Started on	Thursday, 8 July 2021, 10:29 PM
State	Finished
Completed on	Tuesday, 13 July 2021, 9:29 AM
Time taken	4 days 10 hours
Overdue	4 days 9 hours
Marks	0.00/50.00
Grade	**0.00** out of 10.00 (**0**%)

Question **1**

Not answered

Marked out of 1.00

Study the following recursive algorithm:

procedure p (n: integer)

```
 if (n<=0) result = 2;
 else result= p(n -2) * p(n -1);
```

p(4) = ?

Select one:

- a. None of the others.
- b. 624
- c. 256
- d. 352

Question **2**

Not answered

Marked out of 1.00

How many functions f:A → B in which |A|=3 and |B|= 7?

Select one:

- a. 21
- b. Only one.
- c. 3^7
- d. None of the others.
- e. 7^3

Question **3**

Not answered

Marked out of 1.00

Study the sequence given recursively by $a_n = -a_{n-1}$ and $a_1 = 5$.
What is a_{2015}?

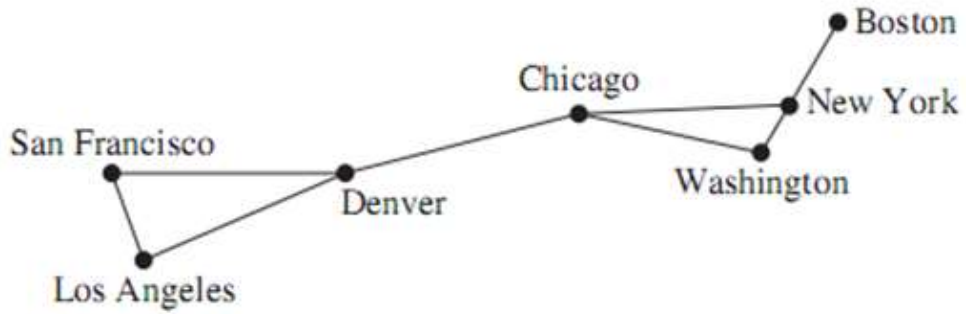
Select one:

- a. -5
- b. None of the others
- c. $(-5)^{2015}$
- d. 5

Question **4**

Not answered

Marked out of 1.00



Let m be number of cut vertices and n be number of cut edges (bridges) of the graph above.

What is m + n?

Select one:

- a. 5
- b. 3
- c. 6
- d. 4
- e. 2

Question **5**

Not answered

Marked out of 1.00

Write a proposition equivalent to ¬*p* → *q using only p, q,* ¬ *and* ^

Select one:

- a. ¬p^q
- b. ¬(¬p^¬q)
- c. ¬(p^¬q)
- d. ¬(q^¬p)

Question **6**

Not answered

Marked out of 1.00

Suppose

c: It is cold

d: It is dry

Write “It is neither cold nor dry” in symbols.

Select one:

- a. c v d
- b. ¬c ^ ¬d
- c. None of the others
- d. ¬c v ¬d
- e. c ^ d

Question 7

Not answered

Marked out of 1.00

Which of these codes are prefix codes?

(i) **a**: 101, **e**: 00, **t**: 11, **s**: 01

(ii) **a**: 01, **e**: 11, **t**: 010, **s**: 101

Select one:

- a. (i) only
- b. None
- c. both
- d. (ii) only

Question **8**

Not answered

Marked out of 1.00

Given $f(x) = x^2 + 1$ and $g(x) = x + 2$, find $(fog)(x) = f(g(x))$.

Select one:

- a. $(x + 2)^2 + 1$
- b. $(x^2 + 1)(x+2)$
- c. $x^2 + 3$
- d. $(x + 2)^2$

Question **9**

Not answered

Marked out of 1.00

What is the value of following expression:

3 2 * 2 ↑ 5 3 -8 4 / * -

Select one:

a. 34
b. 30
c. 36
d. 32

Question 10

Not answered

Marked out of 1.00

For each of these arguments determine whether the argument is valid or not valid.
(i) Everyone enrolled in the university has lived in a dormitory. Mia has never lived in a dormitory. Therefore, Mia is not enrolled in the university.
(ii) A convertible car is fun to drive. Isaac's car is not a convertible. Therefore, Isaac's car is not fun to drive.

Select one:

a. (i): not valid, (ii): not valid

a. (i): not valid, (ii): not valid
b. (i): not valid, (ii): valid
c. (i): valid, (ii): not valid
d. (i): valid, (ii): valid

Question 11

Not answered

Marked out of 1.00

Study the sequence of pseudorandom numbers is generated $x_{n+1} = (4x_n - 5) \bmod 7$, with seed $x_o = 1$. Find x_2.

Select one:

a. 5
b. 7
c. None of the others
d. 4

e. 3

Question 12

Not answered

Marked out of 1.00

Which of the following functions is $O(x^2)$?

Select one:

a. $g(x) = (x\log x + 1)x$

b. $h(x) = x(x+1)(x+2)$

c. None of the others

d. $f(x)=100x^2 + 3$

e. $k(x) = 2^x$

e. K(X) = Z^

Question **13**

Not answered

Marked out of 1.00

Which of the following graphs has an Euler circuit?

Select one:

a. All of the others.

b. K_6

c. K_{10}

d. K_9

Question **14**

Not answered

Marked out of 1.00

How many bit strings of length 10 either begin with three 0s or end with two 1s?

Select one:

a. None of the others

b. 2^{10}

c. $2^7 + 2^8 - 2^5$

d. $2^7 + 2^8$

Question **15**

Not answered

Marked out of 1.00

What is the **average number of bits** for each letter of the word "amazing" using **Huffman coding algorithm**?

Select one:

- a. 19/7
- b. 20/7
- c. 17/7
- d. None of these
- e. 18/7
- f. 3

Question **16**

Not answered

Marked out of 1.00

Study the following statements:
(i) $1 + 2 + 3 + \ldots + n = n(n+1)$ for $n = 1, 2, 3, \ldots$
(ii) $1 + 3 + 5 + \ldots + 2n - 1 = n^2$ for $n = 1, 2, 3, \ldots$

(i) is ... and (ii) is ...

Select one:

- a. true, false
- b. false, false
- c. false, true
- d. true, true

Question 17

Not answered

Marked out of 1.00

$f(x) = x^3$ is:

Select one:

a. O(x)

b. $O(2^x)$

c. $O (x^2)$

d. $O(x^2 \log x)$

Question **18**

Not answered

Marked out of 1.00

Let G be an undirected graph with 7 vertices, in which 3 vertices are of degree 4 and 4 vertices are of degree 3. How many edges does G have?

Select one:

- a. 14
- b. None of these
- c. 7
- d. 24
- e. 12

Question **19**

Not answered

Marked out of 1.00

How many leaves does a full 3-ary tree with 100 vertices have?

Select one:

- a. 67
- b. 76
- c. 68
- d. 78

Question **20**

Not answered

Marked out of 1.00

Set up a binary tree for the following list, in the given order, using alphabetical ordering: SHE, SELLS, SEA, SHELLS, BY, THE, SEASHORE. How many comparisons with words in the tree are needed to determine if the word SHARK is in the tree?

Select one:

a. 5
b. 3
c. 2
d. 4

Question 21
Not answered
Marked out of 1.00

What is the value of following expression:
3 4 * 5 3 - + 2 2 ↑ *

Select one:
a. 56
b. 9
c. 37
d. 32

Question 22
Not answered
Marked out of 1.00

Find the base 5 expansion of 173.

Select one:
a. None of these

b. 413
c. 643
d. 1143
e. 143

Question 23

Not answered

Marked out of 1.00

Let p, q, and r be the propositions

p : You get an A on the final exam.

q : You do every exercise in this book.

Write these propositions using p, q, and r and logical connectives (including negations).

"Doing every exercise in this book is sufficient for getting an A on the final exam."

Select one:

a. None of these
b. p v q
c. p ^ q
d. p → q
e. q → p

Question **24**

Not answered

Marked out of 1.00

Suppose that a “word” is any string of seven letters of the alphabet (with 26 letters), with repeated letters allowed.
How many words have exactly one vowel?

Select one:

a. $5 . 7. 21^6$

b. $7. 21^6$

c. $5 .21^6$

d. 26^7

e. None of the others

Question **25**

Not answered

Marked out of 1.00

Study the following recursive algorithm:

Procedure T (n: integer)

If n<3 then T(n) := 2

Else If n mod 2=0 then T(n) := n

Else T(n) := T(n-1) + 2

Find T(9).

Select one:

- a. 6
- b. 10
- c. None of these
- d. 9

Question **26**

Not answered

Marked out of 1.00

How many **comparisons** required for searching the word "**make**" in the BINARY SEARCH TREE for the words: A, swallow, can't, make, a, summer.

Select one:

- a. None of these
- b. 4
- c. 2
- d. 3
- e. 5

Question 27

Not answered

Marked out of 1.00

Given the function

$$f(n)=\begin{cases}1 & \text{if } n \le 3\\ f(n-1)+2 & \text{if } n>3\end{cases}$$

for the integer n.
Find f(4).

Select one:

a. 2

b. 3

c. 1

d. 4

e. None of the others

Question 28

Not answered

Marked out of 1.00

$K_{m,n}$ has ____ edges and ____vertices.

Select one:

- a. mn, m + n
- b. min(m, n), max(m,n)
- c. max(m, n), min(m,n)
- d. m + n, mn

Question **29**

Not answered

Marked out of 1.00

With domain is the set {1,2,3,4,5,6,7,8,9}, the bit string represents the ***union*** of two sets {1,5,8} and {2,3,4,5} is .....

Select one:

- a. None of the others
- b. 000001101
- c. 111110000
- d. 111111111
- e. 111100111

Question **30**

Not answered

Marked out of 1.00

Consider a set of integers recursively defined by :
1 and 2 are S; and
if x in S then x+3 in S.
Which statement below is true?

(i) 6 is in S

(ii) 7 is in S

Select one:

- a. None
- b. (ii) only
- c. Both
- d. (i) only

Question 31

Not answered

Marked out of 1.00

Suppose that a graph G and the graph W_7 are isomorphic.
How many edges does G have?

Select one:

- a. 7
- b. not enough data to know.
- c. 14
- d. 6
- e. 8

Question **32**

Not answered

Marked out of 1.00

In a technician's box there are 200 VLSI chips, 8 of which are faulty. How many ways are there to pick two chips, so that one is a working chip and the other is faulty?

Select one:

- a. 208
- b. 200×8
- c. 192×8
- d. None of the others

Question **33**

Not answered

Marked out of 1.00

There are ___ nonzero entries in an adjacent matrix representing the graph K_5.

Select one:

- a. 20
- b. 12
- c. 10
- d. 15

Question **34**

Not answered

Marked out of 1.00

Which of the following statements is true?

(i) $\varnothing \in \{x\}$

(ii) $x \subset \{x\}$

Select one:

- a. both
- b. none
- c. (ii) only
- d. (i) only

Question 35

Not answered

Marked out of 1.00

Consider the algorithm

```
result(a,b: integer)
    x:=a
    y:=b
    while y<>0
       begin
```

```
        r:=x mod y
        x:=y
        y:=r
    end.
```

Given a=27,b=4. What is the value of x after the pseudocode has been executed?

Select one:

- a. 1
- b. None of the others.
- c. 3
- d. 4
- e. 27

Question **36**

Not answered

Marked out of 1.00

Let A_i = {1, 2, 3, ..., i} for i = 1, 2, 3, ...
What is A_3?

Select one:

- a. A_3 = {3}
- b. A_3 = {1, 2, 3}
- c. None of the others

c. None of the others

d. A_3 = {...-1, 0, 1, 2, 3}

Question **37**

Not answered

Marked out of 1.00

The following expression will be evaluated to .....
5 4 + 2 6 - * 3 /

Select one:

a. None of the others.

b. -17

c. -12

d. 20

e. 16

Question 38

Not answered

Marked out of 1.00

Given the following prefix codes:

M: 00, N: 010, T: 011, I: 100, U: 101, A: 11.

Find the word represented by 0010001001111

Select one:

a. MINUA

b. MIUNA

c. MINTA

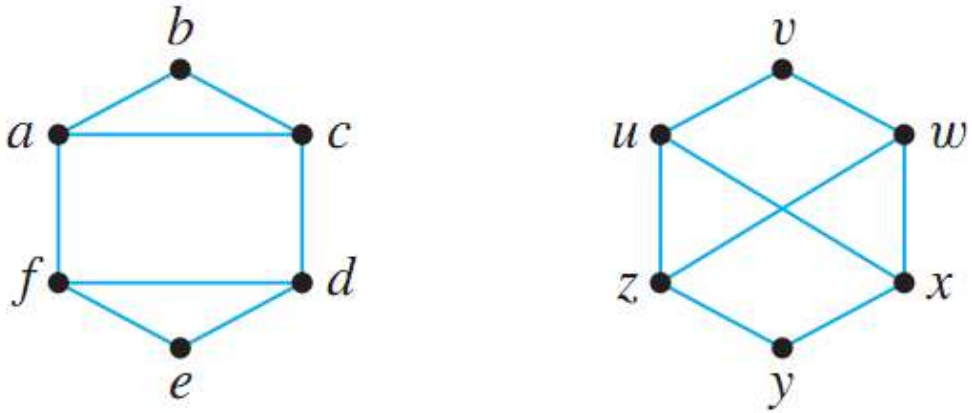
d. MITNA

e. None of the others.

Question **39**

Not answered

Marked out of 1.00



Are G and G' isomorphic? Explain.

Select one:

- a. No, G has a rectangle, and G' does not have.
- b. No, G has two triangles, and the graph G' does not have that property.
- c. Yes, they have the same number of vertices and edges

Question **40**

Not answered

Marked out of 1.00

(i) If the graph K_6 has a Hamilton circuit, then the graph W_5 has an Euler circuit.
(ii) If the graph K_6 has an Euler circuit, then the graph W_5 has a Hamilton circuit.
Which statements are FALSE?

Select one:

- a. (ii) and (iii)
- b. (i) only
- c. (iii) only
- d. (i) and (iii)
- e. (ii) only

Question **41**

Not answered

Marked out of 1.00

Encrypt the message CR by using the encryption function $f(p) = (p + 11) \bmod 26$.

Select one:

a. KV

b. NC

c. NA

d. None of the others.

Question **42**

Not answered

Marked out of 1.00

Consider the statements about the function $f(x) = (x - 3)^2 + 5$ from R to R.
(i) f is one-to-one

(ii) f is onto

Which statement is true?

Select one:

- a. Both
- b. None
- c. (i)
- d. (ii)

Question **43**

Not answered

Marked out of 1.00

If A x B has 72 elements and A has 8 elements, how many elements does B have?

Select one:

- a. 64
- b. 72.8
- c. 9
- d. None of these

Question **44**

Not answered

Marked out of 1.00

Which of the following graphs has an Euler circuit?

(i) K_{11}

(ii) $K_{2,8}$

Select one:

a. (i) only

b. none

c. both

d. (ii) only

Question **45**

Not answered

Marked out of 1.00

-23 div 5 = ___ and -23 mod 5 = ___

Select one:

a. -4, 2

b. -4, 3

c. -5, 2

d. -4, -3

Question **46**

Not answered

Marked out of 1.00

Study the statements:

(1) W_n has Hamilton circuit for all n >=3.

(2) $K_{2,3}$ has Hamilton circuit.

(1) is ___ and (2) is ___

Select one:

a. false, false

b. false, true

c. true, true

d. true, false

Question **47**

Not answered

Marked out of 1.00

Study the recursive function: F(n+1)= - F (n) / F(n-1), F(0)=-1, F(1)=2

Select one:

a. F(6)=3

b. F(6)=1/2

c. F(6)=-1

d. F(6)=-1/2

e. F(6)=2

Question **48**

Not answered

Marked out of 1.00

Find the negation of the proposition

$\forall x \exists y$ (P(x, y) → Q(x, y))

(i) $\forall x \exists y$ (¬P(x, y) → ¬Q(x, y)

(ii) $\forall x \exists y$ (P(x, y) ^ ¬Q(x, y)

(iii) $\exists x \forall y$ (P(x, y) ^ ¬Q(x, y)

(iv) $\exists x \forall y$ (¬P(x, y) → ¬Q(x, y)

Select one:

- a. (ii)
- b. (i)
- c. (iv)
- d. None of these
- e. (iii)

Question **49**

Not answered

Marked out of 1.00

Let S(x): x is a student in this class,
C(x): x visited Canada

M(x): x visited Mexico.

Translate the statement "All students in this class visited Canada or Mexico".

Which translation is true?

(I) $\forall x(C(x) \wedge M(x))$

(II) $\forall x(\neg C(x) \rightarrow M(x))$

Select one:

a. (I)

b. Both

c. (II)

d. None

Question **50**

Not answered

Marked out of 1.00

Give a recursive definition for the sequence $a_n = 3n + 5$, n=1,2,...

Select one:

- a. $a_n = a_{n-1} + 3$ for n>=2 and $a_1 = 5$
- b. None of these
- c. $a_n = a_{n-1} - 3$ for n>=2 and $a_1 = 8$
- d. $a_n = a_{n-1} + 3$ for n>=2 and $a_1 = 8$