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DU PhD in Computer Science

Topic:- PHD_CS_topic1

1) For a particular course in the Delhi University Ph.D. curriculum, the probability that a surprize quiz happens on any day is 0.6. Moreover, it is found that if the student attendance on a day is more than 50%, the probability that a surprize quiz happens on that day is 0.4. The student attendance on any day is equally likely to be more than 50% or at/below 50%. What is the probability that a surprize quiz will happen on a day on which the student attendance is at/below 50%?
[Question ID = 3522]

1. 0.4 [Option ID = 14085]
2. 0.6 [Option ID = 14086]
3. 0.8 [Option ID = 14087]
4. 0.5 [Option ID = 14088]

Correct Answer :-
- 0.4 [Option ID = 14085]

2) Suppose that each of the three men at a party throws his hat into the center of the room. The hats are first mixed up and then each man randomly selects a hat. The probability that none of the three men selects his own hat is

[Question ID = 3524]

1. 1/2 [Option ID = 14093]
2. 1/4 [Option ID = 14096]
3. 2/3 [Option ID = 14095]
4. 1/3 [Option ID = 14094]

Correct Answer :-
- 1/2 [Option ID = 14093]

3) An unbiased coin is tossed repeatedly until you get two successive heads or two successive tails. Assuming all the trials are independent, the expected number of tosses is

[Question ID = 3523]

1. 4 [Option ID = 14091]
2. 2 [Option ID = 14089]
3. 3 [Option ID = 14090]
4. None of these. [Option ID = 14092]

Correct Answer :-
- 2 [Option ID = 14089]

4) If $A^4 = I_n$, but $A \neq I_n, A^2 \neq I_n, A^3 \neq I_n$, the powers of A equal to A^{-1} are

[Question ID = 3527]

1. ....., A^{-5}, A^{-1}, A^3, A^7, ... [Option ID = 14108]
2. A^3, A^7, ... [Option ID = 14107]
3. A^7 [Option ID = 14105]
4. A^3 [Option ID = 14106]

Correct Answer :-
- A^7 [Option ID = 14105]

5) For a=[-2, 1, 4], b=[1, -4, 3], $proj_a b$ is

[Question ID = 3526]

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1. $\left[\frac{2}{7}, \frac{6}{7}, \frac{3}{7}\right]$ [Option ID = 14104]

2. $\left[\frac{-4}{7}, \frac{2}{7}, \frac{8}{7}\right]$ [Option ID = 14102]

3. $\frac{1}{7}[-2,\ 1,4]$ [Option ID = 14101]

4. $\frac{2}{7}[2,-1,-4]$ [Option ID = 14103]

Correct Answer :-

- $\frac{1}{7}[-2,\ 1,4]$ [Option ID = 14101]

6)

Position vector of a moving body at time t is $\overrightarrow{r(t)} = (t - \sin t)\hat{\imath} + (1 - \cos t)\hat{\jmath} + t^2\hat{k}$. Body's speed and direction when $t = \frac{\pi}{2}$ respectively are

[Question ID = 3525]

1. $(\pi^2 + 2); \frac{1}{(\pi^2+2)}\left(\hat{\imath} + \hat{\jmath} + \pi\hat{k}\right)$ [Option ID = 14099]

2. $\pi; \frac{1}{\pi}\left(\hat{\imath} + \hat{\jmath} + \pi\hat{k}\right)$ [Option ID = 14097]

3. $\frac{1}{(\sqrt{\pi^2+2})}; \left(\sqrt{\pi^2 + 2}\right)\left(\hat{\imath} + \hat{\jmath} - \pi\hat{k}\right)$ [Option ID = 14098]

4. $\left(\sqrt{\pi^2 + 2}\right); \frac{1}{(\sqrt{\pi^2+2})}\left(\hat{\imath} + \hat{\jmath} + \pi\hat{k}\right)$ [Option ID = 14100]

Correct Answer :-

- $\pi; \frac{1}{\pi}\left(\hat{\imath} + \hat{\jmath} + \pi\hat{k}\right)$ [Option ID = 14097]

7)

The equation of a hyperbola with eccentricity $\frac{3}{2}$ and directrix x=2 is

[Question ID = 26133]

1. $r = \frac{2}{2+3\cos\theta}$ [Option ID = 44530]

2. $r = \frac{1}{2+3\cos\theta}$ [Option ID = 44527]

3. $r = \frac{3}{3+2\cos\theta}$ [Option ID = 44528]

4. $r = \frac{6}{2+3\cos\theta}$ [Option ID = 44529]

Correct Answer :-

- $r = \frac{1}{2+3\cos\theta}$ [Option ID = 44527]

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The most appropriate relation between the functions e^{-x}, e^{3x}, e^{4x} and the differential equation (D.E.)

$\frac{d^3y}{dx^3} - 6\frac{d^2y}{dx^2} + 5\frac{dy}{dx} + 12y = 0$ is that

[Question ID = 3521]

1. Only e^{3x} is a solution to the given D.E. [Option ID = 14082]
2. All are linearly independent solutions of the given D.E [Option ID = 14083]
3. Both e^{-x} and e^{3x} are solutions to the given D.E [Option ID = 14084]
4. These are linearly dependent solutions of the given D.E. [Option ID = 14081]

Correct Answer :-

- These are linearly dependent solutions of the given D.E. [Option ID = 14081]

9) The sum of the series $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n} x^n$, when $|x| < 1$, is

[Question ID = 3520]

1. $\ln(1+x)$ [Option ID = 14080]
2. $\ln(1-x)$ [Option ID = 14079]
3. $\ln(x^2+1)$ [Option ID = 14077]
4. $\ln x$ [Option ID = 14078]

Correct Answer :-

- $\ln(x^2+1)$ [Option ID = 14077]

10) $\lim_{n\to\infty} x_n$ where $x_n = \frac{a^{n+1}+b^{n+1}}{a^n+b^n}$ and $0 < b < a$ is

[Question ID = 3519]

1. (b/a) [Option ID = 14073]
2. (a/b) [Option ID = 14074]
3. b [Option ID = 14076]
4. a [Option ID = 14075]

Correct Answer :-

- (b/a) [Option ID = 14073]

11) If for $A = \begin{bmatrix} 5 & -1 \\ -3 & 4 \end{bmatrix}, B = \begin{bmatrix} -2 & 6 \\ 4 & -1 \end{bmatrix}, C = \begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix} (A^T + B)^T . C = k \begin{bmatrix} -1 \\ 2 \end{bmatrix}$, then value of k is

[Question ID = 3517]

1. 2 [Option ID = 14065]
2. 1/2 [Option ID = 14068]
3. 1 [Option ID = 14067]
4. 3 [Option ID = 14066]

Correct Answer :-

- 2 [Option ID = 14065]

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12) For the function $f(x,y) = \frac{x^2}{2} + \frac{y^2}{2}$, the respective directions of most rapid increase, most rapid decrease and zero change at (1,1) are

[Question ID = 3515]

1. $\frac{1}{\sqrt{2}}\hat{\imath} + \frac{1}{\sqrt{2}}\hat{\jmath};\ \frac{1}{\sqrt{2}}\hat{\imath} - \frac{1}{\sqrt{2}}\hat{\jmath};\ \frac{1}{\sqrt{2}}\hat{\imath} - \frac{1}{\sqrt{2}}\hat{\jmath}$ [Option ID = 14057]
2. $\frac{1}{\sqrt{2}}\hat{\imath} + \frac{1}{\sqrt{2}}\hat{\jmath};\ \frac{-1}{\sqrt{2}}\hat{\imath} - \frac{1}{\sqrt{2}}\hat{\jmath};\ \frac{-1}{\sqrt{2}}\hat{\imath} - \frac{1}{\sqrt{2}}\hat{\jmath}$ [Option ID = 14059]
3. $\frac{1}{\sqrt{2}}\hat{\imath} + \frac{1}{\sqrt{2}}\hat{\jmath};\ \frac{-1}{\sqrt{2}}\hat{\imath} - \frac{1}{\sqrt{2}}\hat{\jmath};\ \frac{-1}{\sqrt{2}}\hat{\imath} + \frac{1}{\sqrt{2}}\hat{\jmath}$ [Option ID = 14058]
4. $\frac{1}{\sqrt{2}}\hat{\imath} - \frac{1}{\sqrt{2}}\hat{\jmath};\ \frac{-1}{\sqrt{2}}\hat{\imath} + \frac{1}{\sqrt{2}}\hat{\jmath};\ \frac{-1}{\sqrt{2}}\hat{\imath} + \frac{1}{\sqrt{2}}\hat{\jmath}$ [Option ID = 14060]

Correct Answer :-

- $\frac{1}{\sqrt{2}}\hat{\imath} + \frac{1}{\sqrt{2}}\hat{\jmath};\ \frac{1}{\sqrt{2}}\hat{\imath} - \frac{1}{\sqrt{2}}\hat{\jmath};\ \frac{1}{\sqrt{2}}\hat{\imath} - \frac{1}{\sqrt{2}}\hat{\jmath}$ [Option ID = 14057]

13) $\lim_{x\to 0} f(x) = \frac{1}{2}$ and $\lim_{x\to 0} g(x) = 4$ then $\lim_{x\to 0} \frac{(f(x)^2 - [f(x)])}{(6-\sqrt{g(x)})^2}$ is equal to

[Question ID = 3513]

1. 1/4√2 [Option ID = 14052]
2. 1/8 [Option ID = 14051]
3. -3/8 [Option ID = 14050]
4. -1/8 [Option ID = 14049]

Correct Answer :-

- -1/8 [Option ID = 14049]

14) A Linearization L(x) of $f(x) = \frac{x}{x+1}$ at $x_0 = 0.2$ is

[Question ID = 3514]

1. $(-x + 0.04)\ (1.2)^{-2}$ [Option ID = 14054]
2. $(x - 0.04)\ (1.2)^{-2}$ [Option ID = 14056]
3. $(x + 0.04)\ (1.2)^{2}$ [Option ID = 14053]
4. $(x + 0.04)\ (1.2)^{-2}$ [Option ID = 14055]

Correct Answer :-

- $(x + 0.04)\ (1.2)^{2}$ [Option ID = 14053]

15) Which of the following statements is true? [Question ID = 3518]

1. If a set of vectors is linearly independent, then it does not contain a zero vector. [Option ID = 14071]
2. The vectors $\{e_1, e_2, \ldots, e_{n+1}\}$ are linearly dependent in R^n. [Option ID = 14069]
3. The vector $v = 0$ is linearly independent. [Option ID = 14072]
4. A two-element set $\{v1, v2\}$ is linearly dependent if and only if neither vector is scalar multiple of the other. [Option ID = 14070]

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Correct Answer :-

- The vectors $\{e_1, e_2, \ldots, e_{n+1}\}$ are linearly dependent in R^n. [Option ID = 14069]

Topic:- PHD_CS_topic2

1) Given a sorted array of n positive integers, let $T(n)$ denote the time taken for the most efficient algorithm to determine if there are two successive elements with sum exactly equal to 500. Which of the following statements is true?

[Question ID = 3536]

1. T(n) = θ (log n) [Option ID = 14142]
2. T(n) = θ (1) [Option ID = 14141]
3. T(n) = θ (n) [Option ID = 14143]
4. T(n) = θ (n log n) [Option ID = 14144]

Correct Answer :-

- T(n) = θ (1) [Option ID = 14141]

2) In round-robin short-term scheduling algorithm, the execution time of the Timer ISR is 10 milli-seconds. What should be the time-slice value to achieve 80% efficiency?

[Question ID = 3547]

1. 100 milli-seconds [Option ID = 14188]
2. 20 milli-seconds [Option ID = 14186]
3. 60 milli-seconds [Option ID = 14187]
4. 40 milli-seconds [Option ID = 14185]

Correct Answer :-

- 40 milli-seconds [Option ID = 14185]

3) A k -regular graph (graph where degree of every vertex is exactly equal to k) is found to be a tree. The maximum number of vertices in the graph is

[Question ID = 3539]

1. 1 [Option ID = 14153]
2. 2 [Option ID = 14154]
3. 3 [Option ID = 14155]
4. None of these [Option ID = 14156]

Correct Answer :-

- 1 [Option ID = 14153]

4) In a modulo-X asynchronous counter, the input/output delay of each of component flip-flop is 4 microseconds. The permissible input/output delay of the counter is 24 microseconds. The upper bound of X should be :

[Question ID = 3550]

1. 128 [Option ID = 14200]
2. 64 [Option ID = 14199]
3. 16 [Option ID = 14197]
4. 32 [Option ID = 14198]

Correct Answer :-

- 16 [Option ID = 14197]

5) A Stereo music with per channel bandwidth of 20 kilohertz is digitized, encoding each sample in 16 bits. What should be the un-compressed bandwidth after digitization?

[Question ID = 3545]

1. 2560 kbps [Option ID = 14180]
2. 1280 kbps [Option ID = 14179]
3. 640 kbps [Option ID = 14178]

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4. 320 kbps [Option ID = 14177]

Correct Answer :-

- 320 kbps [Option ID = 14177]

6) Suppose this question paper has ten questions each from three different topics Algorithms, Data Structures and Discrete Mathematics. An applicant has to select exactly two topics out of the three, and for each selected topic, he/she has to answer exactly eight questions. The total number of different combinations of questions that can be answered is [Question ID = 3538]

1. $\binom{10}{8}.3$ [Option ID = 14152]
2. $\binom{3}{2}.\binom{20}{16}$ [Option ID = 14151]
3. $\binom{10}{8}.\binom{10}{8}$ [Option ID = 14149]
4. $\binom{3}{2}.\binom{10}{8}.\binom{10}{8}$ [Option ID = 14150]

Correct Answer :-

- $\binom{10}{8}.\binom{10}{8}$ [Option ID = 14149]

7) Consider a virtual memory system with the page fault probability of 10%, primary memory access time of 1 microseconds and average page fault service time of 1 milliseconds. The effective primary memory access time shall be deteriorated by:

[Question ID = 3548]

1. More than 100% [Option ID = 14192]
2. 50 % only [Option ID = 14190]
3. 100% only [Option ID = 14191]
4. 10 % only [Option ID = 14189]

Correct Answer :-

- 10 % only [Option ID = 14189]

8) Consider a virtual memory system with FIFO page replacement policy. For an arbitrary page access pattern, increasing the number of page frames in main memory will

[Question ID = 3549]

1. always decrease the number of page faults. [Option ID = 14193]
2. always increase the number of page faults. [Option ID = 14194]
3. never affect the number of page faults. [Option ID = 14196]
4. sometimes increase the number of page faults. [Option ID = 14195]

Correct Answer :-

- always decrease the number of page faults. [Option ID = 14193]

9) Consider a Satellite link, operating on Selective Repeat Datalink layer error-recovery protocol with round-trip (both way) transit time of 500 milliseconds, link bandwidth of 50 kbps and frame size of 1000 bits. To achieve the maximum link bandwidth utilization, what should be the sender's window size?

[Question ID = 3544]

1. 52 [Option ID = 14176]
2. 26 [Option ID = 14174]
3. 50 [Option ID = 14175]
4. 25 [Option ID = 14173]

Correct Answer :-

- 25 [Option ID = 14173]

10)

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Consider a tightly coupled shared-memory multi-processor system with 10 processors. The primary memory access time is 10 micro-seconds.Each processor on the average, makes a primary memory read/write request at least once in 10 micro-seconds. Assuming the fair scheduling of the storage arbitrator , compared to the uniprocessor system, the slow-down factor of primary memory of the aforesaid multi-processor system would be:

[Question ID = 3551]

1. 1 [Option ID = 14201]
2. 100 [Option ID = 14203]
3. 10 [Option ID = 14202]
4. 1000 [Option ID = 14204]

Correct Answer :-

- 1 [Option ID = 14201]

11) Consider an array of size n which is increasingly sorted from index 0 to some index k, and decreasingly sorted from k to n-1. You however don't know the value of k, thus k can be any value between 1 and n-2. Suppose T(n) denote the time taken for the most efficient algorithm to determine the minimum sum of two consecutive elements in the array. Which of the following statements is true?

[Question ID = 3543]

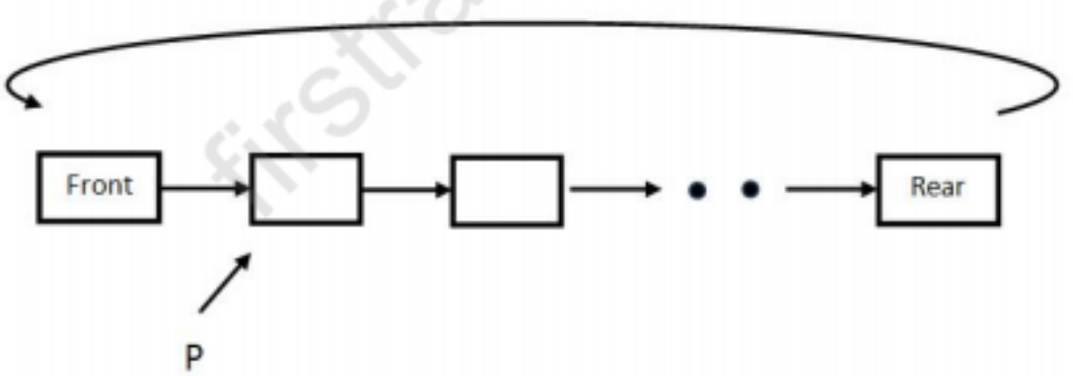
1. T (n) =θ (1) [Option ID = 14169]
2. T (n) =θ (log n) [Option ID = 14170]
3. T (n) =θ (n) [Option ID = 14171]
4. T (n) =θ (n log n) [Option ID = 14172]

Correct Answer :-

- T (n) =θ (1) [Option ID = 14169]

12)

A circularly linked list is used to represent a Queue. A single variable P is used to access the Queue as shown in the figure. What is the complexity of the operations enQueue and deQueue if currently there are n elements in the Queue?



[Question ID = 3542]

1. Enqueue takes θ (n) , Dequeue takes θ (1) [Option ID = 14167]
2. Enqueue takes θ (n) , Dequeue takes θ (n) [Option ID = 14168]
3. Enqueue takes θ (1) , Dequeue takes θ (1) [Option ID = 14165]
4. Enqueue takes θ (1) , Dequeue takes θ (n) [Option ID = 14166]

Correct Answer :-

- Enqueue takes θ (1) , Dequeue takes θ (1) [Option ID = 14165]

13) Let n denote a non-negative integer, and ε denote a positive quantity. Define the relation ~ as

$$x \sim y, \quad \text{if} \quad |x^n - y^n| < \varepsilon$$

Then which of the following is true?

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[Question ID = 3527]

1. There exists some n and ε for which ~ is neither symmetric nor transitive. [Option ID = 14148]
2. ~ is an equivalence relation for any value of n and ε [Option ID = 14145]
3. ~ is reflexive and symmetric for any value of n and ε , but there is some n and ε for which ~ is not transitive. [Option ID = 14147]
4. ~ is reflexive and transitive for any value of n and ε , but there is some n and ε for which ~ is not symmetric [Option ID = 14146]

Correct Answer :-

- ~ is an equivalence relation for any value of n and ε [Option ID = 14145]

14) Consider the following C++ like code segments:

(i)
```
while (x % y != 0){
    t = y;
    y = x % y;
    x = t;
}
gcd = y;
```

(ii)
```
while (x % y != 0){
    t = x;
    x = x % y;
    y = t;
}
gcd = y;
```

(iii)
```
for (i = 1; i<= x &&i<= y; i++)
    if (x % i == 0 && y % i == 0)
gcd = i;
```

(iv)
```
for (i = 1; i<= x &&i<= y; i++)
    if (x % i == 0 && y % i == 0){
gcd = i;
        break;
    }
```

Which of these code segments correctly computes the Greatest Common Divisor (GCD) of two numbers x and y?

[Question ID = 3531]

1. (i), (iii) and (iv) [Option ID = 14122]
2. (ii) and (iv) [Option ID = 14124]
3. (ii) and (iii) [Option ID = 14123]
4. (i) and (iii) [Option ID = 14121]

Correct Answer :-

- (i) and (iii) [Option ID = 14121]

15) What will be the output of the following C++ like code segment?

```
char s[10];
strcpy(s, "Hello");
cout<<sizeof(s) << " " <<strlen(s) << " ";
cout<<sizeof("Hello") << " " <<strlen("Hello");
```

[Question ID = 3529]

1. 5 5 5 5 [Option ID = 14116]
2. 10 5 6 5 [Option ID = 14113]
3. 6 6 6 6 [Option ID = 14115]
4. 10 6 6 6 [Option ID = 14114]

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Correct Answer :-

- 10 5 6 5 [Option ID = 14113]

16) Consider the following C++ like pseudocode fragment:

```
if (x + y > z && y + z > x && z + x > y)
    display "yes";
else
    display "no";
```

The output of this code will be no if

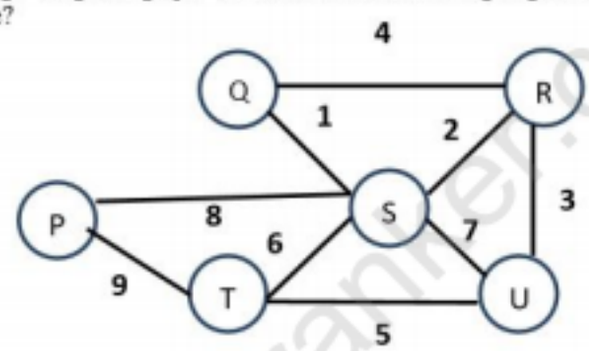
[Question ID = 3532]

1. x+y <=z || y+z <= x || z+x <= y [Option ID = 14127]
2. x+y <= z && y+z <=x && z+x<= y [Option ID = 14126]
3. x + y < z && y + z < x && z + x< y [Option ID = 14125]
4. x+y>z || y+z >x || z+x> y [Option ID = 14128]

Correct Answer :-

- x + y < z && y + z < x && z + x< y [Option ID = 14125]

17) Suppose we run Kruskal's Minimum Spanning Tree determination algorithm on the following edge weighted graph. In what order do the edges get included into the minimum spanning tree?



[Question ID = 3534]

1. PS, QS, RS, RU, TU [Option ID = 14133]
2. QS, RS, RU, UT, PS [Option ID = 14136]
3. QS, RS, RU, UT, TS [Option ID = 14135]
4. QS, RS, RU, QR, UT [Option ID = 14134]

Correct Answer :-

- PS, QS, RS, RU, TU [Option ID = 14133]

18) What will be the output of the following C++ like code segment?

```
#include <iostream>
    using namespace std;
    int operate (int a, int b)
    {
      return (a * b);
        }
    float operate (float a, float b)
     {
      return (a / b);
        }
    int main ()
     {
        int x = 5, y = 2;
        float n = 5.0, m = 2.0;
        cout << operate (x, y);
        cout << operate (n, m);
        return 0;
       }
```

[Question ID = 3533]

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2. 2.510 [Option ID = 14131]
3. 102.5 [Option ID = 14130]
4. 2.52.5 [Option ID = 14132]

Correct Answer :-

- 1010 [Option ID = 14129]

19) Consider the following two functions that take as input a positive integer n.

```
func1(int n)

{
   if(n <= 1) return 1;

   else return n * func1(n − 1);
 }
func2(int n)
{
  if(n <= 1) return 1;

  else{
        sum=0;
        for(i = 0; i < n; + + i)
        sum+= func2(n − 1);
    return sum;
  }
}
```

The incorrect statement is:

[Question ID = 13634]

1. Both func1 and func2 output the same value for any input. [Option ID = 24533]
2. func2 computes factorial of its input. [Option ID = 24535]
3. Time complexities of func1 and func2 are same. [Option ID = 24534]
4. None of above is incorrect [Option ID = 24536]

Correct Answer :-

- Both func1 and func2 output the same value for any input. [Option ID = 24533]

20) The following postfix expression with single digit operands is evaluated using a stack:

8 2 3 ^ / 2 3 * + 5 1 * -

Note that ^ is the exponentiation operator. The top two elements of the stack after, the first * is evaluated, are:

[Question ID = 3540]

1. 6, 1 [Option ID = 14157]
2. 5, 7 [Option ID = 14158]
3. 3, 2 [Option ID = 14159]
4. 1, 5 [Option ID = 14160]

Correct Answer :-

- 6, 1 [Option ID = 14157]

21)

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Consider a hash table of size seven, with starting index zero, which uses a hash function $(3x + 4) mod 7$ with *open addressing* and collisions resolved using *linear probing*. After inserting a set of values into the table, suppose the current content of the hash table at respective locations (starting from zero) is

5, 10, e, e, 14, 12, 3

where e denotes an empty location.What can be a possible order in which the entries are inserted into the hash table?

[Question ID = 3541]

1. 3, 10, 12, 5, 14 [Option ID = 14163]
2. 3, 12, 5, 10, 14 [Option ID = 14161]
3. 3, 12, 10, 5, 14 [Option ID = 14162]
4. 10, 3, 5, 12, 14 [Option ID = 14164]

Correct Answer :-

- 3, 12, 5, 10, 14 [Option ID = 14161]

22) What will be the output of the following C++ like code segment?

```
class base {
public:   void display(){ cout<< " base ";}
};
class derived1 : public base{
public:   virtual void display(){ cout<< " derived1 ";}
};
class derived2 : public derived1{
public:   void display(){ cout<< " derived2 ";}
};

int main(){
      base *bp;
      derived1 *dp1;
      derived2 d2;

bp = &d2;  // Statement 1
      dp1 = &d2;
bp -> display();
      dp1 -> display();
            return 0;
  }
```

[Question ID = 3530]

1. The program will not compile as Statement 1 is incorrect. [Option ID = 14120]
2. base base [Option ID = 14117]
3. base derived1 [Option ID = 14118]
4. base derived2 [Option ID = 14119]

Correct Answer :-

- base base [Option ID = 14117]

23) The correct matching for the following pairs is

(I) Weighted Interval Scheduling (1) Greedy
(II) Quick Sort (2) Depth First Search
(III) Minimum weight spanning tree (3) Dynamic Programming
(IV) Reachability in a graph (4) Reachability in a graph

[Question ID = 3535]

1. I-4 II-1 III-2 IV- 3 [Option ID = 14140]
2. I-2 II-4 III-1 IV-3 [Option ID = 14137]
3. I-3 II-4 III-1 IV-2 [Option ID = 14138]
4. I-3 II-4 III-2 IV-1 [Option ID = 14139]

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Correct Answer :-

- I-2 II-4 III-1 IV-3 [Option ID = 14137]

24) The maximum window size for data transmission using the selective reject protocol with n-bit frame sequence numbers is:

[Question ID = 3546]

1. 2^n [Option ID = 14181]
2. $2^n - 1$ [Option ID = 14183]
3. $2^{(n-1)}$ [Option ID = 14182]
4. $2^{(n-2)}$ [Option ID = 14184]

Correct Answer :-

- 2^n [Option ID = 14181]

25) The computer memory is designed using:

[Question ID = 3552]

1. Combinational flip-lop circuits [Option ID = 14205]
2. Combinational register circuits [Option ID = 14207]
3. Sequential Flip-flop circuits [Option ID = 14206]
4. Sequential register circuits. [Option ID = 14208]

Correct Answer :-

- Combinational flip-lop circuits [Option ID = 14205]

Topic:- PHD_CS_topic3

1) *based on the following passage*

III. Half a millennia ago, forests covered much of the Iberian peninsula. But that soon changed. Centuries of wars and invasions, agricultural expansion and woodcutting for charcoal and shipping wiped out most of the woods and transformed places like Matamorisca, a small village in northern Spain, into degraded landscapes. Could the forest return to the village? The Amsterdam-based Land Life Company took up the challenge. They intervened in 17 barren hectares and peppered them with their signature device: a biodegradable cardboard donut they call the cocoon which can hold 25 litres of water underground to aid a seedling's first year. Around 16,000 oaks, ashes, walnuts, rowans, and whitebeams were planted in May 2018, and the company reports that 96% of them survived that year's scorching summer without extra irrigation, a critical milestone for a young tree. With around 600 hectares replanted around the world since 2015 and another 1,100 planned for this year, the company's drive fits into the Bonn Challenge, a global effort to restore 150 million hectares of the world's deforested and degraded land by 2020.

By 2030, the goal is to reach 350 million hectares – 20% more land than India. Money for the 20x20 Initiative comes mostly from financial organisations with triple goals – a modest return on their investment, environmental benefits and social gains – known as impact investors. By reintroducing trees in the landscape, we impact positively humidity, rain capture, soil conservation and biodiversity preservation.

Of course, some crops can coexist with the forest, if you find the right balance. Agroforestry provides an opportunity for small-holder farmers to sustain their livelihoods while adding some forest cover to their farms. Not every piece of land is amenable for reforestation. So, reforestation agencies like Vergara's look for safe investments, and even Land Life Company only runs major projects in what they consider "low-risk" countries, like Spain, Mexico or the US.

In Costa Rica's Baru, former grazing lands are now exuberant woods and the property boasts over 150 hectares of secondary forests with no intervention from humans. In the past 10 years, howling monkeys, scarlet macaws and even migratory cougars have returned to the refuge's land, boosting tourism and reinvigorating the ecosystem.

Mark the statement that is NOT true:

[Question ID = 3556]

1. It has been shown that even wildlife returns to the reclaimed forests in course of time. [Option ID = 14224]
2. Land Life Company stored water underground so that the new plants did not require further irrigation in summer. [Option ID = 14221]
3. By 2030, Land Life Company hopes to reclaim forests in over 350 million hectares of degraded land in many countries including India. [Option ID = 14223]
4. The reforestation agencies look for a small return on investments as also environmental benefits and social gains. [Option ID = 14222]

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Correct Answer :-

- Land Life Company stored water underground so that the new plants did not require further irrigation in summer. [Option ID = 14221]

2) *based on the following passage*

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How does agroforestry help in bringing back forests?

[Question ID = 3555]

1. It helps in increasing humidity, rain capture, soil conservation. [Option ID = 14220]
2. Irrigation for crops helps forest trees also to grow. [Option ID = 14218]
3. It provides protection to growing trees. [Option ID = 14217]
4. Forests come to provide cover to the farms and as such provides an opportunity for small-holder farmers to sustain their livelihoods. [Option ID = 14219]

Correct Answer :-

- It provides protection to growing trees. [Option ID = 14217]

3) *based on the following passage*

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How did Chief Ivo Kenjaby bring back forests to the small village in Spain?

[Question ID = 3554]

1. They planted a large number of trees and regularly watered them. [Option ID = 14213]
2. They stored enough water for a seedling to help it grow through its first year. [Option ID = 14216]
3. They stopped agricultural expansion and woodcutting for charcoal. [Option ID = 14214]
4. They peppered them with their signature device. [Option ID = 14215]

Correct Answer :-

- They planted a large number of trees and regularly watered them. [Option ID = 14213]

Topic:- PHD_CS_topic4

1) based on the following passage

II. Although tsunamis are commonly known as tidal waves, they're actually unrelated to the tidal activity caused by the gravitational forces of the Sun and Moon. In many ways, tsunamis are just larger versions of regular waves. They have a trough and a crest, and consist not of moving water, but the movement of energy through water. The difference is in where this energy comes from. For normal ocean waves, it comes from wind. Because this only affects the surface, the waves are limited in size and speed. But tsunamis are caused by energy originating underwater, from a volcanic eruption, a submarine landslide, or most commonly, an earthquake on the ocean floor. This energy travels up to the surface, displacing water and raising it above the normal sea level, but gravity pulls it back down, which makes the energy ripple outwards horizontally. Thus, the tsunami is born, moving at over 500 miles per hour. When it's far from shore, a tsunami can be barely detectable since it moves through the entire depth of the water. But when it reaches shallow water, something called wave shoaling occurs. Because there is less water to move through, this still massive amount of energy is compressed. The wave's speed slows down, while its height rises to as much as 100 feet. . If the trough of a tsunami reaches shore first, the water will withdraw farther than normal before the wave hits, which can be misleadingly dangerous. A tsunami will not only drown people near the coast, but level buildings and trees for a mile inland or more, especially in low-lying areas. So how can we protect ourselves against this destructive force of nature? People in some areas have attempted to stop tsunamis with sea walls, flood gates, and channels to divert the water. But these are not always effective. Many scientists and policy makers are instead focusing on early detection, monitoring underwater pressure and seismic activity, and establishing global communication networks for quickly distributing alerts. When nature is too powerful to stop, the safest course is to get out of its way.

Mark the statement that is NOT true:

[Question ID = 3561]

1. Gravitational pull plays no part in the creation of the tsunami. [Option ID = 14242]
2. A tsunami can cause massive destruction for more than a mile from the shore. [Option ID = 14244]
3. Tsunami waves resemble regular waves in many ways but are not regular waves as such. [Option ID = 14241]
4. The only protection against tsunami lies in early detection and moving out of its way. [Option ID = 14243]

Correct Answer :-

- Tsunami waves resemble regular waves in many ways but are not regular waves as such. [Option ID = 14241]

2) based on the following passage

II. Although tsunamis are commonly known as tidal waves, they're actually unrelated to the tidal activity caused by the gravitational forces of the Sun and Moon. In many ways, tsunamis are just larger versions of regular waves. They have a trough and a crest, and consist not of moving water, but the movement of energy through water. The difference is in where this energy comes from. For normal ocean waves, it comes from wind. Because this only affects the surface, the waves are limited in size and speed. But tsunamis are caused by energy originating underwater, from a volcanic eruption, a submarine landslide, or most commonly, an earthquake on the ocean floor. This energy travels up to the surface, displacing water and raising it above the normal sea level, but gravity pulls it back down, which makes the energy ripple outwards horizontally. Thus, the tsunami is born, moving at over 500 miles per hour. When it's far from shore, a tsunami can be barely detectable since it moves through the entire depth of the water. But when it reaches shallow water, something called wave shoaling occurs. Because there is less water to move through, this still massive amount of energy is compressed. The wave's speed slows down, while its height rises to as much as 100 feet. . If the trough of a tsunami reaches shore first, the water will withdraw farther than normal before the wave hits, which can be misleadingly dangerous. A tsunami will not only drown people near the coast, but level buildings and trees for a mile inland or more, especially in low-lying areas. So how can we protect ourselves against this destructive force of nature? People in some areas have attempted to stop tsunamis with sea walls, flood gates, and channels to divert the water. But these are not always effective. Many scientists and policy makers are instead focusing on early detection, monitoring underwater pressure and seismic activity, and establishing global communication networks for quickly distributing alerts. When nature is too powerful to stop, the safest course is to get out of its way.

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Why can't the tsunami be detected when it is far from the shore?

[Question ID = 3560]

1. It spreads out over the sea in the middle. [Option ID = 14238]
2. It is spread over a vast and distant area. [Option ID = 14237]
3. It travels slowly when it is far from the shore. [Option ID = 14240]
4. It travels deep under the surface along the entire depth of water. [Option ID = 14239]

Correct Answer :-

- It is spread over a vast and distant area. [Option ID = 14237]

3) *based on the following passage*

II. Although tsunamis are commonly known as tidal waves, they're actually unrelated to the tidal activity caused by the gravitational forces of the Sun and Moon. In many ways, tsunamis are just larger versions of regular waves. They have a trough and a crest, and consist not of moving water, but the movement of energy through water. The difference is in where this energy comes from. For normal ocean waves, it comes from wind. Because this only affects the surface, the waves are limited in size and speed. But tsunamis are caused by energy originating underwater, from a volcanic eruption, a submarine landslide, or most commonly, an earthquake on the ocean floor. This energy travels up to the surface, displacing water and raising it above the normal sea level, but gravity pulls it back down, which makes the energy ripple outwards horizontally. Thus, the tsunami is born, moving at over 500 miles per hour. When it's far from shore, a tsunami can be barely detectable since it moves through the entire depth of the water. But when it reaches shallow water, something called wave shoaling occurs. Because there is less water to move through, this still massive amount of energy is compressed. The wave's speed slows down, while its height rises to as much as 100 feet. . If the trough of a tsunami reaches shore first, the water will withdraw farther than normal before the wave hits, which can be misleadingly dangerous. A tsunami will not only drown people near the coast, but level buildings and trees for a mile inland or more, especially in low-lying areas. So how can we protect ourselves against this destructive force of nature? People in some areas have attempted to stop tsunamis with sea walls, flood gates, and channels to divert the water. But these are not always effective. Many scientists and policy makers are instead focusing on early detection, monitoring underwater pressure and seismic activity, and establishing global communication networks for quickly distributing alerts. When nature is too powerful to stop, the safest course is to get out of its way.

Where does the tsunami get its destructive power from?

[Question ID = 3559]

1. From the energy originating underwater. [Option ID = 14236]
2. From the turbulence on the ocean floor. [Option ID = 14235]
3. From the gravity which pulls down the waves. [Option ID = 14234]
4. It comes from the wind blowing above the sea. [Option ID = 14233]

Correct Answer :-

- It comes from the wind blowing above the sea. [Option ID = 14233]

4) *based on the following passage*

II. Although tsunamis are commonly known as tidal waves, they're actually unrelated to the tidal activity caused by the gravitational forces of the Sun and Moon. In many ways, tsunamis are just larger versions of regular waves. They have a trough and a crest, and consist not of moving water, but the movement of energy through water. The difference is in where this energy comes from. For normal ocean waves, it comes from wind. Because this only affects the surface, the waves are limited in size and speed. But tsunamis are caused by energy originating underwater, from a volcanic eruption, a submarine landslide, or most commonly, an earthquake on the ocean floor. This energy travels up to the surface, displacing water and raising it above the normal sea level, but gravity pulls it back down, which makes the energy ripple outwards horizontally. Thus, the tsunami is born, moving at over 500 miles per hour. When it's far from shore, a tsunami can be barely detectable since it moves through the entire depth of the water. But when it reaches shallow water, something called wave shoaling occurs. Because there is less water to move through, this still massive amount of energy is compressed. The wave's speed slows down, while its height rises to as much as 100 feet. . If the trough of a tsunami reaches shore first, the water will withdraw farther than normal before the wave hits, which can be misleadingly dangerous. A tsunami will not only drown people near the coast, but level buildings and trees for a mile inland or more, especially in low-lying areas. So how can we protect ourselves against this destructive force of nature? People in some areas have attempted to stop tsunamis with sea walls, flood gates, and channels to divert the water. But these are not always effective. Many scientists and policy makers are instead focusing on early detection, monitoring underwater pressure and seismic activity, and establishing global communication networks for quickly distributing alerts. When nature is too powerful to stop, the safest course is to get out of its way.

How are tsunamis different from regular sea waves?

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[Question ID = 3563]

1. Waves are confined to the shore, tsunamis go far inland. [Option ID = 14232]
2. Unlike regular waves, tsunamis do not have a trough and a crest. [Option ID = 14230]
3. Regular waves are tidal waves caused by the gravitational forces of the Sun and Moon while tsunamis result from the movement of energy through water. [Option ID = 14229]
4. The difference lies in the massive destruction that tsunamis cause. [Option ID = 14231]

Correct Answer :-

- Regular waves are tidal waves caused by the gravitational forces of the Sun and Moon while tsunamis result from the movement of energy through water. [Option ID = 14229]

Topic:- PHD_CS_topic5

1) *based on the following passage*

I. Chances are you belong to the world's bilingual and multilingual majority. And besides having an easier time traveling or watching movies without subtitles, knowing two or more languages means that your brain may actually look and work differently than those of your monolingual friends. So what does it really mean to know a language? Language ability is typically measured in two active parts, speaking and writing, and two passive parts, listening and reading. While a balanced bilingual has near equal abilities across the board in two languages, most bilinguals around the world know and use their languages in varying proportions.

Because all types of bilingual people can become fully proficient in a language regardless of accent or pronunciation, the difference may not be apparent to a casual observer. But recent advances in brain imaging technology have given neurolinguists a glimpse into how specific aspects of language learning affect the bilingual brain. It's well known that the brain's left hemisphere is more dominant and analytical in logical processes, while the right hemisphere is more active in emotional and social ones. According to this theory, children learn languages more easily because the plasticity of their developing brains lets them use both hemispheres in language acquisition, while in most adults, language is lateralized to one hemisphere, usually the left. If this is true, learning a language in childhood may give you a more holistic grasp of its social and emotional contexts. Conversely, recent research showed that people who learned a second language in adulthood exhibit less emotional bias and a more rational approach when confronting problems in the second language than in their native one. But regardless of when you acquire additional languages, being multilingual gives your brain some remarkable advantages. Some of these are even visible, such as higher density of the grey matter that contains most of your brain's neurons and synapses, and more activity in certain regions when engaging a second language. The heightened workout a bilingual brain receives throughout its life can also help delay the onset of diseases, like Alzheimer's and dementia by as much as five years.

Children can learn languages more easily than adults because.

[Question ID = 3564]

1. their brains are more plastic at this age. [Option ID = 14253]
2. brain's left hemisphere is more dominant and analytical in logical processes. [Option ID = 14254]
3. they have a more holistic grasp of their social and emotional contexts. [Option ID = 14256]
4. Unlike the adults they use both hemispheres in language acquisition. [Option ID = 14255]

Correct Answer :-

- their brains are more plastic at this age. [Option ID = 14253]

2) *based on the following passage*

I. Chances are you belong to the world's bilingual and multilingual majority. And besides having an easier time traveling or watching movies without subtitles, knowing two or more languages means that your brain may actually look and work differently than those of your monolingual friends. So what does it really mean to know a language? Language ability is typically measured in two active parts, speaking and writing, and two passive parts, listening and reading. While a balanced bilingual has near equal abilities across the board in two languages, most bilinguals around the world know and use their languages in varying proportions.

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brain. Some of these advantages. Some of these are even visible, such as higher density of the grey matter that contains most of your brain's neurons and synapses, and more activity in certain regions when engaging a second language. The heightened workout a bilingual brain receives throughout its life can also help delay the onset of diseases, like Alzheimer's and dementia by as much as five years.

Your ability to use a language can be judged by the way,

[Question ID = 3563]

1. Both You speak and write a language and read and listen [Option ID = 14251]
2. You use your active and passive parts of the brain [Option ID = 14252]
3. You read and listen [Option ID = 14250]
4. You speak and write a language [Option ID = 14249]

Correct Answer :-

- You speak and write a language [Option ID = 14249]

3) *based on the following passage*

I. Chances are you belong to the world's bilingual and multilingual majority. And besides having an easier time traveling or watching movies without subtitles, knowing two or more languages means that your brain may actually look and work differently than those of your monolingual friends. So what does it really mean to know a language? Language ability is typically measured in two active parts, speaking and writing, and two passive parts, listening and reading. While a balanced bilingual has near equal abilities across the board in two languages, most bilinguals around the world know and use their languages in varying proportions.

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Mark the statement that is NOT true:

[Question ID = 3565]

1. Monolinguals' brains are supposed to work differently from bilinguals' brains. [Option ID = 14260]
2. Bilinguals may suffer from some brain-related diseases a little later than monolinguals. [Option ID = 14259]
3. Bilinguals have certain advantages over monolinguals. [Option ID = 14257]
4. The left and the right hemispheres of brain have entirely different functions to perform. [Option ID = 14258]

Correct Answer :-

- Bilinguals have certain advantages over monolinguals. [Option ID = 14257]

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