Dhirubhai Ambani Institute of Information and Communication Technology (DA-IICT)
M.Sc.(Data Science) Entrance Test
Sample Question Paper

Time: 1 hour 30 minutes

Application No.   **Name:**

Instructions

1. Write your **Application Number and Name** clearly in the space provided at the top of the question paper.

2. The entrance examination contains four sections : Quantitative Aptitude, Statistics, Computer Science and Mathematics.

3. Attempt all questions. All questions carry equal marks.

4. Each question has five choices out of which only one is the correct answer. 4 marks for correct answer, -1 mark for incorrect answer, 0.25 marks for not attempting.

5. **The question booklet** along with the answers has to be returned at the end of the examination.

6. Calculator is not allowed. Cellular phone and other electronic gadgets are NOT allowed in the examination hall.

FOR EVALUATOR'S USE ONLY

Question No.	Marks	Question No.	Marks
1		11	
2		12	
3		13	
4		14	
5		15	
6		16	
7		17	
8		18	
9		19	
10		20	
Total Marks		Total Marks	

1. "Indian history was written by British historians – extremely well documented and researched, but not always impartial. History had to serve its purpose: Everything was made subservient to the glory of the Union Jack. Latter-day Indian scholars presented a contrary picture". From the text, we can infer that Indian history written by British historians _____

   (a) was well documented and not researched but always biased.

   (b) was not well documented and researched and was always biased.

   (c) was well documented and researched but was sometimes biased.

   (d) was not well documented and researched and was sometimes biased.

   Answer: c

2. Two design consultants, P and Q, started working from 8 AM for client. The client budgeted a total of USD 3000 for the consultants. P stopped working when the hour hand moved by 210 degrees on the clock. Q stopped working when the hour hand moved by 240 degrees. P took two tea breaks of 15 minutes each during her shift, but took no lunch break. Q took only one lunch break for 20 minutes, but no tea breaks. The market rate for consultant is USD 200 per hour and breaks are not paid. After paying the consultants, the client shall have USD _____ remaining in the budget.

   (a) 0

   (b) 166.67

   (c) 300

   (d) 433.33

   Answer: b

3. Statements: Some hills are rivers. Some rivers are deserts. All deserts are roads.
   Conclusions: I. Some roads are rivers II. Some roads are hills III. Some deserts are hills

   (a) Only I follow

   (b) Only I and II follow

   (c) Only II and III follow

   (d) All follow

   (e) None follow

   Answer: a

4. A man walked 30m towards south. Then, turned to his right and walked 30m. Then, turned to his left, he walked 20m. Again, he turned to his left, walked 30m. How far is he from his initial position

   (a) 30m

   (b) 20m

   (c) 80m

   (d) 60m

   (e) None of these

   Answer: d

5. Following series consists of seven figures, two of which at the ends are unnumbered. One of the five numbered figures does not fit into the series. Find out the figure.
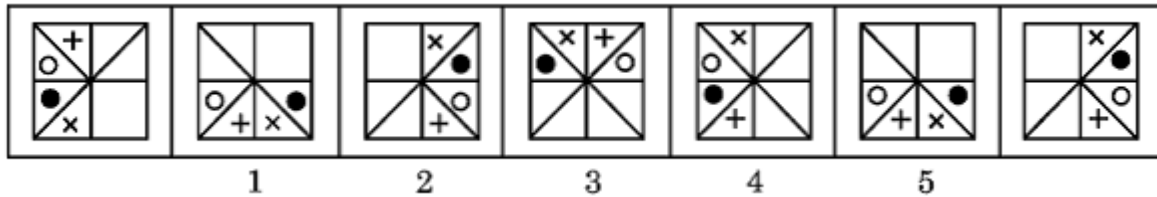
Answer: e

6. A dice is numbered from 1 to 6 in different ways. If 1 is adjacent to 2, 3 and 5 then which of the following statements is necessary true?

   (a) 4 is adjacent to 6

   (b) 2 is adjacent to 5

   (c) 1 is adjacent to 6

   (d) 1 is adjacent to 4

   (e) None of these

   Answer: a

7. If 'A $ B' means 'A is brother of B', 'A @ B' means 'A is wife of B', 'A # B' means 'A is daughter of B' and 'A & B' means 'A is father of B', then which of the following expressions indicates the relationship 'K' is father-in-law of H'?

   (a) H @ J $ L # P & K

   (b) H @ J $ P & L # K

   (c) H @ J $ L # K & P

   (d) H @ P $ J & L # K

   (e) None of these

   Answer: c

8. Assertion (A): Information technology is fast becoming a very important field of activity in India.
   Reason (R): Software is one of the major exports of the country and India has a very strong base in hardware.

   (a) Both (A) and (R) are individually true and (R) is the correct explanation of (A).

   (b) Both (A) and (R) are individually true and (R) is not the correct explanation of (A).

   (c) (A) is true but (R) is false.

   (d) (A) is false but (R) is true.
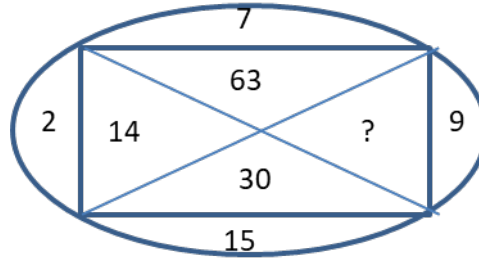
   (e) None of these

   Answer: a

9. What do you understand by –"IF K is there L has to be there"

   (a) K & L will always be together

(b) K is not there, then L will not be there

(c) K is there, then L will also be there

(d) K & L will always be not together

(e) None of these

Answer: c

10. Find the missing number in the following figure

(a) 33

(b) 135

(c) 145

(d) 18

(e) None of these

Answer: b

1. The number of permutations of letters in the world "statistics" is

   (a) 50400
   (b) 52300
   (c) 47400
   (d) 48600
   (e) None of the above

   Correct answer is a)

2. Mean deviation about ………….. is the least

   (a) Mean
   (b) Median
   (c) First quartile
   (d) Third quartile
   (e) None of the above

   Correct answer is b)

3. If the probability that machine A will be working in next 5 years is 0.6 and the machine B will be working in next 5 years is 0.3, the probability that both will be working in next 5 years is

   (a) 0.38
   (b) 0.90
   (c) 0.18
   (d) 0.24
   (e) None of the above

   Correct answer is c)

4. Let a pair of fair dice be thrown. What is the probability that the sum of scores will be 8?

   (a) 4/36
   (b) 5/36
   (c) 1/36
   (d) 6/36
   (e) None of the above

   Correct answer is b)

5. Two numbers are chosen at random from among the numbers 1 to 10 without replacement. Find the probability that the second number chosen is 5.

   (a) 1/10
   (b) 1/2

   (c) 2/5

   (d) 3/10

   (e) None of the above

Correct answer is a)

6. In 100 tosses of a fair coin, the standard deviation of number of heads is

   (a) 20

   (b) 10

   (c) 15

   (d) 5

   (e) None of the above

Correct answer is d)

7. If a fair die is thrown 12 times, the probability of getting the scores 1, 2, 3, 4, 5, and 6 exactly twice each is

   (a) 0.0024

   (b) 0.0034

   (c) 0.0043

   (d) 0.0045

   (e) None of the above

Correct answer is b)

8. Let X be a Poisson random variable with parameter λ. Then $E(X^2)$ is

   (a) λ^2

   (b) λ

   (c) $\lambda^2 + \lambda$

   (d) 2λ

   (e) None of the above

Correct answer is c)

9. Let the Moment Generating Function (MGF) of a random variable X is $(0.2 + 0.8e^t)$. Then P(X=1) is

   (a) 0.2

   (b) 0.4e

   (c) 0.8

   (d) 0.8e

   (e) None of the above

Correct answer is c)

10. Let X and Y are independently distributed as Binomial (n, p) and Binomial (m, p). Then distribution of $Z = X + Y$ is

   (a) Normal $(m + n, p)$

   (b) Binomial (mn, p)

   (c) Binomial $(m + n, p)$

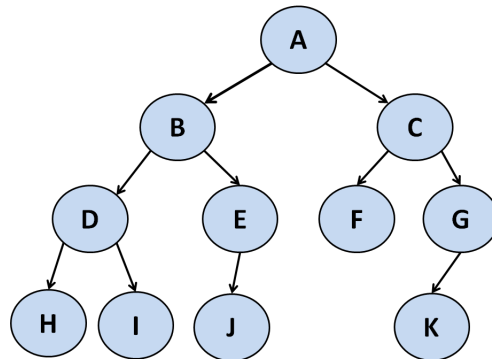   (d) Exponential (p^{m+n})

   (e) None of the above

   Correct answer is c)

1. Which of the following time complexities represent better worst case running time?

    (a) $O(\lg(n!))$

    (b) $O(n)$

    (c) $O(n^2)$

    (d) $O(\lg(\lg(n)))$

    (e) none of the above

    Answer: (d)

2. Traverse the given tree using inorder and preorder traversals?

    (a) Inorder: HDIBJEAFCKG, Preorder: ABDHIEJCFGK

    (b) Inorder: ABDHIEJCFGK, Preorder: HDIBJEAFCKG

    (c) Inorder: KGFCHIDEBCA, Preorder: ABDHIEJCFGK

    (d) Inorder: HDIBJEAFCKG, Preorder: KGFCHIDEBCA

    (e) none of the above

    Answer: (a)

3. What will be the output of the following pseudocode?

```
a = 8, b = 9
function(a, b)
  if(a < b)
   return function(b, a)
  else if(b != 0)
   return (a + function(a,b-1))
  else
   return 0
```

    (a) 56

    (b) 78

    (c) 72

    (d) 68

    (e) none of the above

    Answer: (c)

4. How will you find the minimum element in a binary search tree?

   (a)
```
public void min(Tree root)
{
        while(root.left() != null)
        {
                root = root.left();
        }
        System.out.println(root.data());
}
```

   (b)
```
public void min(Tree root)
{
        while(root != null)
        {
                root = root.left();
        }
        System.out.println(root.data());
}
```

   (c)
```
public void min(Tree root)
{
        while(root.right() != null)
        {
                root = root.right();
        }
        System.out.println(root.data());
}
```

   (d)
```
public void min(Tree root)
{
        while(root != null)
        {
                root = root.right();
        }
        System.out.println(root.data());
}
```

   (e) none of the above

   Answer: (a)

5. How many times the loop in the following code snippet will be executed?

```
ch = 'b';
while(ch >= 'a' && ch <= 'z')
ch++;
```

   (a) infinite
   (b) 26
   (c) 25

   (d) 0

   (e) none of the above

Answer: (c)

6. Let P be a Quick Sort Program to sort numbers in ascending order using the first element as a pivot. Let t1 and t2 be the number of comparisons made by P for the inputs 1, 2, 3, 4, 5 and 4, 1, 5, 3, 2 respectively. Which one of the following holds?

   (a) $t1 = 5$

   (b) $t1 < t2$

   (c) $t1 > t2$

   (d) $t1 = t2$

   (e) none of the above

Answer: (c)

7. Consider the following C code snippet. How many times will x be printed?

```c
#include <stdio.h>
int main()
{
  int x = 5;
  for(x = 0; x<10; x++)
    {
     x =10;
     printf("%d", x);
    }
}
```

   (a) 0

   (b) 1

   (c) 10

   (d) 2

   (e) none of the above

Answer: (b)

8. Which of the following is a valid identifier in C?

   (a) static

   (b) break

   (c) sort

   (d) switch

   (e) none of the above

Answer: (c)

9. What will happen when the following C function is called with a positive argument n ?

```c
int convert(int n)
{
    if (n<0)
        printf("%d", n);
    else
    {
    convert(n/2);
        printf("%d", n%2);
    }
}
```

(a) It will print the binary representation of n and terminate

(b) It will not print anything and not terminate

(c) It will print 0

(d) It will not print anything and will terminate

(e) none of the above

Answer: (b)

10. What will be the output of the following C program?

```c
#include <stdio.h>
int counter = 0;
int calc (int a, int b)
{
    int c;
    counter=counter+1;
    if (b==3)
        return (a*a);
    else
    {
        c = calc(a, b/3);
        return (c*c);
    }
}

int main (){
    calc(4, 27);
    printf ("%d", counter);
}
```

(a) 4

(b) NaN

(c) 3

(d) 2

(e) none of the above

Answer: (c)

1. If $\lambda(\neq 0)$ is an eigenvalue of a nonsingular matrix A, then which of the following is an eigenvalue of adj(A)?

   (a) λ

   (b) $\frac{1}{\lambda}$

   (c) $\overline{\lambda}$

   (d) $\frac{\det(A)}{\lambda}$

   Answer: (d)

2. Consider the matrix $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$. If $a+b = c+d$, then what are the two eigenvalues of A?

   (a) $\lambda_1 = a + b$, $\lambda_2 = a - b$

   (b) $\lambda_1 = a - b$, $\lambda_2 = c - d$

   (c) $\lambda_1 = a + b$, $\lambda_2 = d - b$

   (d) $\lambda_1 = a + b$, $\lambda_2 = d + b$

   Answer: (c)

3. Let (a_n) be a non negative sequence of real numbers and let $\sum a_n$ be convergent. Then which of the following is true?

   (a) $\sum a_n^2$ is convergent but $\sum a_n a_{n+1}$ is divergent.

   (b) Both $\sum a_n^2$ and $\sum a_n a_{n+1}$ are convergent.

   (c) Both $\sum a_n^2$ and $\sum a_n a_{n+1}$ are divergent.

   (d) $\sum a_n^2$ is divergent but $\sum a_n a_{n+1}$ is convergent.

   Answer: (b)

4. Let

$$f(x) = \begin{cases} \frac{1}{9^n} & \text{if } x = \frac{1}{3^n} (n = 1, 2, 3, ...) \\ 0 & \text{otherwise} \end{cases} \tag{1}$$

   Then which of the following is true?

   (a) f is differentiable at 0.

   (b) f is continuous at 0, but not differentiable at 0.

   (c) f is not continuous at 0.

   (d) f is differentiable everywhere except at 0.

   Answer: (a)

5. Which of the following is an integrating factor of the differential equation

$$xdy + ydx + 3x^3y^4dy = 0?$$

   (a) $\frac{1}{xy}$

(b) $\frac{1}{xy^2}$

(c) $\frac{1}{xy^3}$

(d) $\frac{1}{x^3y^3}$

Answer: (d)

6. $\lim\limits_{x\to\infty} (x - \log x)$ is

   (a) $-\infty$

   (b) e

   (c) $+\infty$

   (d) $\frac{1}{e}$

Answer: (c)

7. Let $S = \left\{y : y = \dfrac{2x+3}{x+1},\ x \geq 0\right\}$. Then which of the following is true?

   (a) S has a maximum but no minimum

   (b) S has a minimum but no maximum

   (c) S has both maximum and minimum

   (d) S has neither a maximum nor a minimum

Answer: (b)

8. The value of the integral $\displaystyle\int_0^{50} e^{x-[x]}dx$ is

   (a) $\frac{e^{50}-1}{50}$

   (b) $\frac{e^{50}-1}{e-1}$

   (c) $50(e-1)$

   (d) $\frac{e-1}{50}$

Answer: (c)

9. Let $f(x) = \sqrt{\sin x},\ \ x \in [0, \pi]$. Then

   (a) $f(x)$ is continuous in $[0, \pi]$.

   (b) $f(x)$ is discontinuous in $[0, \pi]$.

   (c) $f(x)$ is discontinuous only at 0 and nowhere else.

   (d) $f(x)$ is discontinuous only at 0 and π, and nowhere else.

Answer: (a)

10. The limit of the sequence $\left\{n^{\left(\frac{1}{n^2}\right)}\right\}$ as $n \to \infty$ is

   (a) 0

   (b) e

   (c) $\frac{1}{e}$

   (d) 1

Answer: (d)