Subject: DISCRETE MATHEMATICS

Number of question: 50

QN=1 If A is any statement, then which of the following is a tautology(#contradition) ?

(the notation ¬ means the negation)

a. A ∧ False (1 ^ 0 = 0, 1 ^ 1 = 1)

b. A ∨ False

c. A ∨ ¬A (0v1 = 1v0 = 1)

d. A ∧ True

QN=2 Let P: I am in Delhi. , Q: Delhi is clean. ; then Q ∧ P is:

a. Delhi is not clean or I am in Delhi

b. Delhi is clean and I am in Delhi

c. I am in Delhi and Delhi is not clean

d. Delhi is clean but I am in Mumbai

QN=3 Let P:If Sahil bowls, Saurabh hits a century. ,Q: If Raju bowls , Sahil gets out on first ball. Now if P is true and Q is false then which of the following can be true?

a. Raju bowled and Sahil got out on first ball

b. Raju did not bowled

c. Sahil bowled and Saurabh hits a century

d. Sahil bowled and Saurabh got out

QN=4 Which of the following is LOGICALLY EQUIVALENCE to [(p ∧ q) → p]?

(the notation ¬ means the negation)

a. ¬ p ∨ ¬ q ∨ p

b. (¬ p ∧ ¬ q) ∨ p

c. ¬ (p ∧ q) → ¬ p

d. p → (p ∧ q)

QN=5 Translate the statement ∃x (R(x) → H(x)) into English

where R(x) is “x has a flu” and H(x) is “x misses final exam”

a. There exists a student x, if x has a flu, then x misses final exam

b. For all student x, if x has a flu, then x misses final exam

c. For all student x, if x misses final exam, then x has a flu

d. There exists a student x, if x misses final exam, then x has a flu

QN=6 Determine the NEGATION of the logical expression (where ¬ is the negation)

∀x (P(x) ∧ Q(x))

a. ∃x (¬P(x) ∧ ¬Q(x))

b. ∃x (P(x) ∨ ¬Q(x))

c. ∃x (P(x) ∧ ¬Q(x))

d. ∃x (¬P(x) ∨ ¬Q(x))

¬ (p^q) ≡ ¬p∨¬q ¬(p∨q) ≡ ¬p^¬q

QN=7 Which of the following option is suitable, if A is “10110110”, B is”11100000” and C is”10100000”?

(“¬” means the bit negation, “or” means or bit, “and” means and bit)

a. C=A or B

b. C=¬A

c. C=¬B

d. C=A ^ B

QN=8 The set O of odd positive integers less than 10 can be expressed by _____

a. {1, 2, 3}

b. {1, 3, 5, 7, 9}

c. {1, 2, 5, 9}

d. {1, 5, 7, 9, 11}

QN=9 {x: x is a real number between 1 and 2} is

a. Infinite set

b. Finite set

c. Empty set

d. Uncountable set

e. Countable set

QN=10 Suppose that the universe U = { a, b, c, d, e, f, g, h, i, j, k }.

Let A = {a, b, c, d, e} and B = {d, e, f, g, h}.

Determine the set [(A \ B) ∩ (B \ A)].

a. {a, b, c}

b. {a, b, c, f, g, h}

c. {f, g, h}

d. ∅

QN=11 Determine if the following function f from N to N is one-to-one, onto or a bijection

f(x) = x % 5 (x mod 5). 0 1 2 3 4 >>> 1 2 3 4 5 6 7 8 9 10 one to many

a. onto (surjective)

b. one-to-one (injective)

c. bijection (1-1 correspondence)

d. not one-to-one, not onto

QN=12 Find the SUM of the sequence: –1, –2, –3, ... –999, –1000.

a. – (999 * 1000) * 2

b. – (1001 * 1000) / 2

c. – (1000+1001) / 2

d. – (999 +1000) * 2

QN=13 If f1(x) is O(g(x)) and f2(x) is O(g(x)), then f1(x) + f2(x) is

a. O(g(x))

b. O(g(x).g(x))

c. 2O(g(x))

d. O(g(x).g(x))

QN=14 The big-O notation for f(x) = 5logx is (5 logx < x)

a. 1

b. x

c. x2

d. x3

QN=15 Out of following which property algorithms does not share?

a. Input/Output

b. Finiteness

c. Generality

d. Constancy

QN=16 Which of the following is (are) the pseudo-code of the ALGORITHM for computing the LEAST COMMON MULTIPLE of two integers?

a.
```
int  lcm(int a, int b)
{
    if (b == 0)
        return  a;
    return  lcm (b, a % b);
}
```

b.
```
int  lcm(int a, int b)
{
    while (b != 0) {
        int  r = a % b;
        a = b;
        b = r;
    }
    return  (a * b) / a;
}
```

c.
```
int  lcm(int a, int b)
{
    return  (a * b)  /  gcd (a, b);
}
where
int  gcd(int a, int b)
{
    if (b == 0)
        return  a;
    return  gcd (b, a % b);
}
```

d.
```
int  lcm(int a, int b)
```

```
{
        while (a != b)
                if (a > b)  a = a – b;
                else        b = b – a;
        return  (a * b) / a;
}
```

QN=17 Which is the big-O estimate of worst–COMPLEXITY of the algorithm BINARY SEARCH for finding the position of an element in an array of integers?

a. O(logn)

b. O(n . n)

c. O(n . logn)

d. O(n)

QN=18 Find big-O estimate of worst–COMPLEXITY of LINEAR SEARCH algorithm for finding the position of an element in an array of integers.

a. O(log n)

b. O(n)

c. O(1)

d. O(n . n)

QN=19 The binary notation of 231 is

a. 11010111

b. 11100111

c. 10111011

d. 11100011

QN=20 If a|b and a|c, then (the notation x|y means that x is a factor of y)

a. b|ac

b. c|a

c. a|(b+c) Ex: 3|(6+9)

d. b|a

QN=21 How may prime numbers are there between 1 to 20?

a. 5

b. 6

c. 7

d. 8 (2 3 5 7 11 13 17 19)

QN=22 DECRYPT the message “CRR” by Caesar cipher (-3 char). [Z A B C] [O P Q R]

a. TOO

b. ZOO

c. ANN

d. DSS

QN=23 What are the QUOTIENT and the REMAINDER (không âm) of the integer division of –30 by 4?

a. –7 and –2

b. –8 and 2

c. –7 and 2

d. –8 and –2

QN=24 Which of the following is the GREATEST COMMON DIVISOR of 120 and 80 (using their prime factorizations as follows: 120=**2.2.2**.3.**5**, 80=2.**2.2.2.5**)?

a. 2.2.2.3.5.2.2.2.2.5

b. 2.2.2.3.5

c. 2.2.2.5

d. 2.2.2.3.5.2.2.2.2.5

QN=25 By induction hypothesis, the series 1.1 + 2.2 + 3.3 + … + p.p can be proved equivalent to (p = 4 >> 30)

a. (p.p+2)/7

b. [p.(p+1).(2.p+1)] / 6 (p=4 >> 30)

c. [p.p.(p+1).(p+1)] / 4

d. [p.(p+1)] / 4

QN=26 For any integer m>=1, the series 1.1.1+2.2.2+3.3.3+…+m.m.m can be equivalent to ___

a. [m.(m+1)] / 2

b. [m.(m+1).(2.m+1)] / 6

c. [m.m.(m+1).(m+1)] / 4

d. [m.(m+1).(2.m+1)] / 4

QN=27 For any integer n >= _____, we can prove by mathematical induction that n! < n.n…n (n times, pow(n,n)).

a. 2

b. 1

c. 0

d. 3

QN=28 Give a correct recursive definition of the FIBONACCI number.

a.

F(n) = F(n-1) + F(n-2), for n>2

F(n) = 1, for n=1

F(n) = 2, for n=2

b.

F(n) = F(n-1) * F(n-2), for n>2

F(n) = 1, for n=1,2

C. F(n) = F(n-1) + F(n-2), for n>2

F(n) = 1, for n=1,2

d.

F(n) = F(n-1) + F(n-2), for n>2

F(n) = 0, for n=1,2

QN=29 Let S be the set defined recursively by: 7 is in S,

and if x is an element of S then x+7 is an element of S.

What is S ?

a. S is the set of all multiples of 7.

b. S is the set of all positive multiples of 7.

c. S is the set of all nonnegative multiples of 7.

d. S is the empty set.

QN=30 How many different bit strings of length seven are there? xxxxxxx (x = 0 or 1)

a. 2.2.2.2.2.2.2

b. 7!

c. 7! / (2! * 5!)

d. (7-2)!

QN=31 A company with just two employees, Sanchez and Patel, rents a floor of a building with 12 offices. How many ways are there to assign different offices to these two employees? 12*11 = 132

a. 132

b. 144

c. 24

d. 12

QN=32 Find the value of A[4] for the recurrence relation A[n] = 2A[n-1] + 3, with A[0]=6.

a. 320

b. 221

c. 141

d. 65

QN=33 How many five-digit numbers can be made from the digits 1 to 7 if repetition is allowed?

a. 16807

b. 54629

c. 23467

d. 32354

QN=34 The solution to the recurrence relation A[n]=A[n-1]+2.n, with initial term A[0]=2 are A[n] = _____

a. 4.n+7

b. [n . (n+1)] + 2

c. 3.n.n

d. 5.(n+1)/2

QN=35 Each user on a computer system has a password, which is five to seven characters long, where each character is an uppercase letter or a digit.

Each password must contain at least one digit.

How many possible passwords are there, where pow(x,y) is the power of x with y times?

a. pow(36,5) + pow(36,6) + pow(36,7)

b. (pow(36,5) − pow(26,5)) + (pow(36,6) − pow(26,6)) + (pow(36,7) − pow(26,7))

c. (pow(36,5) − pow(26,5)) . (pow(36,6) − pow(26,6)) . (pow(36,7) − pow(26,7))

d. pow(36,5) . pow(36,6) . pow(36,7)

QN=36 How many bit strings of LENGTH 10 that do NOT have TWO CONSECUTIVE 0s?

a. 2.2.2.2.2.2.2.2

b. 55

c. 144

d. 2.2.2.2.2.2.2.2.2.2

QN=37 A _____ in a graph G is a simple vertex which consists of every vertex (except first/last vertex) of G exactly once

a. Euler path

b. Hamiltonian path

c. Euler circuit

d. Hamiltonian circuit

QN=38 The maximum number of edges in a bipartite graph on 14 vertices is ___ (1/4 * vectices ^2)

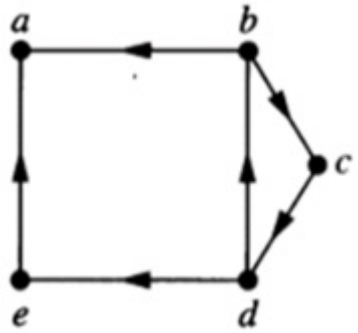
a. 56

b. 14

c. 49

d. 196

QN=39 The following directed graph is ……



a. Weakly connected

b. Strongly connected

c. Both of them

d. None of them

QN=40 How many edges are there in the complete graph Kn (n = 1, 2, …)?

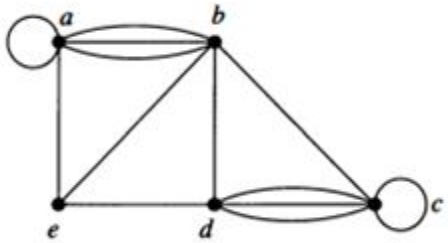
a. [n . (n + 1)] / 2

b. n.n

c. [n . (n – 1)] / 2

d. [n . (n – 1)]

QN=41 What are the number of EDGES in the given undirected graph?



a. 12

b. 16

c. 13

d. 15

QN=42 Select CORRECT statements:

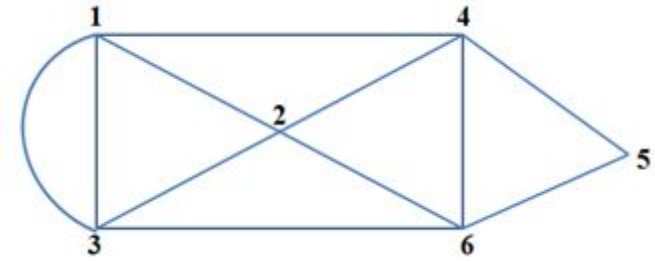
a. The adjacency matrix for K5,6 (Kuratowski graph) has 11 columns.

b. The adjacency matrix for C5 (cycle graph) has 5 rows.

c. There are 100 1-entries in the adjacency matrix for K10 (complete graph)

d. There are 10 1-entries in the adjacency matrix for K10 (complete graph)

QN=43 Given the graph. Which statement(s) is (are) TRUE?



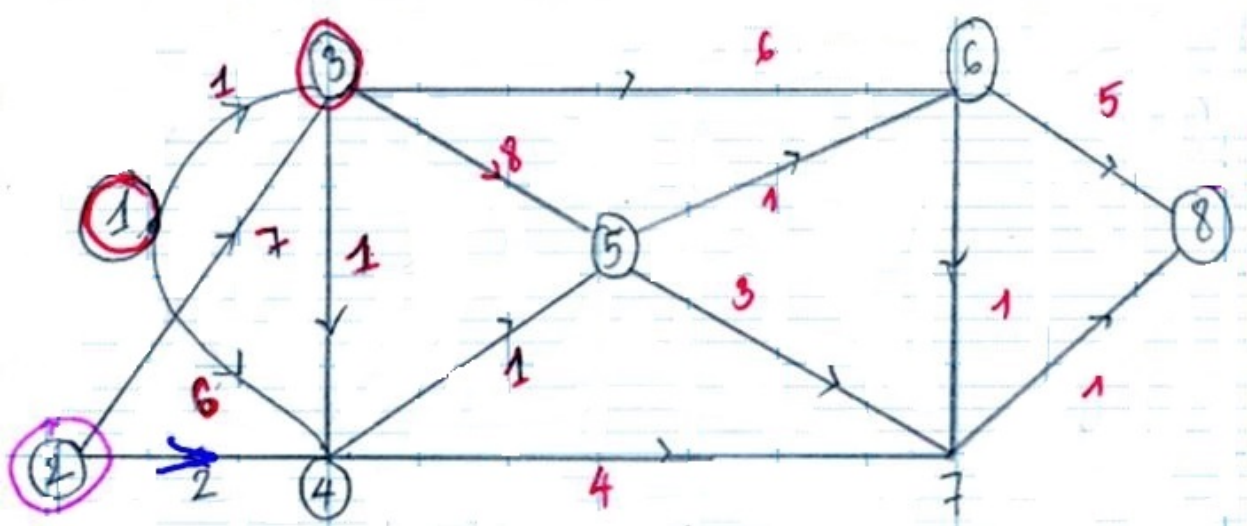
a. The graph has no Euler circuit.

b. An Euler circuit is 1 2 3 1 3 6 4 5 6 2 4 1

c. An Euler circuit is 1 2 3 4 5 6 3 1

d. An Euler circuit is 1 3 4 5 6 1

QN=44 Using Dijsktra's algorithm, we find out the SHORTEST PATH from 1 to 6 in given weighted graph is … and the weight sum is ….



a. The shortest path is 1 → 3 → 4 → 5 → 6 and the weight sum is 4.

b. The shortest path is 1 → 3 → 4 → 5 → 6 and the weight sum is 5.

c. The path from 1 to 6 does not exist.

d. The shortest path is 1 → 3 → 6 and the weight sum is 2.

QN=45 In an n-ary tree, each vertex has at most _____ children

a. n

b. n-1

c. n.n

d. 2.n

QN=46 An n-vertex tree has _____ edges

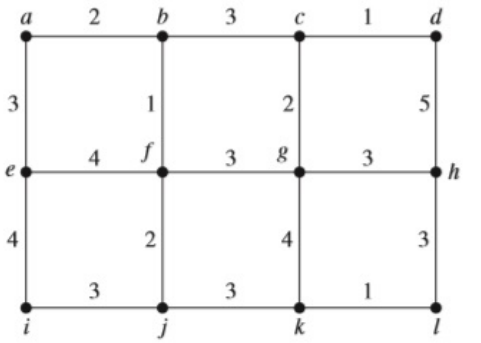
a. n . n

b. n-1

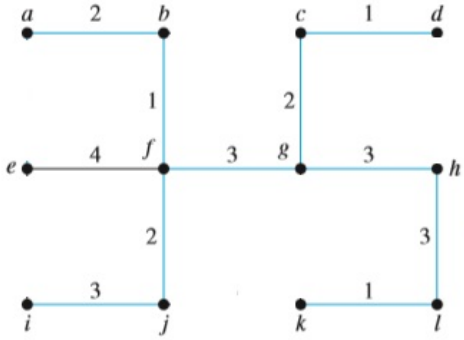
c. n + n

d. [n.(n+1)] / 2

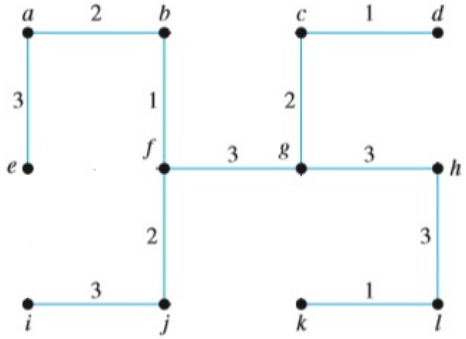
QN=47Which of the following is the minimal spanning tree produced using algorithm PRIM on weighted graph (G') with the root as a?



(G')



(i)



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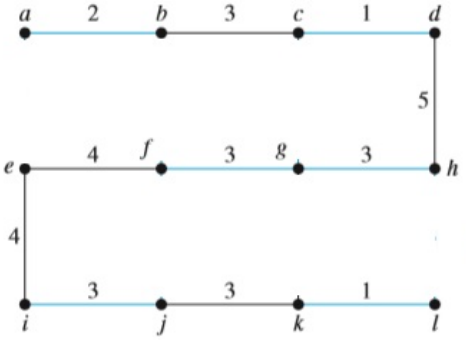

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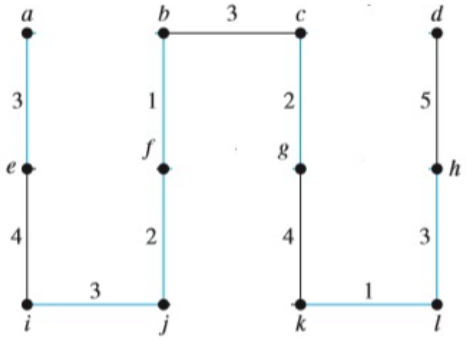


(iv)

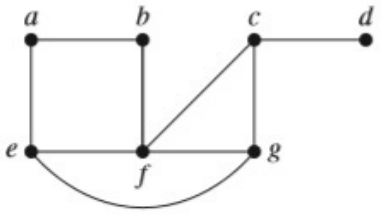
a. (i)

b. (ii)

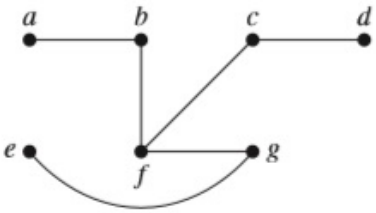
c. (iii)

d. (iv)

QN=48 Which of the following spanning trees produced using breadth-first search on graph (G) with the root as a?



(G)



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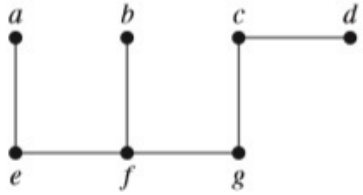
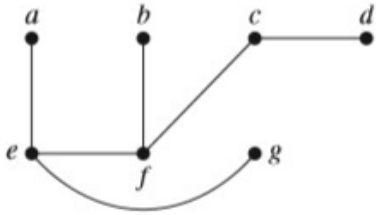
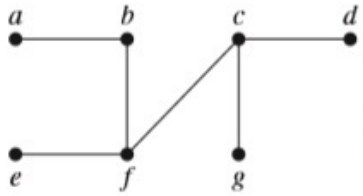


(i)



(iii)



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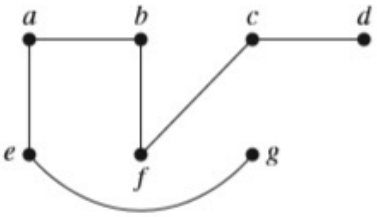


(iv)

a. (i)

b. (ii)

c. (iii)

d. (iv)

e. (v)

QN=49 What is the VALUE of each of the following POSTFIX expressions?

5 2 1 - - 3 1 4 + + *

[5 - (2-1)] * [(1+4) + 3] = 32

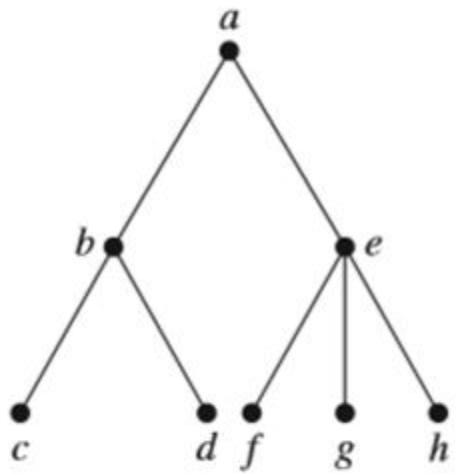
a. 30

b. 36

c. 34

d. 32

QN=50 Show the POST-ORDER traversal of the following ordered rooted tree.



a. a b c d e f g h

b. c d b f g h e a

c. a f c d b e g h

d. h g f e d c a b

(a) Inorder (Left, Root, Right)

(b) Preorder (Root, Left, Right)

(c) Postorder (Left, Right, Root)