



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

EXCLUSIVE OFFER FOR OTS STUDENTS ONLY ON BOOK PACKAGES

FULL SYLLABUS TEST-5 (ADVANCE LEVEL) GATE 2019 - REPORTS

OVERALL ANALYSIS

COMPARISON REPORT

SOLUTION REPORT

ALL(65)

CORRECT(35)

INCORRECT(16)

SKIPPED(14)

Q. 1

Choose the word which is least like "REMISS"

[Solution Video](#) | [Have any Doubt ?](#) |

A

Careless

B

Harmful

C

Dutiful

Correct Option

Solution :

(c)

The meaning of the word REMISS is lacking care or attention to duty; negligent.

D

Forgetful

[QUESTION ANALYTICS](#)

Q. 2

You are provided with two sentences, in each of them two words are missing. You are given four options suggesting pair of words that together can make each of the sentences coherent and complete. Identify the correct pair.

1. The Cassini-Huygens satellite, commonly called Cassini, which has been _____ Saturn these past 15 years, will destroy itself on 7th October by taking a _____ into the ringed planet's atmosphere.
2. For people more accustomed to _____ the water than experiencing it first hand, the _____ at Rishikesh river rafting rapids posed a bit of a challenge.

[Solution Video](#) | [Have any Doubt ?](#) |

A

exploring, dive

Your answer is Wrong

B

researching, fall

C

studying, plunge

Correct Option

Solution :

(c)

'Explore' means to examine or evaluate or travel through, this won't fit into sentence 2 as it mentions people who haven't experienced water. 'Shove' is incorrect in sentence 1, it means to push (roughly) which does not fit into the context here, similarly 'fall' means to suddenly go down onto the ground or towards the ground without intending to just fall. You don't take fall. Considering sentence 1 here, a satellite studying a planet makes more sense than just observing a planet.

D

surviving, above



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES
Q. 3

Choose the option which can be used to substitute for 'state in which the few govern the many'.

[Solution Video](#) [Have any Doubt ?](#)

A

Monarchy

B

Plutocracy

C

Oligarchy

Your answer is **Correct****Solution :**

(c)

Oligarchy is a state in which the few govern the many. Monarchy is a form of government with a monarch at the head. Plutocracy is government by the wealthy. Autocracy is a state governed by one person with absolute power.

D

Autocracy

QUESTION ANALYTICS

Q. 4

Four athletes are standing at the vertices of a square park. When a whistle is blown, each of the athletes starts running along the sides of the park at a speed of 20 km/hr. The probability that they do not collide with each other is

[Solution Video](#) [Have any Doubt ?](#)

A

0.125

Correct Option

Solution :

(a)

We are given 2 specific inputs:

- (a) the four athletes are moving at the same speed and
- (b) they are moving along the sides of the park only.

They will NOT collide if the direction of their movement is identical i.e. either all four of them move in clockwise direction OR all of them move in anticlockwise direction.

$$P(\text{all move in clockwise direction}) = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{16}$$

$$P(\text{all move in anti clockwise direction}) = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{16}$$

$$\text{Required probability} = P(\text{clockwise}) + P(\text{anticlockwise}) = \frac{1}{16} + \frac{1}{16} = \frac{1}{8} = 0.125$$

B

0.16

C

0.25

D

0.50

QUESTION ANALYTICS



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES

Three taps A, B and C can fill a cistern in 20, 24 and 30 hours respectively. On a given day, tap A is opened at 6:00 AM to fill the empty cistern. Tap B is also opened after two hours and tap C is opened another two hours later. When all three taps have been opened for two hours simultaneously, tap B is required to be closed. The minutes from start, after which tap A should be closed so that the cistern is full at 8:00 PM is _____.

[Solution Video](#) | [Have any Doubt ?](#) |

600

Your answer is Correct 600

Solution :

600

Since the total time to fill the empty cistern individually by each tap is given as 20, 24 and 30

respectively, we can say that in one hour the three taps fill $\frac{1}{20}$, $\frac{1}{24}$ and $\frac{1}{30}$ th part of the cis-

Tap B remains open for 2 hours and tap C is open from 10:00 AM till 8:00 PM i.e. 10 hours. W
 write

$$\frac{x}{20} + \frac{4}{24} + \frac{10}{30} = 1 \text{ or } x = 10 \text{ hours i.e. 600 minutes which is the required answer.}$$

QUESTION ANALYTICS

Q. 6

The ratio of the ages between Sachin and Shikhar is 6 : 5. The difference between the ages of Ajinkya and Sachin is more than 5 years. The ages of Mahendra is a prime number between the ages of Sachin and Ajinkya. The ratio of the ages of Shikhar and Ajinkya is 2 : 3. If the ages of all four are integers, the minimum possible difference between the ages of Ajinkya and Mahendra is

[Solution Video](#) | [Have any Doubt ?](#) |

A

3

B

2

C

1

Your answer is Correct

Solution :

(c)

Suppose the ages of Sachin, Shikhar, Ajinkya and Mahendra be a, b, c and d respectively.

$$a : b = 6 : 5$$

$$c - a > 5;$$

d = prime number between the ages of Sachin and Ajinkya

Also,

$$b : c = 2 : 3$$

So,

$$a : b : c = 12 : 10 : 15$$

To satisfy the condition required, multiply the ratio by 2.

Thus,

$$a : b : c = 24 : 20 : 30$$

Let Sachin's age be 24 years, Shikhar's age be 20 years and Ajinkya's age be 30 years.

Now, the difference in the ages of Sachin and Ajinkya is greater than 5.

Now, the age of Mahendra is a prime number between the ages of Sachin (a = 24) and Ajinkya (c = 30)

It means, d = 29

Hence, required difference between c and d = 30 - 29 = 1 year

D

0

QUESTION ANALYTICS



Ashima Garg

Course: GATE
Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

EXCLUSIVE OFFER FOR OTS
STUDENTS ONLY ON BOOK
PACKAGES

In a right angle triangle ABC with vertex B being the right angle, the mutually perpendicular sides AB and BC are p cm and q cm long respectively. If the length of the hypotenuse is $(p + q - 6)$ cm, the radius of the largest possible circle that can be inscribed in the triangle is

[Solution Video](#) [Have any Doubt ?](#)

A

1.5 cm

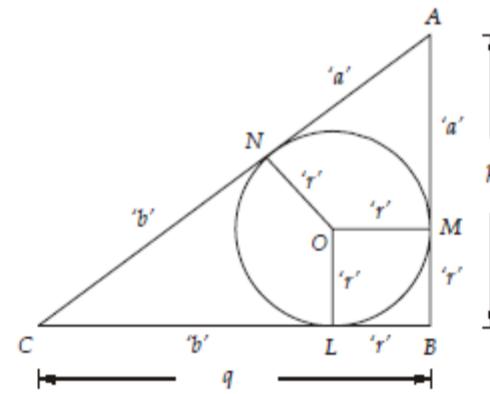
B

3 cm

Correct Option

Solution :

(b)



The largest possible circle that can be inscribed in the triangle is the one which touches the 3 sides. Since A is an external point from where AN and AM are tangents to this circle, we have $AM = AN = a$ (say)

Similarly, $CN = CL = b$ (say)

If O is the centre of the circle, then $OM = OL = r$ (radius of this circle)

$$BC = q = b + r \text{ and } AB = p = a + r$$

We are given the hypotenuse $CA = AN + NC$

$$= p + q - 6 = a + b$$

Or using the values of p and q ,

$$b + r + a + r - 6 = a + b$$

We get $r = 3$ cm

C

6 cm

D

3.3 cm

QUESTION ANALYTICS

Q. 8

Nine persons are standing in a 3×3 matrix arrangement. Reena is the tallest amongst the shortest persons of each row whereas Seema is the shortest amongst the tallest person in each column. Which of the following cannot be concluded based on these two statements?

[Solution Video](#) [Have any Doubt ?](#)

A

Reena is the 3rd shortest person.

Your answer is Wrong

B

Seema is shorter than Reena.

Correct Option

Solution :

(b)

We can have three possible scenarios:

(I) : Reena and Seema are in the same row. Since Reena is the shortest person in the row, Seema is taller than Reena



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES

to a person 'X' who is in the same row as Reena and in the same column as Seema. Now Reena is shorter than 'X' who is shorter than Seema; which again leads us to conclude Seema is taller than Reena.

C

Seema is the third tallest person.

D

Seema is taller than Reena.

QUESTION ANALYTICS

Q. 9

A sum of ₹ 45,000 is to be distributed amongst NOT more than 18 students as prize amount in denomination of ₹ 250, ₹ 1250, ₹ 6250 and ₹ 31250 such that there is at least one student getting a prize of each denomination and each student gets exactly one prize. The entire amount has to be distributed. The number of ways this amount can be distributed is

[Solution Video](#) | [Have any Doubt ?](#)

A

1

B

2

Your answer is **Correct****Solution :**

(b)

We will start with one student each being recipient of one prize value. This implies $31250 + 6250 + 1250 + 250 = ₹ 39000$ has been used up leaving a sum of ₹ 6,000 to be distributed among NOT more than 18 - 4 = 14 students. Since the amount remaining is less than ₹ 6250, the amount has to be distributed as prizes of denomination ₹ 1250 and/or ₹ 250 only.

We can start with four students receiving ₹ 250 each and the remaining ₹ 5,000 can be given to four more students @ ₹ 1250 leading to total number of 12 students receiving the prizes.

Alternately, we can have $4 + 5 = 9$ students receiving ₹ 250 each and the remaining ₹ 3750 can be given to three more students @ ₹ 1250 leading to total number of 16 students receiving the prizes. Any more options are ruled out since we have to increase in steps of 5 - 1 = 4 students only. This means that the next option will lead to 20 students getting the prize money which is not possible since there are only 18 students in all.

C

3

D

more than 3

QUESTION ANALYTICS

Q. 10

600 men and 250 women can build a skyscraper in 4 weeks. 450 men and 125 women will take 6 weeks to build the same skyscraper. How many women will be needed to build the skyscraper in one week?

[Solution Video](#) | [Have any Doubt ?](#)

3000

Correct Option

Solution :

3000



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
STUDENTS ONLY ON BOOK
PACKAGES

$$\Rightarrow 1200m + 500w = 1500m + 5/6w$$

$$\Rightarrow 150m = 125w$$

$$\Rightarrow m = \frac{5w}{6}$$

We express X in terms of w

$$X = \left(600 \times \frac{5w}{6} + 250w \right) \times 4$$

$$= 750w \times 4 = 3000w$$

∴ 3000 women are required to complete X in one week.

Your Answer is 5000

QUESTION ANALYTICS

Q. 11

Which of the following represents a valid inorder traversal of a Binary Search Tree?

Have any Doubt ?

A

 $2^5, 2^4, 2^3, 2^2, 2^1, 2^0$

B

 $2^3, 2^2, 2^1, 2^0, 2^4, 2^5$

C

 $6^0, 5^0, 4^0, 3^0, 2^0, 1^0$

Your answer is Correct

Solution :

(c)

Option (c) is the only valid inorder traversal of BST. As the inorder traversal of BST must be sorted in ascending order, options (a) and (b) are wrong. Option (c) simplifies to 1, 1, 1, 1, 1, 1 and therefore is a valid inorder traversal of BST. Hence (c) is the correct choice.

D

None of these

QUESTION ANALYTICS

Q. 12

Consider the following C program:

```
bool foo(char *s)
{
    char c[] = "correspondence";
    int i = 0, j = 0;
    while(s[i] && c[j])
    {
        if(s[i] == c[j]) j++;
        i++;
    }
    if(!c[j]) return true;
    else return false;
}
```

The strings 'responce' and 'credence' are passed to the above function foo one by one and the output is observed in each case. Note that the bool data type returns a value in {true, false}. The outputs obtained will be

Have any Doubt ?



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES
Solution :

(a)

The above function checks whether the input string s is a subsequence of the string "correspondence". Since both response and credence are subsequences of correspondence, will return true and therefore (a) will be the answer.

B

True, False

C

False, True

D

False, False

Your answer is Wrong

QUESTION ANALYTICS

Q. 13

Consider the following statements given below:

 S_1 : User-level threads switching does not require context switching. S_2 : Virtual memory increases the context switching overhead. S_3 : Every thread has its own registers and stack but not program counter.

Which of the above statements are correct?

Have any Doubt ?

A

 S_1 and S_2 only

Your answer is Correct

Solution :

(a)

 S_1 : User-level threads switching does not require context switching. S_2 : There is more context switching in virtual memory concept, so it increases the context switching overhead. S_3 : Every thread has its own registers, stack and program counter. S_3 is incorrect

So option (a) is correct.

B

 S_2 and S_3 only

C

Only S_2

D

Only S_1

QUESTION ANALYTICS

Q. 14

Which of the following is correct about vectored interrupt?

Have any Doubt ?

A

Branch address is always assigned to a fixed memory location.

B



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES

Solution :

(b)

Interrupt vector gives the branch address of the interrupting device.

C

Polling technique is used to transfer the branch information.

D

None of the above

QUESTION ANALYTICS

Q. 15

 Let x , y and z be regular expressions. Let α , β , Γ be regular expressions defined as follows.

$$\alpha = (x^*y)^* x^*y$$

$$\beta = x^*y (x^*y)^*$$

$$\Gamma = x^* (yx^*)^*y$$

 Let $L(\alpha)$, $L(\beta)$, $L(\Gamma)$ be language generated by regular expressions α , β , Γ respectively. Which of the following is true?

A

$$L(\alpha) \subset L(\beta), L(\beta) \subset L(\Gamma)$$

B

$$L(\beta) \subset L(\alpha), L(\beta) \supset L(\Gamma)$$

C

$$L(\alpha) \neq L(\Gamma), L(\beta) \neq L(\Gamma)$$

D

$$L(\alpha) = L(\beta), L(\beta) = L(\Gamma)$$

Your answer is Correct

Solution :

(d)

$$\Gamma = x^* (yx^*)^*y$$

$$\text{Take } P = x^*, Q = y$$

$$\text{Now use } P(QP)^* = (PQ)^* P \text{ to get } \alpha = (x^*y)^* x^*y$$

$$\text{Now take } P = y, Q = x^*$$

$$\text{And use } (PQ)^* P = P(QP)^* \text{ to get } \beta = x^*y (x^*y)^*$$

 Since we are able to derive α and β from Γ , option (d) is correct. (All are equal)

QUESTION ANALYTICS

Q. 16

Consider the following grammar:

$$S \rightarrow (A) \mid bB$$

$$A \rightarrow SA'$$

$$A' \rightarrow +SA' \mid \epsilon$$

What is the FIRST and FOLLOW of non-terminal symbol S?

A

$$\text{FIRST}(S) = \{(, b\}$$

$$\text{FOLLOW}(S) = \{+, \$\}$$



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES

C

$$\text{FIRST}(S) = \{(, b\}$$

$$\text{FOLLOW}(S) = \{+,), \$\}$$

Your answer is Correct

Solution :

(c)

$$\begin{aligned} \text{FIRST}(S) &= \{(, b\} \\ \text{FOLLOW}(S) &= \text{FIRST}(A') \\ \text{FIRST}(A') &= \{+, \epsilon\} \\ \text{FIRST}(A') \text{ contain } \epsilon, \text{ so FOLLOW}(S) &= \text{FIRST}(A') \cup \text{FOLLOW}(A) \\ &= \{+\} \cup \{\}\} \\ \text{FOLLOW}(S) &= \{+, \$\} (\$ \text{ because } S \text{ is a start symbol}) \end{aligned}$$

D

$$\text{FIRST}(S) = \{(, b\}$$

$$\text{FOLLOW}(S) = \{+,), (, \$\}$$

QUESTION ANALYTICS

Q. 17
 The value of the expression ${}^n C_r + 2{}^n C_{r-1} + {}^n C_{r-2}$, where $2 \leq r \leq n$ will be equal to

Have any Doubt ?

A

$${}^{n+1} C_{r-1}$$

B

$$2({}^{n+1} C_{r+1})$$

C

$$2{}^{n+2} C_r$$

D

$${}^{n+2} C_{n-r+2}$$

Your answer is Correct

Solution :

(d)

$$\begin{aligned} &= {}^n C_r + 2({}^n C_{r-1}) + {}^n C_{r-2} \\ &= \underbrace{{}^n C_r + {}^n C_{r-1}}_{\downarrow} + {}^n C_{r-1} + {}^n C_{r-2} \\ &= \underbrace{{}^{n+1} C_r + {}^n C_{r-1} + {}^n C_{(r-1)-1}}_{\downarrow} [{}^n C_r + {}^n C_{r-1} = {}^{n+1} C_r \text{ and } {}^n C_{r-2} = {}^n C_{(r-1)-1}] \\ &= \underbrace{{}^{n+1} C_r + {}^{n+1} C_{r-1}}_{\downarrow} \\ &= {}^{n+2} C_r \end{aligned}$$

 Now using ${}^n C_r = {}^n C_{n-r+1}$ we get

$${}^{n+2} C_{n+2-r} = ({}^{n+2} C_{n-r+2})$$

Hence option (d) is the answer.

QUESTION ANALYTICS



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES

Other switch. What is the minimum number of NAND gates required to implement such system?

[Have any Doubt ?](#)

A

3

B

2

C

4

Correct Option

Solution :

(c)

Functionality of the system can be represented by the below table.

Switch 1(A)	Switch 2(B)	Y (Output)
0	0	0
0	1	1
1	0	1
1	1	0

$$Y = A \oplus B$$

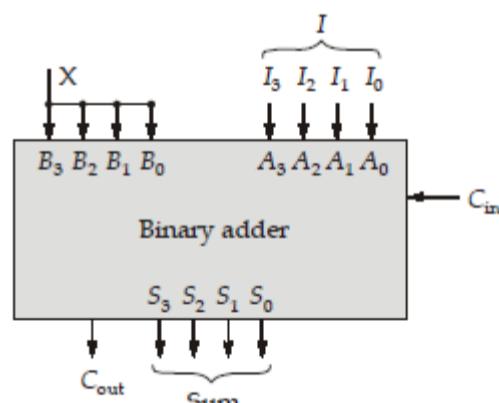
Now, to implement Ex-OR gate.

4 NAND gate is required.

D

5

QUESTION ANALYTICS

Q. 19Consider the below circuit where I is a 4-bit binary number input ($I_3 I_2 I_1 I_0$).

The circuit works as

[Have any Doubt ?](#)

A

 $\text{Sum} = I - 1 \text{ if } X = 0, \text{Sum} = I + 1 \text{ if } X = 1$

B

 $\text{Sum} = I + 1 \text{ if } X = 0, \text{Sum} = I - 1 \text{ if } X = 1$

C

 $\text{Sum} = I - 1 \text{ if } X = 0, \text{Sum} = I \text{ if } X = 1$

D

 $\text{Sum} = I \text{ if } X = 0, \text{Sum} = I - 1 \text{ if } X = 1$

Correct Option



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES
Hence Sum = $I - 1$

QUESTION ANALYTICS

Q. 20

Consider a relation R(A, B, C, D, E) with functional dependencies F = {A → B, BC → E, ED → A}
 Number of additional relations required to convert it into lossless, dependency preserving 3NF decomposition _____.

[Have any Doubt ?](#)

A

1

B

2

C

0

Your answer is **Correct****Solution :**

(c)

Relation R(A, B, C, D, E)

$$F = \{A \rightarrow B, BC \rightarrow E, ED \rightarrow A\}$$

$$\text{Closure of } (CDE)^+ = \{ABCDE\}$$

So CDE is a candidate key of R

$$\text{Closure of } (ACD)^+ = \{ABCDE\}$$

ACD is a candidate key of R

$$\text{Closure of } (BCD)^+ = \{ABCDE\}$$

BCD is a candidate key of R

Total 3 key CDE, ACD, BCD

A, B, C, D, E all are key attribute so relation R is already is 3NF. So, no additional relation required.

D

3

QUESTION ANALYTICS

Q. 21

Given that,

 $A(x)$ means "x is an alligator", $H(x)$ means "x is a human", and $E(x, y)$ means "x eats y",

Which of the given choices is the best English translation for the following first order logic statement?

$$\forall x(H(x) \rightarrow \forall y[E(y, x) \rightarrow A(y)])?$$

[Have any Doubt ?](#)

A

All humans eat alligators



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES

Every Alligators eats humans

Your answer is Wrong

D

Only alligators eat humans

Correct Option

Solution :

(d)

Option (d) is the most appropriate translation for the above predicate logic statement.

QUESTION ANALYTICS

Q. 22

Consider the following statements.

I. If a finite group G has prime order, then G is guaranteed to be Abelian.

II. A group with infinite order can never be cyclic.

Which of the above statements are correct?

Have any Doubt ?

A

Both I and II

B

I only

Correct Option

Solution :

(b)

Only I is true. II is false, because it uses the phrase 'never' – and we can easily disprove it, as \mathbb{Z}_p is a well known cyclic group with generators 1 and -1 respectively.

I is true because every prime order group is cyclic and we also know that every cyclic group is Abelian and so the statement I is also correct.

C

II only

D

None of these

QUESTION ANALYTICS

Q. 23

Consider the following floating point format:

What is the representation of 0.875×8^{13} in hexadecimal without normalization?

Have any Doubt ?

A

0xA4580

B

0x38700

C

0xBC300

Your answer is Wrong



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)
[HOME](#)[MY TEST](#)[BOOKMARKS](#)[MY PROFILE](#)[REPORTS](#)[BUY PACKAGE](#)[ASK AN EXPERT](#)[OFFER](#)
 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES
Solution :

(d)

$$\text{Bias} = 2^{8-1} - 1 = +127$$

Biased Exponent (B.E.) = Actual exponent + Bias

$$\text{We can write, } 8^{13} = (2^3)^{13} = 2^{39}$$

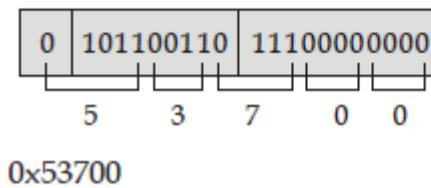
$$\text{Now, } \text{B.E.} = 39 + 127 = 166$$

Representing Exponent in binary

$$(166)_2 = (10100110)_2$$

Representing mantissa in binary

$$(0.875)_2 = (0.11100000000)_2$$

Floating point representation will be as follows:
[QUESTION ANALYTICS](#)**Q. 24**
 Which of the following procedure results same output as Dijkstra's algorithm on unweighted graph with ' n ' vertices?

[Have any Doubt ?](#)
A

Breadth first search

Correct Option**Solution :**

(a)

 Dijkstra's algorithm will output same as breadth first search on graph and will take $O(m + n)$ time.
B

Depth first search

C

Kruskal algorithm

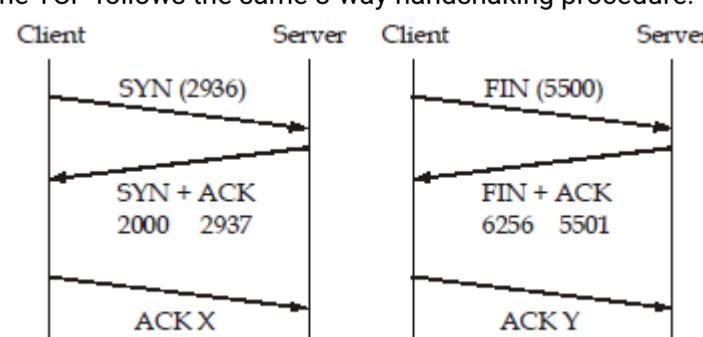
D

Prim's algorithm

Your answer is Wrong[QUESTION ANALYTICS](#)**Q. 25**

Consider the TCP connection where only control segments are exchanged between client and server as shown below.

The TCP follows the same 3-way handshaking procedure.



Which of the following is correct value for X and Y?

[Have any Doubt ?](#)



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES

2938, 5502

C

2001, 6257

Your answer is Correct

Solution :

(c)

- ACK X value will be 2001.
 - ACK Y value will be 6257.
- Hence option (c) is correct answer.

D

2938, 6257

QUESTION ANALYTICS

Q. 26

Consider the following Booths multiplication

Multiplicand: 10010011011

Multiplier: 10100101

The number of subtraction operations required in the multiplication will be _____.

Have any Doubt ?

4

Correct Option

Solution :

4

Multiplier	Pair with $(q - 1)$	0 operation
1	0	SUB
0	1	ADD
1	0	SUB
0	1	ADD
0	0	Shift only
1	0	SUB
0	1	ADD
1	0	SUB

Total 4 SUB required.

QUESTION ANALYTICS

Q. 27

Consider the following code given below:

$$a = a * b$$

$$c = a + c$$

$$e = c + d$$

$$a = c/e$$

What will be the minimum number of nodes present in the Directed Acyclic Code (DAG) representation of the above code _____.

Have any Doubt ?

8

Your answer is Correct8

Solution :

8

$$\begin{aligned} a &= a * b \\ c &= a + c \end{aligned} \quad \left. \right\} c = a * b + c$$



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

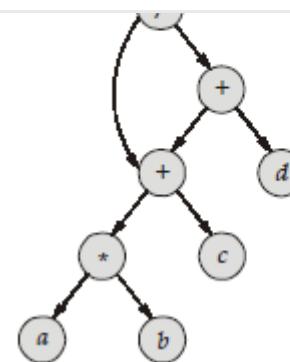
MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
STUDENTS ONLY ON BOOK
PACKAGES


Total 8 nodes presented in the DAG representation.

QUESTION ANALYTICS

Q. 28

Consider the following C code:

```

#include <stdio.h>
#include <iostream>
int bar(int m, int n)
{
    if(m == 0) return n;
    if(n == 0) return m;
    return bar(n%m, m);
}
int foo(int m, int n)
{
    return (m*n/bar(m, n));
}
int main()
{
    int x = foo(1000, 1500);
    printf("%d", x);
    return 0;
}
  
```

The output of the program will be _____.

[Have any Doubt ?](#)

3000

Your answer is Correct3000

Solution :

3000

The function `foo()` computes the LCM of the integers m and n , given as input. Let's see why.
 We know the relation, $\text{LCM}(m, n) * \text{GCD}(m, n) = m * n$
 So we can write, $\text{LCM}(m, n) = m * n / \text{GCD}(m, n)$
 So we know that the LCM of 1000 and 1500 will be 3000.
 Therefore 3000 will be the answer.

QUESTION ANALYTICS

Q. 29

Consider the following expression in reverse polish notation.

100 200 + 2 / 5 * 7 + 245 - 256 - 4 *

Let the value obtained by the evaluation of the above expression be X. Then the value of \sqrt{X} will be _____.
[Have any Doubt ?](#)



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES
Therefore $\sqrt{X} = 32$

Hence 32 will be the answer.

QUESTION ANALYTICS

Q. 30

Consider the following processes, their arrival time and burst time given below:

Process	Arrival Time	Burst Time
P_0	1	2
P_1	6	4
P_2	4	7
P_3	5	4

(All time in milliseconds)

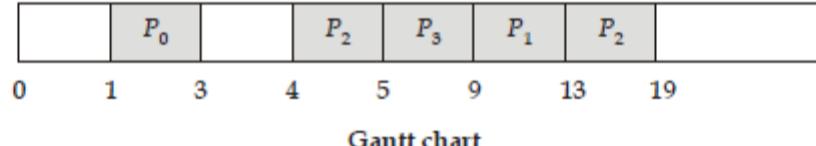
Operating system uses Shortest Remaining Time First (SRTF) algorithm to schedule the processes.
What is the average waiting time _____ ms. (Upto 2 decimal places)[Have any Doubt ?](#)

2.75 (2.75 - 2.75)

Your answer is Correct 2.75

Solution :

2.75 (2.75 - 2.75)



Waiting Time = Turn Around Time - Burst Time

Process	Waiting Time
P_0	0
P_1	3
P_2	8
P_3	0

$$\text{Average Waiting Time} = \frac{\sum_{i=0}^n \text{Waiting Time of } P_i}{\text{Total number of process}}$$

$$= \frac{0+3+8+0}{4} = \frac{11}{4} = 2.75 \text{ ms}$$

QUESTION ANALYTICS

Q. 31Let $|L|$ denote the number of strings present in L. Let R and S be two languages, such that $|R \cup S| = 96$ and $|R \cap S| = 32$. Then the value of $|(R - S) \cup (S - R)|$ is equal to _____.[Have any Doubt ?](#)

64

Your answer is Correct 64

Solution :

64

$$|(R - S) \cup (S - R)| = |R \oplus S| = |R \cup S| - |R \cap S|$$

$$= 96 - 32 = 64$$

QUESTION ANALYTICS



Ashima Garg

Course: GATE
Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

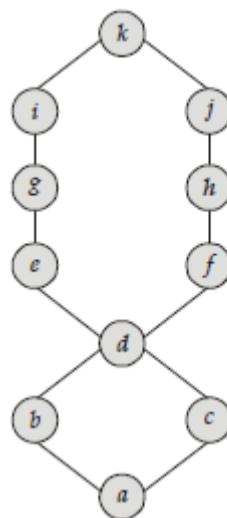
MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
STUDENTS ONLY ON BOOK
PACKAGES

Have any Doubt?

40

Correct Option

Solution :

40

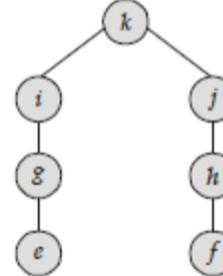
We have to fill in the following blanks in order to find the number of total order sets of the above poset.

$$\boxed{a} \text{ ----- } \boxed{k}$$

Now 2nd and 3rd positions can be filled in 2! ways (b, c or c, b) and then at 4th place 'd' has to be there.

$$\boxed{a} \left(\frac{b \ c}{c \ b} \right) \boxed{d} \text{ ----- } \boxed{k}$$

Now after deleting 'd' we have the following picture.



Now we have to fill in the remaining blanks and make sure the following dependency is present:
(a → b indicates a must come before b)

$$\begin{pmatrix} e \rightarrow g \\ g \rightarrow i \end{pmatrix} \text{ and } \begin{pmatrix} f \rightarrow h \\ h \rightarrow j \end{pmatrix}$$

Now out of the 6 blanks we will choose 3 blanks and fill (e, g, i) in those 3 blanks $\Rightarrow {}^6C_3$ ways.

Now we're only left with 3 blanks and we can fill f, h, j in only 1 way.

So number of toposorts = $2! \times {}^6C_3 = 2 \times 20 = 40$

QUESTION ANALYTICS

Q. 33

Consider the following relations where keys are underlined:

P(X, Y, Z) and Q(A, X)

P contain 500 records and Q contain 1500 records. X in Q is a NON-NULL attribute and a foreign key referencing to P. If a is the maximum number of records in

P \bowtie Q and b is the minimum number of records in P \bowtie Q. What is the value of $2a - b$ _____. (Where \bowtie is a natural join)

Have any Doubt?

1500

Your answer is Correct 1500

Solution :

1500



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

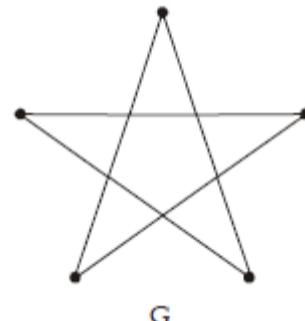
OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES

QUESTION ANALYTICS

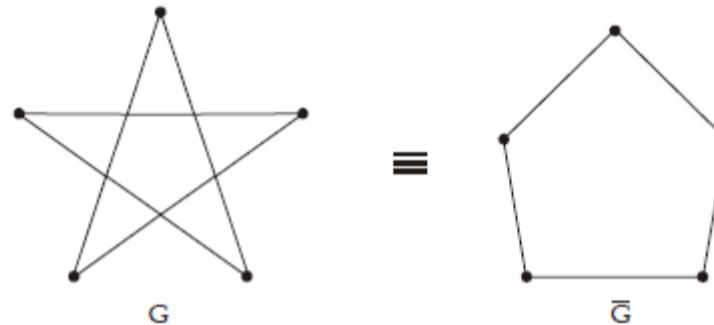
Q. 34

Consider the following graph G:


 Let X and Y denote the number of spanning trees and chromatic number of G respectively. Then the value of $X + Y$ will be equal to _____.

8

Your answer is **Correct** 8
Solution :
 8

 G happens to be a self complementary graph (G is isomorphic to \bar{G}).

 So G is isomorphic to C_5 (cycle graph with 5 vertices).

 Therefore number of spanning trees (C_5) = ${}^5C_4 = 5$

 Hence $X = 5$

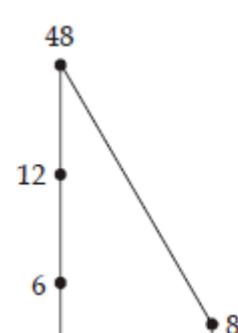
 Chromatic number (C_5) = 3

 $\therefore (X + Y) = 5 + 3 = 8$

QUESTION ANALYTICS

Q. 35The number of edges in the Hasse diagram of $(\{1, 3, 6, 7, 8, 12, 13, 48\}, /)$ is equal to _____.

8

Your answer is **Correct** 8
Solution :
 8




Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES

So we can count the number of edges and they are equal to '8'.

QUESTION ANALYTICS

Q. 36

Consider the following C implementation which when given 3 numbers a, b, c as input, finds the maximum of 3 numbers a, b and c.

```
int kickstart(int a, int b, int c)
{
    if(B1) return a;
    if (a >= b) return B2;
    return kickstart(c, a, b);
}
```

A student named Deepak attempts to fill in these boxes B1, B2, and B3 in the following ways:

- I. B1: $a \geq b \ \&\& a > c$; B2: `kickstart(c, b, a);`
- II. B1: $a \geq b \ \&\& a \geq c$; B2: `kickstart(c, b, a);`
- III. B1: $a \geq b \ \&\& a \geq c$; B2: `kickstart(c, a, b);`
- IV. B1: $a \geq b \ \&\& a \geq c$; B2: `kickstart(b, c, a);`

For which of the above approaches, the implementation fails to work correctly?

[Have any Doubt ?](#)**A**

Only I

B

I and II only

C

II, III and IV only

D

I and IV only

Correct Option**Solution :**

(d)

I will fail the case when $a = b = c$

For example, take `kickstart(1, 1, 1)`

`kickstart(1, 1, 1)` will keep calling itself in case 1, and won't produce any output, thus overflow the stack.

II and III will work totally fine for all inputs.

However IV will fail in some cases, for example take `kickstart(2, 4, 3)`.

`kickstart(2, 4, 3) ⇒ kickstart(3, 2, 4) ⇒ kickstart(2, 4, 3) ⇒ kickstart(3, 2, 4) ⇒ ...`

So as it can be seen the recursion looks like a cycle of length 2 (just for the sake of clarity) and program will go into a hang.

So (d) is also an incorrect implementation.

QUESTION ANALYTICS

Q. 37

Consider an error-free 64-kbps satellite channel used to send 512-byte data frames in one direction, with very short acknowledgments coming back the other way. Assume the earth-satellite propagation time is 270 msec. what is the minimum window size so that the channel is fully utilized?

[Have any Doubt ?](#)**A**

1

B



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES

10

Your answer is Correct

Solution :

(c)

With a window size of 10 frames

Maximum data that can transferred

$$= 10 \times \text{Frame size}$$

$$= 10 \times 512 \times 8 \text{ bit} = 40960 \text{ bit}$$

$$\text{R.T.T.} = 2 \times \text{Propagation Time}$$

$$= 2 \times 270 \text{ msec} = 640 \text{ msec}$$

So, in 1 R.T.T. maximum 40960 bit

Can be transferred

Now,

$$\text{Data rate} = 640 \text{ msec} \rightarrow 40960 \text{ bit}$$

$$1 \text{ sec} \rightarrow ?$$

$$= \frac{40960}{640 \times 10^{-3}} \text{ bit/sec} = 64 \text{ Kbps}$$

For a window size of 10 or greater channel efficiency is fully utilized.

So, minimum window size is 10.

D

15

QUESTION ANALYTICS

Q. 38

Consider the following grammar:

$$S \rightarrow AaBb$$

$$A \rightarrow ce \mid d$$

$$B \rightarrow cB \mid d \mid D$$

$$D \rightarrow e$$

Which of the following is true about the above grammar?

Have any Doubt?

A

SLR(1) but not LR(0)

B

Only CLR(1)

C

CLR(1) but not LALR(1)

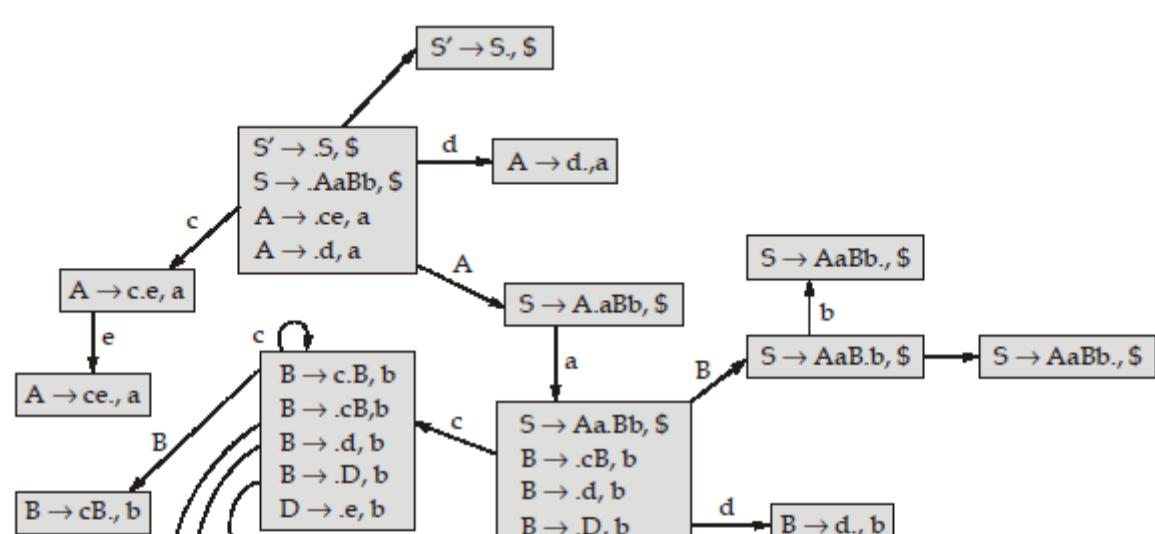
D

SLR(1) and LR(0)

Your answer is Correct

Solution :

(d)





Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES

It contain no conflicting state.
 So the grammar is LR(0), SLR(1), LALR(1) and CLR(1).

QUESTION ANALYTICS

Q. 39

Consider a unix inode, which maintain 20 direct pointers, 3 single indirect, 2 double indirect and 4 triple indirect pointers. Disk block size is 4 KB and disk block address is 32 bits. What is the maximum possible file size? (File is stored in last 4 triple indirect DBA's)

A

512 GB

B

1024 GB

C

16384 GB

Your answer is **Correct**

Solution :

(c)

$$\text{Block size} = 4 \text{ KB}$$

$$\text{Block address} = 32 \text{ bits} = 4B$$

The number of disk block pointers that will fit in one block

$$= \frac{2^{12}B}{4B} = 2^{10}$$

Maximum file size can be possible with triple indirect pointers.

$$\text{File size due to all pointers} = (20 + 3 \times 2^{10} + 2 \times 2^{10} \times 2^{10} + 4 \times 2^{10} \times 2^{10} \times 2^{10}) 4 \text{ KB}$$



$$\text{Maximum file size} = 4 \times 2^{10} \times 2^{10} \times 2^{10} \times 2^{12}B$$

$$= 2^{14} \text{ GB}$$

$$= 16384 \text{ GB}$$

So option (c) is correct.

D

4096 GB

QUESTION ANALYTICS

Q. 40

Consider the following schedules involving three transaction:

 $S : r_1(x), r_2(z), r_1(z), r_3(z), r_3(y), w_1(x), r_2(x), c_1, w_3(y), c_3, r_2(y), w_2(y), c_2$

(Where X, Y, Z are data items and R(x) and W(x) denote the read and write operation on that data item and C_i is the commit operation of transaction T_i).

Which of the following is correct about the above schedule?

A

Schedule is conflict serializable and contain blind write.

B



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES

Schedule is conflict serializable and does not contain dirty read.

D

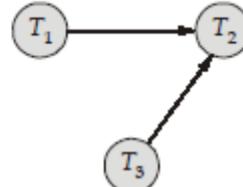
Schedule contain dirty read and not contain blind write.

Your answer is Correct

Solution :

(d)

Precedence graph of S



It does note contain any cycle so conflict serializable.

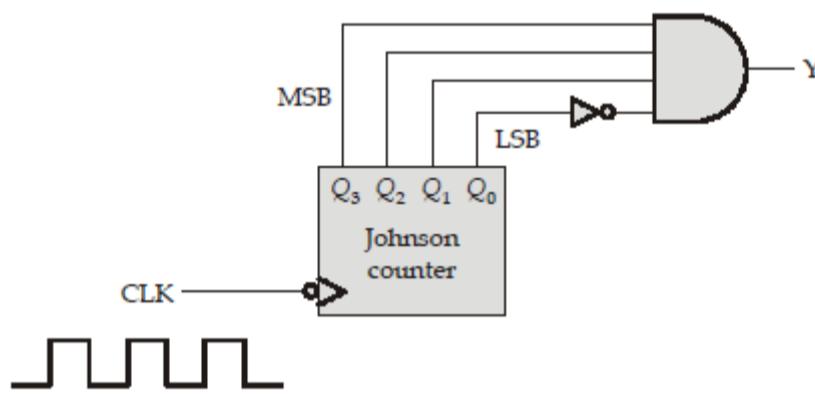
All transaction are first reading the value before writing it so it does not contain any blind write. Transaction T_2 is reading the value of x that is written by an uncommitted T_1 so it has dirty read operation. The schedule is recoverable.

So option (d) is correct.

QUESTION ANALYTICS

Q. 41

Consider the digital circuit given below:

Assume initially Johnson counter is in reset state. The number of clock cycles required to make the output at $Y = 1$ is (Assume delay in circuit and gate is zero).

Have any Doubt?

A

3

Your answer is Correct

Solution :

(a)

Output $Y = 1$ only when $Q_3 = 1, Q_2 = 1, Q_1 = 1$ and $Q_0 = 0$.

The truth table of Johnson counter is as follows:

CLK	Q_3	Q_2	Q_1	Q_0	Y
0	0	0	0	0	0
1	1	0	0	0	0
2	1	1	0	0	0
3	1	1	1	0	1

Output $Y = 1$ when 3 clock cycles is applied.

B

4

C

5

D

6



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES

Q. 42

Consider the boolean expression $F(A, B, C, D) = \sum m = (0, 1, 2, 5, 6, 7, 8, 10, 14, 15)$. Find the number of essential prime implicants

A

0

B

1

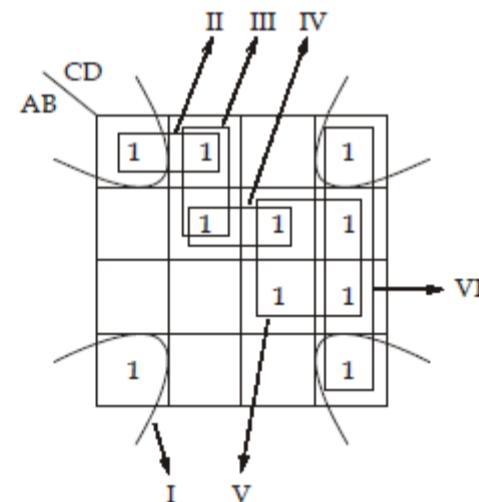
C

2

Correct Option

Solution :

(c)



Only (I) and (V) are essential prime implicants all others are non-essential prime implicants. Hence the number of essential prime implicants is 2.

D

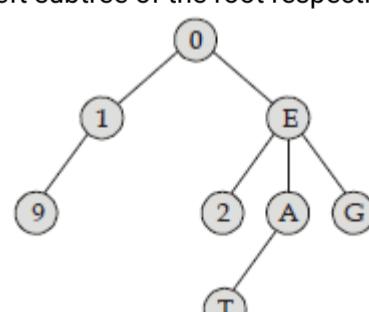
3

Your answer is Wrong

QUESTION ANALYTICS

Q. 43

Consider the following ternary tree. We define the out-order traversal of a ternary tree as right-middle-root i.e. first visit the right subtree, then visit the middle subtree, followed by visiting the root and lastly the left subtree of the root respectively.



The out order traversal of T will be

A

EGAT2019

B

GATE2019

Your answer is Correct

Solution :
(h)



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES

 C
 GTAE2019

 D
 TGAE2019

QUESTION ANALYTICS

Q. 44

Consider the two process P_i and P_j need to access a critical section. The following synchronization construct used by both the processes.

Process P_i

While (True)

{

 $j = \text{False};$ $i = \text{True};$ While ($j == \text{True}$);

CRITICAL SECTION

 $i = \text{False};$

}

Process P_j

While (True)

{

 $i = \text{False};$ $j = \text{True};$ While ($i == \text{True}$);

CRITICAL SECTION

 $j = \text{False};$

}

(Here i and j are two boolean shared variable between process P_i and P_j). Which of the following is true about the above construct?

[Have any Doubt ?](#)

A

Satisfy mutual exclusion but does not prevent deadlock.

Your answer is Wrong

B

Prevent deadlock but does not satisfy mutual exclusion.

C

Mutual exclusion and deadlock prevention both are satisfied.

D

Neither mutual exclusion nor deadlock prevention is satisfied.

Correct Option**Solution :**

(d)

When both process P_i and P_j execute simultaneously then P_i execute $i = \text{true}$ and P_j execute $j = \text{true}$ and while executing While loop no process will enter into CRITICAL SECTION. This is a deadlocked condition.

When P_i first executed then P_i enter into CRITICAL SECTION and when P_j execute then it enter into CRITICAL SECTION.

So it does not satisfy mutual exclusion.

QUESTION ANALYTICS

Q. 45

Consider the following grammar and their Syntax Directed Translation (SDT) rules.

 $S \rightarrow S * A \quad \{S.\text{val} = S.\text{val} \times A.\text{val}\}$
 $S \rightarrow A \quad \{S.\text{val} = A.\text{val}\}$
 $A \rightarrow A + B \quad \{A.\text{val} = A.\text{val} - B.\text{val}\}$
 $B \rightarrow (S) \quad \{B.\text{val} = 2\}$
 $A \rightarrow B \quad \{A.\text{val} = B.\text{val}\}$
 $B \rightarrow \text{id} \quad \{B.\text{val} = \text{id}.\text{val}\}$

(Here id represent a integer and id.val is value of that integer)

S₁ : Given SDT is L-attributed and using L-attributed evaluation the value of the expression



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)
[HOME](#)[MY TEST](#)[BOOKMARKS](#)[MY PROFILE](#)[REPORTS](#)[BUY PACKAGE](#)[ASK AN EXPERT](#)[OFFER](#)
[EXCLUSIVE OFFER FOR OTS
STUDENTS ONLY ON BOOK
PACKAGES](#)

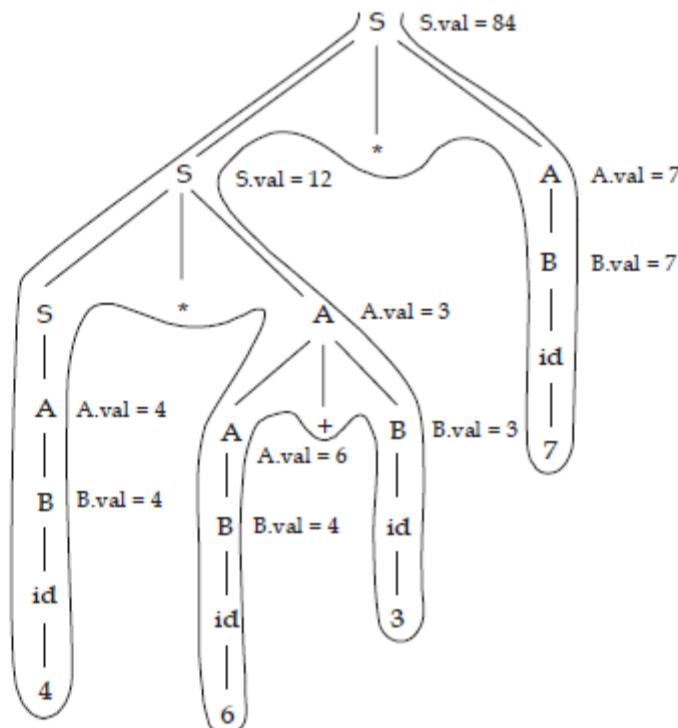
 A
 Only S_1

 B
 Only S_2

 C
 Both S_1 and S_2
[Have any Doubt?](#)
[Correct Option](#)
Solution :

(c)

Given SDT is L-attributed and S-attributed both, all the translation rules are written at the end and there is no inherited attribute.

 Expression $4 * 6 + 3 * 7$


Value of the expression is 84.

 So both S_1 and S_2 is correct.

 D
 None of the above

[Your answer is Wrong](#)
[QUESTION ANALYTICS](#)**Q. 46**

Consider a procedure find () which take array of n integers as input and produce pair of elements of array whose difference is not greater than the difference of any other pair of element of that array. Which of the following represent worst case time complexity of find () procedure?

[Have any Doubt?](#)

 A
 $O(n)$
[Your answer is Wrong](#)

 B
 $O(n \log n)$
[Correct Option](#)
Solution :

(b)

 Using divide and conquer approach, closest pair can be found in $O(n \log n)$ time.
Algorithm :
 Step 1 : Divide the set into two equal sized parts by the line l , and recursively comput



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES

- Step 3 : Eliminate points that lie farther than ' d ' apart from $l, \dots O(n)$.
 Step 4 : Merge the two sorted lists into one sorted list ... $O(n)$.
 Step 5 : Scan the remaining points in the y -order and compute the distances of each point
 5 neighbour ... $O(n)$.
 Step 6 : If any of these distances is less than ' d ' the update ' d ' ... $O(1)$.

$$T(n) = 2T\left(\frac{n}{2}\right) + O(n)$$

$$T(n) = O(n \log n)$$

C

$$O(n^2)$$

D

$$O(n^2 \log n)$$

QUESTION ANALYTICS

Q. 47

A CPU has recorded 450 memory references. The CPU has been organized into 2-level of cache memory L_1 and L_2 . There are 50 misses and 25 misses in L_1 and L_2 respectively. The miss penalty from L_2 cache to memory is 60 cycles and hit time of L_2 cache is 30 cycles. What is the average stall (in cycles) per instruction.

If there are 3 memory reference per instruction?

Have any Doubt ?

A

20

Correct Option

Solution :

(a)

3 memory reference \rightarrow 1 instructions450 memory reference \rightarrow ?

$$\text{Number of instruction} = \frac{450}{3} = 150$$

$$\left[\frac{\text{Number of memory stalls}}{\text{Number of instructions}} \right] = \left[\frac{\text{Number of misses } L_1 \times \text{hit } L_2}{\text{Number of instructions}} \right]$$

$$+ \left[\frac{\text{Number of misses } L_2 \times \text{miss penalty } L_2}{\text{Number of instructions}} \right]$$

$$= \left[\frac{50}{150} \times 30 \right] + \left[\frac{25}{150} \times 60 \right]$$

$$= [10 + 10] = 20 \text{ cycles}$$

B

40

C

18

D

32

QUESTION ANALYTICS

Q. 48

Consider the state diagram of Turing Machine T over $\Sigma = \{a\}$ and $\Gamma = \{a, \sqcap\}$.



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

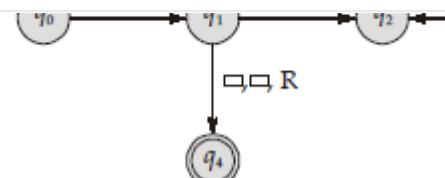
MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES


The language accepted by T will be

[Have any Doubt ?](#)

A

$$L(T) = \{w \mid w \in \Sigma^*, |w| = 3x, x \text{ is integer}\}$$

B

$$L(T) = \{w \mid w \in \Sigma^*, |w| = 3x + 1, x \text{ is integer}\}$$

Your answer is Wrong

C

$$L(T) = \{w \mid w \in \Sigma^*, |w| = 3x + 2, x \text{ is integer}\}$$

Correct Option

Solution :

(c)

The Turing Machine T is accepting regular language $(aaa)^*$ aa [number of a's = $3x + 2$]. T because the start state is q_2 instead of q_0 . Had initial state been q_0 , language would have $a(aaa)^*$.

So correct choice is option (c).

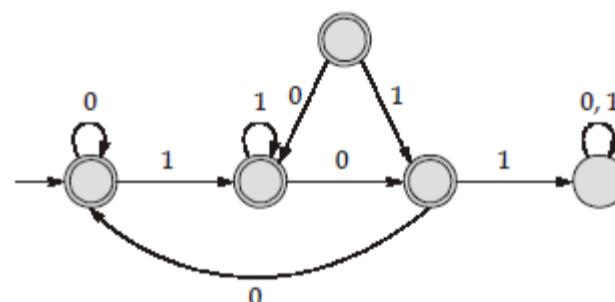
D

$$L(T) = \{w \mid w \in \Sigma^*, n_a w = 3x, x \text{ is integer}\}$$

QUESTION ANALYTICS

Q. 49

Let M be a deterministic finite automata as shown below:



Let S denote the set of 7 bit binary strings in which the first, the fourth and the last bits are 1. The number of strings in S that are accepted by M is equal to

[Have any Doubt ?](#)

A

3

B

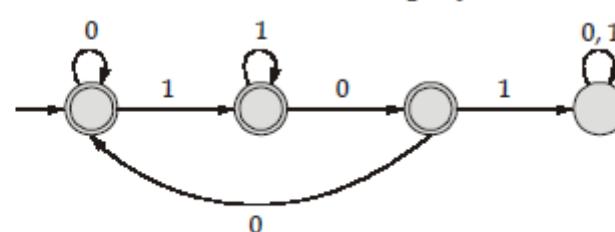
4

Your answer is Correct

Solution :

(b)

The DFA has an unreachable state, so let's first simplify the DFA.



Now we can see that the DFA represents set of strings not containing '101' as a substring. We have count number of 7 bit binary strings in which the first, 4th and 7th bits is '1', which go to accepting state of DFA.



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES

 (b_5, b_6) can be either (0, 0) or (1, 1) \Rightarrow 2 ways
Total number of ways = $2 \times 2 = 4$

So there are 4 strings which will be accepted by M.

C

7

D

11

QUESTION ANALYTICS

Q. 50

Consider the following POSETs:

- I. $(\{1, 2, 5, 7, 10, 14, 35, 70\}, \leq)$
- II. $(\{1, 2, 3, 6, 14, 21, 42\}, /)$
- III. $(\{1, 2, 3, 6, 11, 22, 33, 66\}, /)$

Which of the above POSETs are isomorphic to $(P(S), \subseteq)$, where $S = \{a, b, c\}$?

Have any Doubt?

A

I and II

B

II and III

C

I, II and III

D

III only

Your answer is Correct

Solution :

(d)

Although I and II represent D_{60} and D_{66} , II is not D_{66} because the divisor 7 is missing. So there is no way for II to be isomorphic to $[P(\{a, b, c\}), \subseteq]$, as it needs to have 8 divisors but right now it has only 7.

Now I won't be isomorphic, as even though I looks like D_{70} , it is actually on the \leq relation resulting in a chain, which won't be a Boolean algebra.

III is D_{66} , a well known Boolean algebra and has 8 vertices in its Hasse diagram and will be isomorphic to $[P(\{a, b, c\}), \subseteq]$.

QUESTION ANALYTICS

Q. 51

Let $A(n)$ denotes the number of n bit binary strings which have no pair of consecutive 1's. Then the time complexity of the efficient algorithm which uses dynamic programming to compute $A(n)$ will be

Have any Doubt?

A

 $O(n)$

Your answer is Correct

Solution :

(a)

If we see the pattern carefully by taking small values, it always follows that $A(n)$ is always the sum of $A(n - 1)$ and $A(n - 2)$.

Hence $A(n)$ is equivalent to the n^{th} Fibonacci number.



Ashima Garg

Course: GATE
Computer Science Engineering(CS)

[HOME](#)
[MY TEST](#)
[BOOKMARKS](#)
[MY PROFILE](#)
[REPORTS](#)
[BUY PACKAGE](#)
[ASK AN EXPERT](#)
[OFFER](#)

EXCLUSIVE OFFER FOR OTS
STUDENTS ONLY ON BOOK
PACKAGES

 A
 $O(2^n)$

 C
 $O(n^3)$

 D
 $O(n \log n)$
[QUESTION ANALYTICS](#)
Q. 52

Let T_1 and T_2 denote the worst case time complexities of sorting an array A of size N using merge sort and quick sort respectively. Suppose the size of array is changed from N to 2^N . Let the corresponding times be T_1' and T_2' . Then $(T_1' + T_2')$ will be asymptotically equal to

[FAQ](#) | [Have any Doubt ?](#) |

A

 $O(N \cdot 2^N)$

B

 $O(N^{2N})$

C

 $O(2^{2N})$
Your answer is Correct
Solution :

(c)

 $\text{Merge sort on } N \text{ elements} \Rightarrow O(N \log N)$
 $\text{Quick sort on } N \text{ elements} \Rightarrow O(N^2)$
 $\therefore \text{Merge sort on } 2^N \text{ elements} \Rightarrow 2^N \log(2^N) = N \cdot 2^N$
 $T_1' = O(N \cdot 2^N)$
 $\text{Similarly quick sort on } 2^N \text{ elements} = O((2^N)^2)$
 $T_2' = O(2^{2N})$
 $\text{Now } T_1' + T_2' = O(N \cdot 2^N + 2^{2N})$
 $\text{Now which is bigger? } 2^{2N} \text{ or } N \cdot 2^N? \text{ Let's check.}$
 $(N \cdot 2^N, 2^{2N})$
 $\text{Cancel common terms by dividing by } 2^N.$

$$\left(N, \frac{2^{2N}}{2^N} \right) \Rightarrow (N, 2^N)$$

 $\text{Clearly } 2^N \text{ is bigger than } N \Rightarrow 2^{2N} \text{ is asymptotically larger than } N \cdot 2^N.$
 $\text{Therefore } 2^{2N} + N \cdot 2^N = O(2^{2N})$
 $\text{Thus, (c) is correct option.}$

D

None of these

[QUESTION ANALYTICS](#)
Q. 53

Host A transmits 12-bit Hamming code whose hexadecimal value is 0xE5F arrives to Host B who is at the receiver end. The medium through the code has been transmitted is not error free but cannot damage parity bit and parity bits has been inserted from left to right at their respective positions. What was the original value Host A transmitted in hexadecimal? (Assume that not more than 1 bit is in error.)

[Have any Doubt ?](#) |

A



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

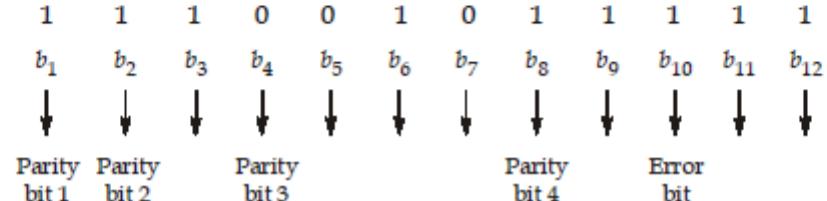
 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES

(a)

If we number the bits from right to left ($b_1 b_2 \dots b_{12}$) where bit 1, bit 2, bit 4 and bit 8 are parity bits. Bit 2 and bit 8 (a parity bit) is incorrect. Hence message at bit 10 has been modified. 12-bit value transmitted (after Hamming encoding) was 0xA4F.

The original 8-bit data value was 0xAB.

0xE5F - 1110 0100 1111



Original data was 0xAB - 1010 1011

B

0xAF

C

x2A

D

0x2F

QUESTION ANALYTICS

Q. 54

Consider the following C code:

```
int R(int m, int n)
{
    if(m == 0) return n + 2;
    if(n == 0) return R(m - 1, 1);
    return R(m - 1, R(m, n - 1));
}
```

The output corresponding to the function call R(1,100) will be _____.

Have any Doubt?

203

Your answer is Correct203

Solution :

203

Let's analyze the output using smaller values.

$$R(1, 1) = 5$$

$$R(1, 2) = 7$$

$$R(1, 3) = 9$$

...

Since there's a definite pattern in the values being returned, therefore we can generalize follows.

$$R(1, n) = 2n + 3$$

Therefore the value returned by R(1,100) will be = $2(100) + 3 = 203$.

QUESTION ANALYTICS

Q. 55

Consider the following relation:

Eid	Ename	Salary
10	A	1000
..	B



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES

29	Z	2100
32	C	2700
52	X	1800

Employee

Consider the following SQL query:

```
SELECT E.id FROM Employee E WHERE
E.salary = (SELECT MAX (E1.salary) FROM
Employee E1 WHERE E1.salary ≠
(SELECT MAX (E2.salary) FROM Employee E2))
```

The number of tuples that will be returned by the SQL query is _____.

[Have any Doubt ?](#)

2

Your answer is **Correct** 2**Solution :**

2

SQL query returned the Eids of employee who make the second highest salary.
 Relation returned by the SQL query.

Eid
5
32

Total 2 tuples returned.

QUESTION ANALYTICS

Q. 56

Consider a 3 km of coaxial cable in which 15 computers are connected. Each node has a capacity to transmit 100 frames/second where the average frame length is 1800 bits. The transmission rate at each node is 65 Mbps. The efficiency of the protocol is _____. (in % upto 2 decimal places)

[Have any Doubt ?](#)

4.15 (4.00 - 4.20)

Correct Option

Solution :

4.15 (4.00 - 4.20)

Each computer can transmit = 100 frames/second

System throughput = $15 \times 100 = 1500$ frames/sec

$$\text{Maximum System Rate} = \frac{\text{Transmission rate}}{\text{Frame length}}$$

$$= \frac{65 \times 10^6 \text{ bits}}{1800 \text{ bits}} = 36111.11 \text{ frames/sec}$$

$$\text{Now, efficiency} = \frac{\text{System throughput}}{\text{Maximum system rate}}$$

$$= \frac{1500}{36111.11} \times 100\% = 4.15\%$$

QUESTION ANALYTICS

Q. 57

A hypothetical CPU supports 300 instructions. Each instruction takes 5 cycles to accomplish the execution. The control unit is designed using vertical programming which has 130 control signals, 64 flags and 12 branch conditions. X and Y represents number of bits required for Control Address Register (CAR) and Control Data Register (CDR) respectively. The value of X + Y is _____.

[Have any Doubt ?](#)



Correct Option

**Ashima Garg**Course: GATE
Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

EXCLUSIVE OFFER FOR OTS
STUDENTS ONLY ON BOOK
PACKAGES**Solution :**

40

Number of instruction in the CPU = 300

Number cycles/instruction = 3 minimum, 5 maximum

In worst case, number of cycles/instruction = 5

Total number of μ -instruction in the CPU = $300 \times 5 = 1500 \mu$ -instructionNumber of bits required for CAR = $\lceil \log_2 1500 \rceil$

$$X = 11 \text{ bit}$$

Now,

Branch conditions	Flag	Control signal	CM address
4 bit	6 bit	8 bit	11 bit

 μ -instruction size = 29 bits

Number of bits required for CDR = 29 bits

$$Y = 29 \text{ bit}$$

$$X + Y = 11 + 29 = 40 \text{ bit}$$

Your Answer is 29

QUESTION ANALYTICS

Q. 58Let l, m, n be 3 regular expressions. Consider the following identities.

- I. $(l^* m^* n^*)^* = (lm^* + mn^* + nl^*)^*$
- II. $(mn + m)^* m = m(nm + m)^*$
- III. $(l^* m^* n^*)^* = (l^* + m^*n + n^*)^*$
- IV. $(l^* m)^* = (l + m)^*$

How many of the above identities are incorrect _____.

Have any Doubt ?

2

Your answer is Correct2

Solution :

2

Correct: I, II

Incorrect: III, IV

I is a classical case of bracketed star.

$$\text{LHS} = (l + m + n)^*$$

$$\text{RHS} = (l + m + n + \dots)^*$$

Since we can get l, m, n separately, RHS is equal to $(l + m + n)^*$.

Therefore I is true.

II is also true. Let's see why

$$(mn + m)^* m = m(nm + m)^*$$

$$\begin{aligned} \text{LHS:} &= (mn + m)^* m \\ &= (m + mn)^* m \quad (\text{Commutative property of regular expression}) \end{aligned}$$

$$= \left(\frac{m}{p} \frac{(\in + n)}{q} \right)^* \frac{m}{p}$$

Now using, $(pq)^*p = p(qp)^*$, we get

$$= m[(\in + n)m]^*$$

$$= m[m + nm]^* = \text{RHS} \Rightarrow \text{II is true}$$

III is false as we can't get " m " separately from RHS.Similarly, IV is also false as we can't generate " l " separately from LHS.

Therefore (2) is the answer.



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

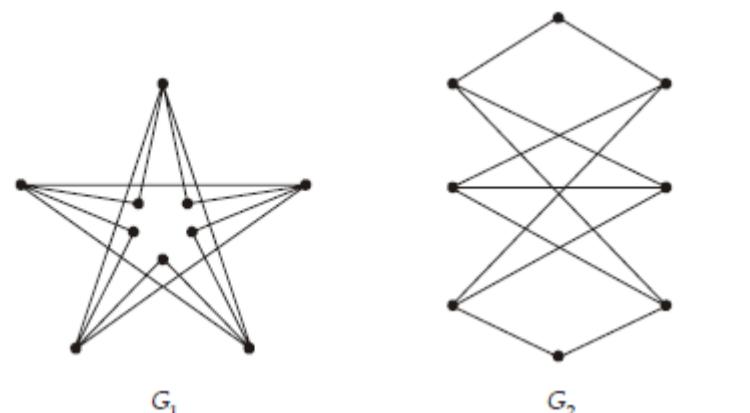
MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES
Q. 59Consider the following graphs G_1 , G_2 and G_3 .

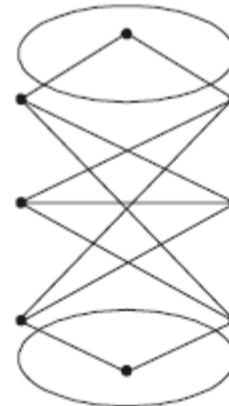
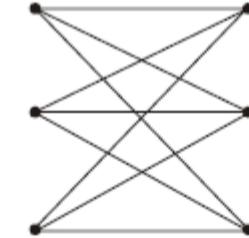
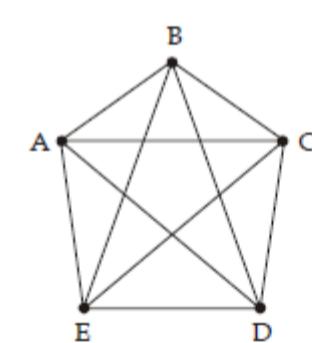
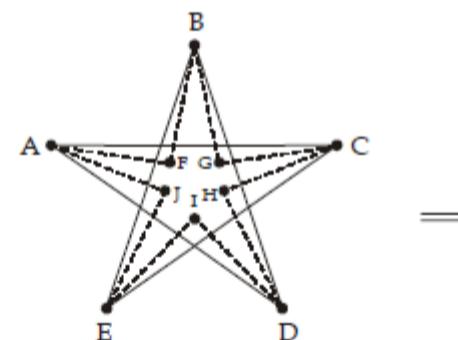
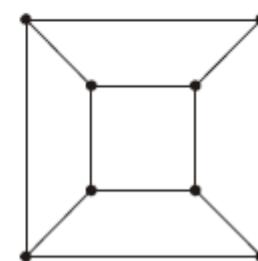
The number of graphs which are planar _____.

Have any Doubt?

1

Your answer is **Correct!****Solution :**

1

Only G_3 is planar. G_3 is the well known ' n cube', now let's see why G_1 and G_2 are nonplanar because it is homomorphic to $K_{3,3}$.
 Apply FES (fuse edges in series)
 on circled edges
 \Rightarrow
Therefore G_2 is nonplanar.Similarly we can apply FES on G_1 as well (fuse $\frac{AF - BF}{(to\ get\ AB)}$, $\frac{BG - CG}{(to\ get\ BC)}$, etc.).Therefore G_1 is also nonplanar, as it is homeomorphic to K_5 as shown above.
 G_3 is planar (n -cube) here $n = 3$, for which we have a planar embedding.Therefore only G_3 is planar. \therefore Number of planar graph = 1

QUESTION ANALYTICS

Q. 60

The minimum number of nodes (both leaf and non leaf) of B+ tree index required for storing 5500 keys and order of B+ tree is 8



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES

901

Correct Option

Solution :
 901

Leaf node = 7 key + 1 block pointer

Non leaf node = 8 child pointer

$$\text{For } 5500 \text{ key} = \left\lceil \frac{5500}{7} \right\rceil = 786 \text{ nodes}$$

$$786 \text{ child pointer} = \left\lceil \frac{786}{8} \right\rceil = 99 \text{ nodes}$$

$$99 \text{ child pointer} = \left\lceil \frac{99}{8} \right\rceil = 13 \text{ nodes}$$

$$13 \text{ child pointer} = \left\lceil \frac{13}{8} \right\rceil = 2 \text{ nodes}$$

$$2 \text{ child pointer} = 1 \text{ node}$$

$$786 + 99 + 13 + 2 + 1 = 901 \text{ nodes}$$

Your Answer is 1561

QUESTION ANALYTICS

Q. 61

Let the difference between maximum possible profit for 0/1 Knapsack and fractional Knapsack problem with capacity (W) = 20 be X. Then the value of 5X will be

Item	a	b	c	d	e	f	g	h	i	j
Weight	3	5	2	1	12	10	9	9	4	1
Profit	7	10	3	3	26	19	18	17	5	4

Have any Doubt ?

15

Correct Option

Solution :
 15
Fractional Knapsack problem:

Select all of item 'a', 'd', 'e', 'j' and 1/3 of item 'g'

$$\text{Total weight} = 3 + 1 + 12 + 1 + 1/3 + 9 = 20$$

$$\text{Total profit} = 7 + 3 + 26 + 4 + 1/3 \times 18 = 46$$

0/1 Knapsack problem:

Select all of item j, d, a, e and c.

$$\text{Total weight} = 2 + 1 + 1 + 3 + 12 = 19$$

$$\text{Total profit} = 7 + 3 + 26 + 4 + 3 = 43$$

$$\begin{aligned} \text{Difference} &= \text{Total profit (using fractional Knapsack - Using 0/1 Knapsack)} \\ &= 46 - 43 = 3 \end{aligned}$$

$$\Rightarrow 5X = 3 \times 5 = 15$$

Your Answer is 20

QUESTION ANALYTICS

Q. 62

Consider a system with 3-level paging with TLB support. TLB access time is 10 ns while main memory



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES

232

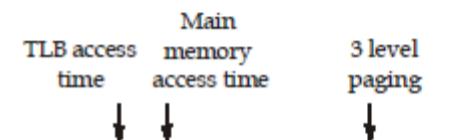
Correct Option

Solution :

232

$$\text{TLB hit ratio} = \frac{420}{500} = 0.84$$

System uses 3-level paging



$$\begin{aligned}\text{Effective memory access time} &= x(t + m) + (1 - x)(t + 4m) \\ &= 0.84(10 + 150) + 0.16(10 + 600) \\ &= 0.84(160) + 0.16(710) \\ &= 134.4 + 97.6 = 232 \text{ ns}\end{aligned}$$

Your Answer is 520

QUESTION ANALYTICS

Q. 63

Consider the following statements:

 S_1 : Hidden node problem in IEEE802.11 can be eliminated by the use of Handshake frames (RTS and CTS). S_2 : IPV₆ does not support broadcasting but IPV₄ supports broadcasting. S_3 : DHCP server is necessary for IPV₆ protocol.

The number of correct statements are _____.

Have any Doubt ?

2

Correct Option

Solution :

2

- Only S_1 and S_2 are correct.
- S_3 is wrong because IPV₆ supports both state full and state less auto configuration mode host devices. So, the absence of DHCP server does not create any problem. So, DHCP not necessary for IPV₆.

QUESTION ANALYTICS

Q. 64Matrix A has x rows and $x + 5$ columns. Matrix B has y rows and $11 - y$ columns. If it is known that both AB and BA exist, the value of $x^2 - y$ is _____.

(Upto 2 decimal places)

Have any Doubt ?

1.00

Your answer is Correct 1.00

Solution :

1.00

Order of matrix, $A = x \times (x + 5)$ Order of matrix, $B = y \times (11 - y)$

For AB matrix to exist,

Number of column of A = Number of rows of B

$$\Rightarrow x + 5 = y$$



Ashima Garg

 Course: GATE
 Computer Science Engineering(CS)

HOME

MY TEST

BOOKMARKS

MY PROFILE

REPORTS

BUY PACKAGE

ASK AN EXPERT

OFFER

 EXCLUSIVE OFFER FOR OTS
 STUDENTS ONLY ON BOOK
 PACKAGES

$$\begin{aligned}x + y &= 11 \\ \text{Solving equation (i) and (ii), we get} \\ x &= 3 \\ y &= 8 \\ \therefore x^2 - y &= (3)^2 - 8 = 9 - 8 = 1\end{aligned}$$

QUESTION ANALYTICS

Q. 65

A dice is tossed thrice. A success is getting '1 or 6' on a toss. Find the variance of number of successes _____ (Upto 2 decimal places)

[Have any Doubt ?](#)

0.66 (0.66 - 0.67)

Correct Option

Solution :
 0.66 (0.66 - 0.67)

$$\text{Probability of a success} = \frac{2}{6} = \frac{1}{3}$$

For Binomial distribution,

$$\begin{aligned}\sigma_x^2 &= np(1-p) \\ &= 3 \cdot \frac{1}{3} \left(1 - \frac{1}{3}\right) = \frac{2}{3} \\ &= 0.667\end{aligned}$$

QUESTION ANALYTICS