**QUESTIONS AND ANSWER**

**QUES:-How many edges are there in a forest of t-trees containing a total of n vertices?**

(A) n+t (B) n-t(yes) (C) n\*t (D) nt

**Explanation** : In each tree we have k-1 edges for k vertices.

***QUES:- What is the probability that a randomly selected bit string of length 10 is a palindrome?***

(A) 1/64 (B) 1/32 (Ans) (C) 1/8 (D) 1/4

**Explanation:**

select 10 bits and with every bit we have two choice either 0 or 1 so the total no of 10 length bit strings are 2^10.

now in palindrome if we chose first 5 bits then our job is done as next 5 are fixed ( first 5 in reverse order).

So, for five bits can be chosen in 25 (for every bit either 0 or 1).

Probability = 2^5/2^10= 1/ 32.

***The number of eight-bit strings beginning with either 111 or 101 is .***

(A) 64(yes) (B) 128 (C) 265 (D) None of the above

***QUES:- A box contains six red balls and four green balls. Four balls are selected at random from the box. What is the probability that two of the selected balls are red and two are green***?

(A) 3/7(Ans) (B) 4/7 (C) 5/7 (D) 6/7

**Explanation:-**C(6,2)C(4,2)/C(10,4)

***QUES:- There is a club consisting of six distinct men and seven distinct women. How many ways can we select a committee of three men and four women?***

**Answer:-**There are "6-choose-3" = (6c3) ways to select the men, and "7-choose-4" =(7c4) ways to select the women.

That's because = (6c3) \* (7c4)

***QUES:- A committee of 5 persons is to be formed from 6 men and 4 women. In how many ways can this be done when at least 2 women are included?***

**Answer:-** Here it says atleast 2 women, which in other words mean, the committee may comprise of 2 women and 3 men or 3 women and 2 men or 4 women and 1 man.

Therefore the answer should be 4C2\*6C3 + 4C3\*6C2 + 4C4\*6C1 = 6\*20 + 4\*15 + 1\*6 = 186

Now lets see why the answer should not be 4C2\*8C3 = 6\*56 = 336

You have to make cases for this question.

Total men available=6

Total women available =4

Condition atleast two women.

Case I: 2 women 3 men. This can be done in 4c2 x 6c3

Case II: 3 women 2 men. This can be done in 4c3 x 6c2

Case III: 4 women 1 men. This can be done in 4c4 x 6c1

***QUES:-Skolmization is the process of***

(A) bringing all the quantifiers in the beginning of a formula in FDL.

(B) removing all the universal quantifiers.

(C) removing all the existential quantifiers.(yes)

(D) all of the above.

***QUES:- Consider a set A = {1, 2, 3, …….., 1000}. How many members of A shall be divisible by 3 or by 5 or by both 3 and 5 ?***

(A) 533 (B) 599 (C) 467(yes) (D) 66

**Explanation:-**

(A U B ) = (A) + (B) - (A ∩ B)

A=1000/3 = 333 [No's divisible by 3]

B=1000/5=200 [No's divisible by 5]

A ∩ B= 1000/15=66 [No's divisible by both 3 and 5]

A U B = 333+200-66=533-66=467

***A graph is non-planar if and only if it contains a subgraph homeomorphic to***

(A) K3,2 or K5 (B) K3,3 and K6 (C) K3,3 or K5(yes) (D) K2,3 and K5

**Explanation:-**

Kuratowski’s Theorem: A graph is non-planar if and only if it contains a subgraph that is homeomorphic to either K5 or K3,3

***The proposition ~ p V q is equivalent to***

(A) p --> q (yes) (B) q --> p (C) p <--> q (D) p V q

Explanation: p--> q = ~p V q

***Find the number of ways to paint 12 offices so that 3 of them will be green, 2 of them pink, 2 of them yellow and the rest ones white.***

(A) 55,440 (B) 1,66,320(YES) (C) 4.790E+08 (D) 39,91,680

**Explanation:-** Total number of ways 12 offices can be painted = 12!

But 3 of them will be green, 2 of them pink, 2 of them yellow and 5 of them white.Answer = 12! /(3!\* 2 ! \* 2! \* 5!) = 166320

***How many distinguishable permutations of the letters BANANA are there***

A)720 B)120 C)60 D)360

Number of permutation of n objects with n1 identical objects of type 1,

n2 identical objects of type 2, ......

and nk identical objects of type k is n! / (n1!n2!....nk!)

Permutation of letter BANANA are 6! / (3!2!) = 60

***A test contains 100 true/false questions. How many different ways can a student answer the questions on the test, if the answer may be left blank also.***

(A) 100P2 (B) 100C2 (C) 2100 (D) 3100(yes)

***How many edges must be removed to produce the spanning forest of a graph with N vertices, M edges and C connected components?***

(A) M+N–C (B) M–N–C (C) M–N+C(yes) (D) M+N+C

**Explanation:-**

For an spanning forest of a graph with N vertices and C connected components, No of edges should be E = (N-C), but the given graph contains M edges .. So to have spanning forest no of edges to be removed = M- (N-C) = M - N + C

***Which of the following connected simple graph has exactly one spanning tree?***

(A) Complete graph (B) Hamiltonian graph (C) Euler graph (D) None of the above(yes)

***A recursive function h, is defined as follows :***

***h(m) = k, if m = 0***

***= 1, if m = 1***

***= 2 h(m – 1) + 4h(m – 2), if m ≥ 2***

***If the value of h(4) is 88 then the value of k is :***

(1) 0 (2) 1 (3) 2(yes) (4) –1

**Explanation:-**

h(2)=2h(1)+4h(0) =2+4k

h(3)= 2h(2)+4h(1) = 4+8k+4 = 8+8k

h(4)= 2h(3)+4h(2) = 16+16k+8+16k= 32k+24 =88

32k=64

k=2

***The proposition ~ q ∨ p is equivalent to :***

1. p->q (ans)

***58 lamps are to be connected to a single electric outlet by using an extension board each of which has four outlets.The number of extension boards needed to connect all the light is?***

We can connect 4 Lamps to first extension

Number of Extension required for Remaining 54 lamps = 54/3 = 18 Extension

Total Extension required to connect all 58 Lamps = 18 + 1 =19

***Domain and Range of the function Y = –√(–2x + 3) is***

(A) x≥3/2, y≥0 (B) x>3/2, y≤0

(C) x≥3/2, y≤0 (D) x≤3/2, y≤0(YES)

***How many solutions are there to the equation x1+x2+x3+x4 = 21 where x1 , x2 , x3 , and x4 are nonnegative integers?***

ANS:-

r = 21, n = 4, so we have C(21+4-1, 21) = C(24, 21) = 2,024 solutions

***How many solutions are there to the equation x+y+z=17 ?They are non-negative integers.***

A) 120 B)171 C)180 D)121

Ans:-

No. of solutions to the equation x+y+z=17 is given by formula

C(n+r-1, n-1) = C(3+17-1, 3-1) = C(19,2) = 171

Ans (B)

***How many multiples of 6 are there between the following pairs of numbers? 0 and 100 and –6 and 34***

(A) 16 and 6 (B) 17 and 6 (C) 17 and 7 (D) 16 and 7

Answer: (C)

Explanation: Between 0 and 100 multiple of 6 are: 0,6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90, 96 ie. 17 multiple.

Between -6 and 34 multiple of 6 are: -6, 0, 6, 12, 18, 24, 30. ie. 7 multiple.

So,option (C) is correct.

***The number of different spanning trees in complete graph, K4 and bipartite graph, K2,2 have \_\_\_\_\_\_ and \_\_\_\_\_\_\_ respectively.***  
  
 (1) 14, 14  (2) 16, 14   (3) 16, 4    (4) 14, 4

**Explanation:**  
  
Let 'n' be total number of vertices in complete graph Kn then total different spanning trees are nn-2

n = 4 as given then total different spanning trees are 44-2= 42= 16.  
  
The number of labelled spanning trees in a bipartite graph Km,n is given by mn-1\*nm-1.  
As given in question number of spanning trees in bipartite graph K2,2 = 22-1 \* 22-1 = 4.

***Suppose that from given statistics, it is known that meningitis causes stiff neck 50% of the time, that the proportion of persons having meningitis is 1 / 50000, and that the proportion of people having stiff neck is 1 / 20. Then the percentage of people who had meningtis and complain about stiff neck is:***

A) 0.01% B) 0.02% C) 0.04% D) 0.05%

Explanation:-

We can solve this using Bayes formula:

P(B|A) = P(A|B)·P(B) / P(A)

Assume A refer to stiff neck and B refer to probability of meningitis,

P(A|B) = meningitis causes stiff neck =50%= 0.5

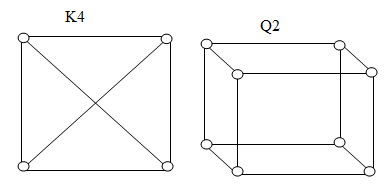
P(A)=1/20

P(B)= 1/50000

P(B|A) = 0.5\*1/50000/(1/20)= 0.02%

***Which one of the following statements is TRUE in relation to these graphs?***

***K4 and Q3 are graph with the following structures :***



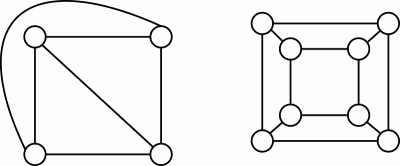
(A) K4 is planar while Q3 is not

(B) Both K4 and Q3 are planar

(C) Q3 is planar while K4 is not

(D) Neither K4 nor Q3 are planar

***Explanation:-***



Both can be made without intersecting edges

***What is the radix of the number if the solution to quadratic equation x^2 − 10x + 31 = 0 is x = 5 and x = 8?***

(A) 10 (B) 8 (C) 5 (D) 13

***Explanation:*** If equation ax^2 + bx + c = 0, then sum of roots = -b/a and product of equations = c/a.

Given equation x^2 − 10x + 31 = 0 and roots are 5 and 8. Therefore,

sum of roots = -b/a = -(-10)/1 = (10)b = 5b + 8b implies b = 13.

Also, product of roots = c/a = 31/1 = (31)b = 5b \* 8b implies b = 13.

Answer is 13.

***The number of positive integers not exceeding 100 that are either odd or the square of an integer is \_\_\_\_\_\_\_ (ugc - jun - 2020 )***

63 59 55 50

Required numbers = n(Odd numbers) + n(Square of integers) – n(odd number & square of integer)

From 1 to 100 there are 50 odd and 50 even numbers

Square of integers = 1,4,9,16,25,64,49,64,81,100 = 10 numbers

Both odd & square of integer= 1,9,25,49,81=5 numbers

Hence required numbers= 50+10−5=55

***Consider the sentence below: (NET – DEC – 2018 )***

***“There is a country that borders both India and Nepal”***

***Which of the following represents the above sentence correctly?***

1. ∃*c* Country(*c*) ∧ Border(*c*,India)∧*Border*(*c*,Nepal) (yes)

2. ∃*c* Country(*c*)⇒[Border(*c*,India)∧*Border*(*c*,Nepal)]

3. [∃*c* Country(*c*)]⇒[Border(*c*,India)∧*Border*(*c*,Nepal)]

4. ∃*c* Border(Country(*c*),India∧Nepal)

***A survey has been conducted on methods of commuter travel. Each respondent was asked to check Bus, Train and Automobile as a major method of travelling to work. More than one answer was permitted. The results reported were as follows : Bus 30 people; Train 35 people; Automobile 100 people; Bus and Train 15 people; Bus and Automobile 15 people; Train and Automobile 20 people; and all the three methods 5 people. How many people completed the survey form? (DEC – NET – 2018 )***

A.120 B. 165 C. 160 D. 115

**Explanation:-**

n(A∪B∪C)=n(A)+n(B)+n(C)-n(A∩B)-n(B∩C)-n(C∩A)+n(A∩B∩C)

n(A∪B∪C)=30+35+100-15-20-15+5

n(A∪B∪C)=120

***The number of substrings that can be formed from string given by a d e f b g h n m p***

***Is (NET –DEC- 2018)***

10 45 55 56(yes)

***Explanation:-***

all the alphabets in the string are distinct ==> ∑n + 1 gives us the number of substrings possible ( include Trivial substrings also )

∴ ∑n + 1 = ∑10 + 1 = 55+1 = 56

∑n = n \* (n+1) / 2