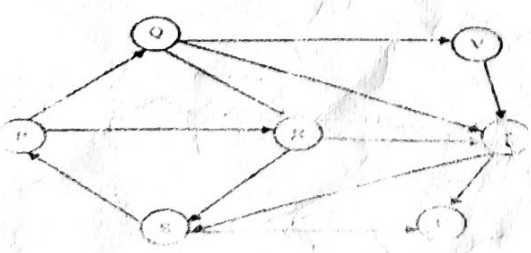
Q9. Consider the following graph:



The number of strongly connected components of the graph is _____.

(a) 1 (b) 2 (c) 4 (d) 3 (e) None of these.

Q10. Which of the following is the correct decomposition of the directed graph given below into its strongly connected components?



(a) {P, Q, R, S}, {T}, {U}, {V}
(b) {P, Q, R, S, T, V}, {U}
(c) {P, Q, S, T, V}, {R}, {U}
(d) {P, Q, R, S, T, U, V}

Bachelor of Technology (Sixth Semester) Examination, Session 2022-23

(Computer Science and Engineering)

Subject Code: CS206TPE07, Subject Name: Artificial Intelligence

Time Allowed: Three Hours

Maximum Marks: 70

Note: - The Question Paper Comprises of Two Parts. Part-A Comprises of 10 Multiple Choice Questions which are Compulsory and Carry Equal Marks that is 2 Marks Each. Part-B Comprises of 5 Sections for 5 Units. Every Section Comprises of 3 Questions of 5 Marks Each. From Every Unit you have to attempt 2 Questions out of 3 Questions.

PART-A [2x10] All Question are Compulsory.

1. Who is regarded as the Father of Artificial Intelligence?
    a. Joe Mathew
    b. John McCarthy
    c. Robert Kin
    d. None of the Above
2. Who Proposed the Turing Test?
    a. Ben Turing
    b. Joe Turing
    c. Alan Turing
    d. None of the Above
3. Which of the following is/are properties expected in a good knowledge representation system?
    a. Representational Adequacy
    b. Inferential Adequacy
    c. Inferential Efficiency
    d. All of the Above
    e. None of the Above
4. ..... can be defined as a Scientific Study of the Process of Reasoning and the System of Rules and Procedures that help in Reasoning Process.
    a. LOGIC
    b. Chemistry
    c. Biology
    d. All of the Above
    e. None of the Above
5. (State True or False) Database operates on Single Object.
    a. TRUE
    b. FALSE
6. Who are the Individuals Involved with Expert Systems:
    a. Users
    b. Domain Expert
    c. Knowledge Engineer

d. All of the Above
e. None of the Above

7. LISP stands for:
   a. LIST Processing
   b. LML Process
   c. Legal Processing
   d. None of the Above
8. (State TRUE or FALSE) LISP is used to Process Non-Numeric and Symbolic Data.
   a. TRUE
   b. FALSE
9. PROLOG was invented by:
   a. Alan Musk
   b. Mark Zuckerberg
   c. Alian Colmerauer
   d. None of the Above
10. (State TRUE or FALSE) Most AI programs reason using Logic. The Syntax and Semantics of PROLOG are very close to Formal Logic.
    a. TRUE
    b. FALSE

PART-B [10x5] Attempt any 2 Questions from Every Unit.

UNIT-1 [5x2]

Question(1) : Give Introduction of Artificial Intelligence (AI)?
Question(2) : Write Short Notes on the Production System?
Question(3) : Give differences between Breadth First Search and Depth First Search?

UNIT-2 [5x2]

Question(1) : What is the Role of Knowledge Representation in AI? Explain in Detail?
Question(2) : Explain FRAMES?
Question(3) : What are the Advantages and Disadvantages of SCRIPT?

UNIT-3 [5x2]

Question(1) : Give Introduction to Expert System?
Question(2) : Write Short Notes on Dendral and Mycin?
Question(3) : Give the Limitation of Expert System?

UNIT-4 [5x2]

Question(1) : Give Introduction to LISP?
Question(2) : Write short notes on Arrays in LISP?
Question(3) : Explain the Predicates in LISP?

UNIT-5 [5x2]

Question(1) : Explain PROLOG control strategy?
Question(2) : What are the following in PROLOG:-

a) Term
b) Ground Term
c) Function
d) Predicates
e) Program Clause

Question(3) : Explain Iterative Programming in PROLOG?

Code No:..... **Set: A**

Main Examination: 2022-23

Dept. of Computer Science & Engg.

SoS, (Engg. & Tech.), GGV, Bilaspur (CG)

Course: BTECH 6th Sem (AICTE) **Subject: Computer Graphics**

Max. Time: 03 Hours **Max. Marks: 70**

Note: Attempt any 14 questions. All are equal marks (14x5=70).

Que. (1) What is raster and random scan system. Explain with the diagram.

Que. (2) Discuss the internal architecture of CRT and explain it.

Que. (3) What is shadow masking? Explain with the diagram.

Que. (4) Write the mid-point circle generation algorithm.

Que. (5) If circle radius r=10. Use midpoint circle algorithm and determine the position along the circle octant in the first quadrant from x = 0 to x = y.

Que. (6) Explain working of scan line polygon fill algorithm.

Que. (7) Discuss the concept of Liang-Barsky line clipping algorithm.

Que. (8) What is composite transformations? Explain with the example.

Que. (9) Rotate the 2-D object in 45 degree of clockwise direction. If coordinates are A(20, 10), B(60, 10) and C(35, 50) of triangle.

Que. (10) If the window size is A(10,10) , B(60,10), C(60,60) and D(10,60). Find the clipping point of the given line L1(30,-10) & (50, 80) by using Cohen-sutherland line clipping algorithm.

Que. (11) What is segmentation? Explain with the example.

Que. (12) Discuss the Sutherland-Hodgeman clipping algorithm with the diagram.

Que. (13) Discuss the Weller-Atherton clipping algorithm with the diagram.

Que. (14) Explain the Bezier curve, Give properties of Bezier curve.

Que. (15) Explain the B-SPLINE curve and surface.

Que. (16) Scale the unit cube 3D object in Sx=2, Sy=1/2 and Sz=1 direction.

Que. (17) Explain the types of projection with the diagram.

Que. (18) Construct the Bezier curve of order 3 and with 4 polygon vertices A(1,1), B(2,3), C(4,3) and D(6,4).

Que. (19) Discuss the Geometric continuity conditions of B-Spline Curve.

B.Tech VI Sem, 2022-23

Computer Science & Engineering
Guru Ghasidas Vishwavidyalaya, Bilaspur
Subject: MANAGEMENT INFORMATION SYSTEM
Subject Code: CS206TPE05
Time Allowed: Three hours
Maximum Marks: 70

Note: This question paper is divided into two sections. All question from Section-A is compulsory. In Section-B attempt any one questions from each unit; each question carries 10 marks.

Section-A

1. Attempt all question. Each question carries 2 marks.

i. Write the name of three dimension of information system.
ii. TPS stand for…..
iii. Full form of DSS is ……
iv. Write note on Decision Making Model.
v. Full form of DMP….
vi. ERP stand for ……
vii. Write down steps of the marketing information system process.
viii. Write short note on information system audit.
ix. Write down two advantages of DSS.
x. Write note on information system security.

Section-B

UNIT-I

2. What is Information system? Explain different type of information system.
3. What is Business process reengineering? Explain in detail.

UNIT-II

4. What is DSS? Write different component of DSS and classification of DSS.
5. What is DMP? Explain Steps of DMP.

UNIT-III

6. Explain factor of success and failure of MIS.
7. Explain development process and planning of MIS.

UNIT-IV

8. What is Cross Functional Information System? Explain different component of Cross Functional Information System.
9. What is HRIS? Write down HRIS benefits, types and function.

UNIT-V

10. Explain management of information system and end user computing.
11. Explain Ethical & Security Issues in Information System.

B.Tech. (Sixth Semester) Examination-2023
(Computer Science &Engineering)
Subject- Design and Analysis of Algorithm(CS206TPC11)
Time allowed: Three hours
Maximum Marks: 70

Note:-There are only subjective type questions. Attempt any two questions from each unit and each question carries equal marks i.e. 7 marks. Assume data if required.

Unit-I

1. Consider the recurrence relation $T(n) = T(n-1) + T(n/2) + n$ and solve by backward substitution method.

2. Use a recursive tree method to give an asymptotically tight solution to the recurrence
   $T(n)=T(\alpha n)+T(1-\alpha)n+n$ where $0<\alpha<1$ and $n>1$
   Otherwise $T(n)=1$ when $n\leq 1$

3. What is outcome of following given recursive code of program? Demonstrate your answer with recursive tree and stack data structure.

```
#include<stdio.h>
int fun(int i)
{
 if ( i>0 )
 {
 return i-fun(--i)+fun(i--);
 return fun(i/2);
 printf("%d\t",i);
 fun(i/2);}
else
   printf("%d\t",i);
return 0;
}
int main()
{
 printf(" %d ", fun(2.5));
 getchar();
 return 0;
}
```

Unit-II

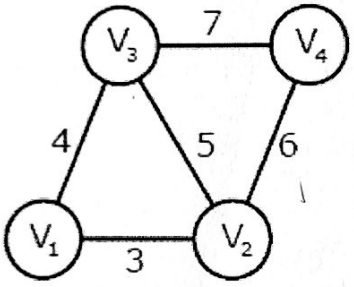
4. Consider a directed graph with vertex set {a, b, c, d, e, f}.Entry W_{ij} in the matrix W below is the weight of the edge {i , j}.

W=

	a	b	c	d	e	f
a	0	1	4	∞	-3	2
b	1	0	3	∞	∞	1
c	4	3	0	6	∞	3
d	∞	∞	6	0	-3	3
e	-3	∞	∞	-3	0	-1
f	2	1	3	3	-1	0

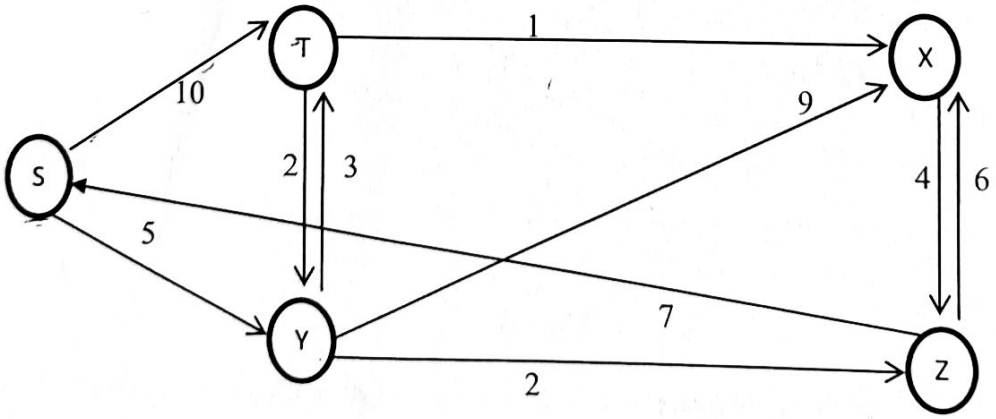
Use prim's algorithm and find out minimum possible weight of a spanning tree T in this graph such that vertex c is a leaf node in the tree T and node b should be predecessor of c. Find out total number of MST and also draw the all possible minimum spanning tree?

5. An undirected graph G(V, E) contains n (n > 2) nodes named v1 , v2 ,....vn. Two nodes vi , vj are connected if and only if 0 < |i – j| <= 2. Each edge (vi, vj) is assigned a weight i + j. A sample graph with n = 4 is shown below.



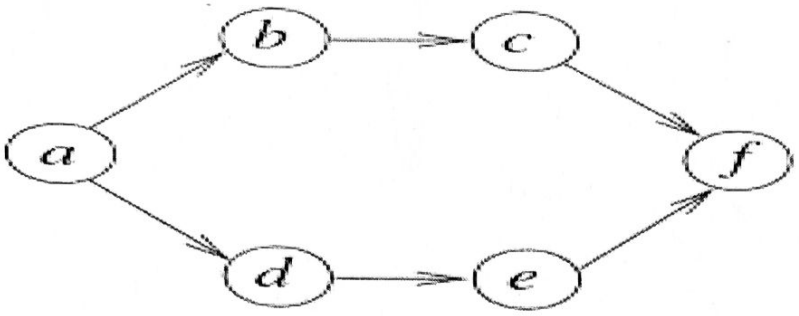
What will be the cost of the minimum spanning tree (MST) of such a graph with n nodes?

6. Let consider the following directed weighted graph as given below. Find out the minimum cost of each vertex from source vertex by Dijkstra's algorithm. (Assume source vertex should be S).



Unit-III

7. Consider the following directed graph as given below:



Find out all possible number of different topological orderings of the vertices of the graph?

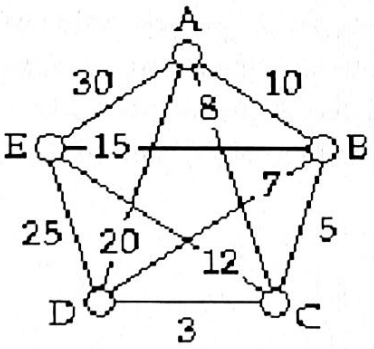
8. Write an algorithm of heap sort with Max-Heapify and Build max heap.
9. Write an algorithm of longest common subsequence (LCS) in dynamic programming technique for both:-

   I. An algorithm to evaluate the length of LCS
   II. An algorithm to print the LCS

Unit-IV

10. Explain the n-Queen problem with examples.

11. A delivery truck must deliver packages to 5 different store locations (A, B, C, D, and E). The trip must start and end at A. The graph below shows the distances (in miles) between locations.



How many Hamilton circuits (HC) would we have to check? Show your all works with all HC.

12. Consider the following adjacency matrix of directed graph G(V,E) as given below. Let assume that cities are the graph's vertices and paths are the graph's edges and path's distance is the edge's length. A salesman who is getting for a big sales tour. Salesman who must travel between all cities but salesman wants to keep both the travel costs as well as the distance should be as low as possible. By considering node 1 should be as root node and node 5 should be as last visited node of salesman and find out cost route in such a way that cost is the minimum and order of visiting the cities by branch and bound technique.

W=

	1	2	3	4	5
1	0	7	3	12	8
2	3	0	6	14	9
3	5	8	0	6	18
4	9	3	5	0	11
5	18	14	9	8	0

Unit-V

13. Suppose that there are three problems L_1, L_2 and L_3 in which problem L_2 is halting problem on Turing machine and problem L_1 is reduced to L_2 in polynomial time. Similarly problem L_2 is reduced to L_3 in polynomial time. Inferred and predict the type of complexity classes of problems L_1, L_2 and L_3.Also draw a Venn diagram of these reductions with respect to L_1, L_2 and L_3.

14. Let G be a simple graph with 20 vertices and 100 edges. The size of the minimum vertex cover of G is 8.What is size of the maximum independent set of G. Give the answer with explanation?
Also lets a problem X is NPC type and Z is unknown problem. Another problem Y is not P type Problem. X is polynomial time reducible to Z and problem Y is polynomial time reducible to X. In this scenario what are problem types of X,Y and Z ?Also considering the above scenario and draw a Venn diagram between of the complexity classes P, NP, NP-Complete (NPC) and NP-hard for problem X,Y and Z.

15. Let's suppose a given solution in polynomial time correctly computes and verified for the clique problem, for another problem vertex cover, there is given a solution in polynomial time correctly verified in a given graph for large value of vertices (n).Can it possible that there will be a solution in polynomial time correctly computes for the vertex cover? If yes prove that and if no why? In this scenario also draw a Venn diagram between of the complexity classes P, NP, NP-Complete (NPC) and NP-hard.

B.Tech. (Sixth semester) Examination 2022-23

(Computer Science and Engineering)

JAVA

Time Allowed: Three hours

Maximum Marks: 70

Note: *This question paper is divided into two sections. All question from Section-A are compulsory. Each question carries two marks in section –A. Attempt* ***any two question*** *from each unit in Section-B. Draw neat diagram wherever possible.*

SECTION-A

(2*10=20)

1. **Multiple choice questions (Choose most appropriate option):**

i. **Which of the following inheritance of class is invalid in Java?**
   a. Single
   b. Multiple
   c. Multi-level
   d. Hierarchical

ii. **Abstract class is ___.**
   a. Created using abstract keyword
   b. Contains only abstract method
   c. Needs to be inherited to be used
   d. All of these

iii. **The break statement in Java is used to ___.**
   a. Terminates from the loop immediately
   b. Terminates from the program immediately
   c. Skips the current iteration
   d. All of these

iv. **Which of the following can be declared as final in java?**

   a. Class
   b. Method
   c. Variable
   d. All of these

v. **Which keyword in java is used for exception handling?**

a. exep
b. excepHand
c. throw
d. All of these

vi. **Can we write a program without a main method in Java?**

a. Yes
b. No

vii. **What makes the Java platform independent?**

a. Advanced programming language
b. It uses bytecode for execution
c. Class compilation
d. All of these

viii. **Which of these is a non-access modifier?**

a. public
b. private
c. native
d. All of these

ix. **When a finally block executed in Java?**

a. Try block is executed without any exception
b. Exception has occurred
c. Executed at last
d. None of these

x. **Which of the following methods is used to extract the length of a string in Java?**

a. length()
b. len()
c. sizeof()
d. size()

SECTION –B

Note: Attempt <u>any two</u> question from each unit. Each question carry equal marks i.e. 5.

(5*10=50)

UNIT-I

Q2. What do you mean by Web Browser? Explain HotJava and Internet Explorer?

Q3. Write any five differences between C and Java.

Q4. Explain Java Virtual Machine.

UNIT-II

Q5. Explain relational operators?

Q6. Explain any five mathematical function with their working?

Q7. Write a program for factorial of given no. using loop.

UNIT-III

Q.8. Write a Program using the concept of Method overloading.

Q9. What do you mean by Packages? Write the name of four package and their functions?

Q10. Is interface is differ from Abstract class? Justify in five points

UNIT-IV

Q11. Write any five differences between Multithreading and Multitasking.

Q.12. what do you mean by Thread. Write any three methods for blocking/Suspension of Thread. How threads can be stopped.

Q13. Write a Program with implementing "Runnable" interface?

UNIT-V

Q.14. Explain Applet Life Cycle?

Q15. Explain Classification of Java Stream classes in short with Diagram?

Q.16.Write a Program to create Rectangle using applet?

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B. TECH VIth SEMESTER EXAMINATION

DIGITAL IMAGE PROCESSING

MM: 70 **Time: 3 hours**

Note: Question paper contains two section A and B. Section A is compulsory. Attempt any ten questions from section B. All question carries equal marks in section B.

Section A

1. Short answer type question: - 10 X 2 = 20

i) Write down the name of Multiplicative Noise.

ii) Write down the name of two methods used for estimation of Degradation Functions.

iii) Which Image Restoration technique is used image restoration when there is no knowledge of the blurring function are available.

iv) Write down the name of Semi-automatic algorithm used for segmenting the image.

v) Write down the different stag of edge detection.

vi) A picture of physical size 2.5 inch by 2 inches is scanned at 150 dpi . How many pixels would be there in the image?

vii) Write down the practical application of image division.

viii) Write down the name of different factors that are responsible for image quality.

ix) What is a Hybrid filter? Write one example of hybrid filter.

x) What do you mean by Image Synthesis.

Section B

1. Use the following 3 X 3 mask to perform the convolution process on the shaded pixels in the 5 X 5 image below. Write the filtered image.

30	40	50	70	90
40	50	80	60	100
35	255	70	0	120
30	45	80	100	130
40	50	90	125	140

Image

0	1/6	0
1/6	1/3	1/6
0	1/6	0

mask

2. What is a wiener filter? Write in detail the construction and implementation of a wiener filter.

3. Write down the principal of Thresholding? Also write the steps of Global Thresholding Algorithm.

4. Write down the steps of Region Growing algorithm and by considering the following image apply the region-growing algorithm and show the result. The seed pixel is 9 (underlined in image). Take the threshold value = 4.

1	0	7	8	7
0	1	8	9	8
0	0	7	9	8
0	1	8	8	9
1	2	8	8	9

5. Detect edge in the following image using magnitude and direction of gradient. Use Prewitt Operator.

0	30	60
5	32	62
10	38	64

6. Explain the different steps of Digital Image Processing.

7. Define low level, middle level and high-level image processing operations.

8. Perform histogram specification on the 8 X 8 , eight level image described below:

Grey Level	0	1	2	3	4	5	6	7
No. of Pixel	790	1023	850	656	329	245	122	81

The target histogram is given as follows:

Grey Level	0	1	2	3	4	5	6	7
No. of Pixel	0	0	0	614	819	1230	819	614

9. Find the shortest path 4- path, 8-path and m – path between p and q in image given below , if :

i) V = {0,1}

ii) V = {1,2}

3	1	2	1 (q)
2	2	0	2
1	2	1	1
1 (p)	0	1	1

10. Find the DFT of following matrix:

2	1	1	1
0	0	0	0
0	0	0	0
0	0	0	0

11. Write down the algorithm for Image smoothing in Frequency domain filtering.

12. What are the different Geometrical Operations used in image processing.

13. Explain briefly the types and implementation of order – statistic filter.

14. What is the difference between Image Enhancement and Image Restoration.

****