

Roll No:

Application No:

Name:

Exam Date: **05-Oct-2020**

Exam Time: **09:00-12:00**

Examination: **1. Course Code - M.A./M.Sc./M.C.A.**

2. Field of Study - MASTER OF COMPUTER APPLICATIONS (MCAM)

SECTION 1 - SECTION 1

Question No.1 (Question Id - 98)

Evaluate $\sum_{r=3}^{10} (5r + 2)$.

Choose the **correct** answer.

- (A) ☐ 265
 (B) ☒ **276 (Correct Answer)**
 (C) ☐ 297
 (D) ☐ None of the above

Question No.2 (Question Id - 6)

What is the volume of a cube ?

Statement I:

The area of each face of the cube is 64 square metres.

Statement II:

The length of one side of the cube is 8 metres.

- (A) ☐ **Statement (I)** alone is sufficient to answer the question.
 (B) ☐ **Statement (II)** alone is sufficient to answer the question.
 (C) ☒ **Statement (I) or Statement (II) alone is sufficient. (Correct Answer)**
 (D) ☐ **Statement (I) and (II)** together are necessary to answer the question.

Question No.3 (Question Id - 26)

What is/are true from the list given below ?

- A. Radix of any number system is the number of digits required to represent all numerical values in that system.
 B. Base of any number system is the number of digits required to represent all numerical values in that system.
 C. Radix is the exponent value of a number in any number system.
 D. Base is the exponent value of a number in any number system.

Choose the **correct** answer from the options given below.

- (A) ☒ **A and B only (Correct Answer)**
 (B) ☐ A and D only
 (C) ☐ B and C only
 (D) ☐ All A, B, C, D

Question No.4 (Question Id - 52)

If $f(n) = \int_0^{\frac{\pi}{4}} \tan^n x \, dx$, then the value of $f(3) + f(1)$ is equal to :

- (A) ☐ 1
- (B) ☒ $\frac{1}{2}$ (Correct Answer)
- (C) ☐ 0
- (D) ☐ $\frac{3}{2}$ (Chosen option)

Question No.5 (Question Id - 95)

Find the domain and range of the function $f: \mathbb{R} \rightarrow \mathbb{R}$, $f(x) = \frac{3x-1}{x-3}$.

- A. $\{x \in \mathbb{R} : x \neq 3\}$
- B. $\{x \in \mathbb{R} : x \neq 1/3\}$
- C. $\{y \in \mathbb{R} : y \neq 3\}$
- D. $\{y \in \mathbb{R} : y \neq 1/3\}$

Choose the **correct** answer from the options given below.

- (A) ☒ **A and C only (Correct Answer)**
- (B) ☐ A and D only
- (C) ☐ B and C only
- (D) ☐ B and D only

Question No.6 (Question Id - 97)

Let $f(x) = \frac{1}{1+\sqrt{x}}$ and $g(x) = x + 7$. Then, the value of x at which $(f^{-1} \circ g^{-1})(x) = 9$ is :

- A. $x = \frac{29}{4}$
- B. $x = \frac{13}{2}$
- C. $x = \frac{19}{2}$
- D. $x = \frac{23}{4}$

Choose the **correct** answer from the options given below.

- (A) ☒ **A and B only (Correct Answer)**
- (B) ☐ A and C only
- (C) ☐ B and D only
- (D) ☐ C and D only

Question No.7 (Question Id - 25)

What is the Excess-3 code for $(45)_{10}$?

- (A) ☐ 0111 0101
- (B) ☒ **0111 1000 (Correct Answer)**
- (C) ☐ 0111 1010
- (D) ☐ 0111 1001

Question No.8 (Question Id - 49)

If ${}^{2n}C_3 : {}^nC_2 = 11 : 1$, what is the value of n ?

- (A) ☐ 4
- (B) ☐ 5
- (C) ☐ 6
- (D) ☒ **None of the above (Correct Answer)**

Question No.9 (Question Id - 78)

Let $2\tan^2x + \sec^2x = 2$, $0 \leq x \leq 2\pi$. Then, the possible solutions of x are :

- A. $\frac{\pi}{6}$
 B. $\frac{5\pi}{6}$
 C. $\frac{\pi}{3}$
 D. $\frac{11\pi}{6}$
 E. $\frac{\pi}{4}$

Choose the **correct** answer from the options given below.

- (A) ☐ A and B only
 (B) ☒ A, B and D only (Correct Answer)
 (C) ☐ D and C only
 (D) ☐ D and E only

Question No.10 (Question Id - 55)

The value of $\int_0^\infty \int_x^\infty \frac{e^{-y}}{y} dy dx$ by changing the order of integration is :

- (A) ☐ Zero
 (B) ☐ $\frac{3}{4}$
 (C) ☒ 1 (Correct Answer)
 (D) ☐ $\frac{1}{2}$

Question No.11 (Question Id - 75)

If $(G, *)$ is a cyclic group of order 73, then the number of generator of G is equal to :

- (A) ☐ 89
 (B) ☐ 23
 (C) ☒ 72 (Correct Answer)
 (D) ☐ 17

Question No.12 (Question Id - 58)

Given that :

x	1	2	3	4	5
u	2	5	10	20	30

- (A) ☐ $\Delta = \nabla E^{-1}$
 (B) ☐ $\Delta = E + I$
 (C) ☐ $\Delta^2 u_4 = u_4 - 2u_3 - u_2$
 (D) ☒ $\nabla^2 u_4 = 5$ (Correct Answer)

Question No.13 (Question Id - 1)

Find the biggest fraction among the following :

$\frac{5}{7}, \frac{7}{9}, \frac{9}{11}, \frac{11}{13}, \frac{13}{15}$

- (A) ☐ $\frac{5}{7}$

- (B) ☐ $\frac{9}{11}$
- (C) ☐ $\frac{11}{13}$
- (D) ☒ $\frac{13}{15}$ (Correct Answer) (Chosen option)

Question No.14 (Question Id - 33)

Consider a graph where

$$V(G) = \{P, Q, R, S\}$$

$$\text{and } E(G) = \{(P, Q), (Q, R), (R, S), (S, Q)\}$$

The degree of each vertices P, Q, R, S respectively in G are as follows :

- (A) ☐ 1, 1, 1, 1
- (B) ☒ 1, 3, 2, 2 (Correct Answer)
- (C) ☐ 1, 2, 2, 3
- (D) ☐ 1, 2, 3, 2

Question No.15 (Question Id - 93)

Given below are two Statements.

Statement I:

Let the function $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined as

$$f(x) = \begin{cases} x & \text{if } x > 2 \\ 5x - 2 & \text{if } x \leq 2 \end{cases}$$

then, $f(x)$ is onto.

Statement II:

Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be a function defined as $f(x) = x^2$. Then, $f(x)$ is one-one.

In the light of the above statements, choose the **correct** answer from the options given below.

- (A) ☐ Both **Statement I** and **Statement II** are true
- (B) ☐ Both **Statement I** and **Statement II** are false
- (C) ☒ **Statement I is correct, but Statement II is false. (Correct Answer)**
- (D) ☐ **Statement I** is incorrect, but **Statement II** is true.

Question No.16 (Question Id - 69)

If $2\hat{i} + 4\hat{j} - 5\hat{k}$ and $\hat{i} + 2\hat{j} + 3\hat{k}$ are two different sides of rhombus, then the length of the diagonals are :

- (A) ☒ 7, $\sqrt{69}$ (Correct Answer) (Chosen option)
- (B) ☐ 6, $\sqrt{59}$
- (C) ☐ 5, $\sqrt{65}$
- (D) ☐ 8, $\sqrt{45}$

Question No.17 (Question Id - 5)

Find the odd man out.

3, 5, 7, 12, 17, 19

- (A) ☐ 19
- (B) ☐ 17
- (C) ☐ 7
- (D) ☒ 12 (Correct Answer)

Question No.18 (Question Id - 94)

Given below are two Statements.

Statement I:

Let n be a positive integer greater than 3. Then, $(n^3 - 8)$ can never be a prime number.

Statement II:

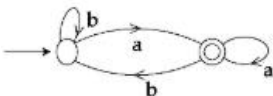
Let n be a positive integer. Then, $(2n + 1)^2 - (2n - 1)^2$ will be always divisible by 8.

In the light of the above statements, choose the **most appropriate** answer from the options given below.

- (A) ☐ Both Statement I and Statement II are correct (Correct Answer)
 (B) ☐ Both Statement I and Statement II are incorrect
 (C) ☐ Statement I is correct, but Statement II is incorrect.
 (D) ☐ Statement I is incorrect, but Statement II is correct.

Question No.19 (Question Id - 46)

What is the language accepted by the following automaton ?



- (A) ☐ $(a + b)^*(a + b)$
 (B) ☐ $(a + b)^*a$ (Correct Answer)
 (C) ☐ $(a + b)^*$
 (D) ☐ a^*b

Question No.20 (Question Id - 53)

Find the value of the integral $\int_{-\pi}^{\pi} \frac{\cos^2 x}{1 + a^x} dx$, where $a > 0$.

- (A) ☐ $\frac{\pi}{2}$ (Correct Answer)
 (B) ☐ $\frac{\pi}{4}$
 (C) ☐ $\frac{\pi}{3}$
 (D) ☐ $\frac{\pi}{6}$ (Chosen option)

Question No.21 (Question Id - 60)

If a variable X has the p.d.f

$$f(x) = \frac{1}{4} x e^{-x/2}, \quad 0 < x < \infty,$$

then the distribution has mean and variance as :

- (A) ☐ mean = 2 and variance = 4
 (B) ☐ mean = $\frac{1}{2}$ and variance = $\frac{1}{4}$ (Chosen option)
 (C) ☐ mean = 4 and variance = 2
 (D) ☐ mean = 4 and variance = 8 (Correct Answer)

Question No.22 (Question Id - 79)

If $\frac{\sin \theta + \cos \theta}{\sin \theta - \cos \theta} = 3$, then the value of $\sin^4 \theta - \cos^4 \theta$ is :

- (A) ☐ $\frac{1}{5}$
 (B) ☐ $\frac{3}{5}$ (Correct Answer) (Chosen option)

(C) ☐ $\frac{2}{5}$

(D) ☐ $\frac{4}{5}$

Question No.23 (Question Id - 18)

MK : 1311 :: HJ : ?

(A) ☐ 911

(B) ☐ 1011

(C) ☐ **810 (Correct Answer)**

(D) ☐ 710

Question No.24 (Question Id - 85)

If $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 3 \\ 0 & 1 & 2 \end{bmatrix}$, then :

(A) ☐ $A^3 - 3A^2 + 6A - 4I = 0$

(B) ☐ $2A^3 - 2A^2 + 4I = 0$

(C) ☐ $A^3 - A^2 + A + I = 0$

(D) ☐ **None of these (Correct Answer)**

Question No.25 (Question Id - 67)

If the points $(-1, -1, 2)$, $(2, m, 5)$ and $(3, 11, 6)$ are collinear, then the value of m is :

(A) ☐ 5

(B) ☐ 3

(C) ☐ 4

(D) ☐ **8 (Correct Answer)**

Question No.26 (Question Id - 11)

A, B and C can paint a wall in 22 days. If A takes 99 days and B takes 36 days to paint the wall, how many days will C take to paint it alone ?

(A) ☐ 66

(B) ☐ 72

(C) ☐ **132 (Correct Answer)**

(D) ☐ None of these

Question No.27 (Question Id - 72)

Let G be a group with 8 elements. Let H be a subgroup of G . It is given that the size of H is at least 3. Then, the size of H will be :

(A) ☐ 8

(B) ☐ 2

(C) ☐ 3

(D) ☐ **4 (Correct Answer)**

Question No.28 (Question Id - 84)

Find the eigenvalues of the matrix $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$.

Choose the **correct** answer from below.

(A) ☐ 0, 0, 0

(B) ☐ 0, 0, 1

(C) ☐ 0, 0, 2

(D) ☐ **0, 0, 3 (Correct Answer)**

Question No.29 (Question Id - 32)

If interrupt occurs during the execution of a program, then it :

- (A) ☐ follows the next instruction in the program
 (B) ☐ jumps to instruction in other registers
 (C) ☒ **breaks the normal sequence of execution of instructions (Correct Answer)**
 (D) ☐ stops executing the program

Question No.30 (Question Id - 43)

Consider the following 'C' declaration.

```
struct {
    short s[5];
    union {
        float y;
        long z;
    } n;
} t;
```

Assume that objects of type short, float and long occupy 2 bytes, 4 bytes and 8 bytes respectively. What will be the memory requirement for variable, ignoring alignment consideration ?

- (A) ☐ 22 Bytes
 (B) ☐ 14 Bytes
 (C) ☒ **18 Bytes (Correct Answer)**
 (D) ☐ 10 Bytes

Question No.31 (Question Id - 50)

If ${}^nC_{r-1} = 36$, ${}^nC_r = 84$ and ${}^nC_{r+1} = 136$, what will be the value of n ?

- (A) ☐ 3
 (B) ☐ 5
 (C) ☐ 7
 (D) ☒ **9 (Correct Answer)**

Question No.32 (Question Id - 70)

If $\vec{a} = 2\hat{i} + \hat{j} + \hat{k}$, $\vec{b} = \hat{i} + 2\hat{j} - \hat{k}$ and unit vector \vec{c} are coplanar vectors such that \vec{c} and \vec{a} are perpendicular, then \vec{c} is :

- (A) ☒ $\frac{-\hat{j} + \hat{k}}{\sqrt{2}}$ **(Correct Answer)**
 (B) ☐ $\frac{-\hat{j} - \hat{k}}{\sqrt{3}}$
 (C) ☐ $\frac{\hat{i} - 2\hat{j}}{\sqrt{5}}$ (Chosen option)
 (D) ☐ $\frac{\hat{i} - \hat{j} - \hat{k}}{\sqrt{3}}$

Question No.33 (Question Id - 87)

Statement I:

The equation of the parabola, whose focus is the point (2, 3) and directrix is the line $x - 4y + 3 = 0$, is

$$16x^2 + y^2 + 8xy - 74x - 78y + 212 = 0.$$

Statement II:

The eccentricity of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ which passes through the points (3, 0) and $(3\sqrt{2}, 2)$ is $\frac{\sqrt{13}}{3}$.

In the light of the above statements, choose the **correct** answer from the options given below.

- (A) ☐ Both **Statement I** and **Statement II** are true. (Correct Answer)
 (B) ☐ Both **Statement I** and **Statement II** are false.
 (C) ☐ **Statement I** is correct, but **Statement II** is false.
 (D) ☐ **Statement I** is incorrect, but **Statement II** is true.

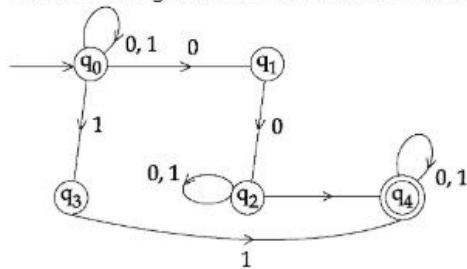
Question No.34 (Question Id - 80)

The minimum value of $2\sin^2\theta + 3\cos^2\theta$ is :

- (A) ☐ 0
 (B) ☐ 3
 (C) ☐ 2 (Correct Answer)
 (D) ☐ 1

Question No.35 (Question Id - 47)

Consider the given NFA and determine the states reached by the input string 0101.



- (A) ☐ {q₀, q₃, q₄} (Correct Answer)
 (B) ☐ {q₀, q₁, q₂}
 (C) ☐ {q₁, q₂, q₃}
 (D) ☐ {q₁, q₂, q₄}

Question No.36 (Question Id - 22)

An OR gate has 6 inputs. What is the only input word that produces a 0 output ?

- (A) ☐ 000000 (Correct Answer)
 (B) ☐ 000111
 (C) ☐ 111000
 (D) ☐ 111111

Question No.37 (Question Id - 82)

The value of $\cos\frac{\pi}{5} \cos\frac{2\pi}{5} \cos\frac{4\pi}{5} \cos\frac{8\pi}{5}$ is :

- (A) ☐ $\frac{1}{16}$ (Chosen option)
 (B) ☐ 0
 (C) ☐ $\frac{4}{5}$
 (D) ☐ $-\frac{1}{16}$ (Correct Answer)

Question No.38 (Question Id - 57)

The Newton divided difference polynomial which interpolate the data $f(0) = 1, f(1) = 3, f(3) = 55$ is :

- (A) ☐ $8x^2 + 6x + 1$
- (B) ☒ $8x^2 - 6x + 1$ (Correct Answer)
- (C) ☐ $8x^2 - 6x - 1$
- (D) ☐ $8x^2 + 6x - 1$

Question No.39 (Question Id - 83)

If $\tan\alpha = \frac{m}{m+1}$ and $\tan\beta = \frac{1}{2m+1}$, then $\alpha + \beta =$ _____.

- (A) ☒ $\frac{\pi}{4}$ (Correct Answer) (Chosen option)
- (B) ☐ $-\frac{\pi}{4}$
- (C) ☐ $\frac{3\pi}{4}$
- (D) ☐ $-\frac{3\pi}{4}$

Question No.40 (Question Id - 38)

The height of binary tree is the maximum number of edges in any root to leaf path. The maximum number of nodes in a binary tree of height h is :

- (A) ☐ 2^h
- (B) ☐ $2^{h-1} - 1$
- (C) ☒ $2^{h+1} - 1$ (Correct Answer)
- (D) ☐ 2^{h+1}

Question No.41 (Question Id - 2)

Three wheels can complete respectively 60, 36, 24 revolutions per minute. There is a white spot on each wheel that touches the ground at time zero. After how much time, all these spots will simultaneously touch the ground again ?

- (A) ☒ 5 (Correct Answer)
- (B) ☐ 10
- (C) ☐ 7
- (D) ☐ 6

Question No.42 (Question Id - 48)

Given a complete graph of 'n' vertices, how many Hamiltonian circuits are possible ?

- (A) ☐ $n!$
- (B) ☒ $(n - 1)!$ (Correct Answer)
- (C) ☐ n^2
- (D) ☐ n^n

Question No.43 (Question Id - 51)

For what value of k, the function

$$f(x,y) = \begin{cases} \frac{\sin^{-1}(xy - 2)}{\tan^{-1}(3xy - 6)} & , (x,y) \neq (1,2) \\ k & , (x,y) = (1,2) \end{cases}$$

is continuous ?

- (A) ☒ $\frac{1}{2}$ (Chosen option)

- (B) ☐ $\frac{1}{3}$ (Correct Answer)
- (C) ☐ $\frac{1}{4}$
- (D) ☐ $\frac{3}{4}$

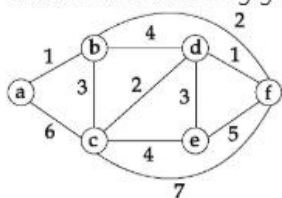
Question No.44 (Question Id - 91)

The equation of the ellipse whose centre is at the origin and the x-axis, the major axis, passing through the points (- 3, 1) and (2, - 2) is given by :

- (A) ☐ $5x^2 + 3y^2 = 32$
- (B) ☐ $3x^2 + 5y^2 = 32$ (Correct Answer)
- (C) ☐ $5x^2 - 3y^2 = 32$
- (D) ☐ $3x^2 + 5y^2 = - 32$

Question No.45 (Question Id - 35)

Consider the following graph.

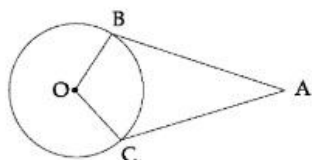


Which one of the following can't be the sequence of edges added in that order, to a Minimal Spanning Tree (MST) using Kruskal's Algorithm ?

- (A) ☐ (a-b), (d-f), (b-f), (d-c), (d-e)
- (B) ☐ (a-b), (d-f), (d-c), (b-f), (d-e)
- (C) ☐ (d-f), (a-b), (d-c), (b-f), (d-e)
- (D) ☐ (d-f), (a-b), (b-f), (d-e), (d-c) (Correct Answer)

Question No.46 (Question Id - 4)

Find the area of the quadrilateral ABOC, given that the diameter of the circle is 20 cm and AB = 18cm



- (A) ☐ 185
- (B) ☐ 180 (Correct Answer)
- (C) ☐ 179
- (D) ☐ 178

Question No.47 (Question Id - 16)

Which of the following is always odd ?

- (A) ☐ Sum of two odd numbers
- (B) ☐ Difference of two odd numbers
- (C) ☐ Product of two odd numbers (Correct Answer)
- (D) ☐ None of these

Question No.48 (Question Id - 64)

Suppose a coin, weighted so that $P(H) = \frac{2}{3}$ and $P(T) = \frac{1}{3}$, is tossed. If head appears, then a number is selected at random from $\{1, 2, 3, 4, 5, 6, 7, 8, 9\}$; if tail appears, then a number is selected from $\{1, 2, 3, 4, 5\}$. Then the probability that an even number 'Ev' appears.

- (A) ☐ $\frac{58}{135}$ (Correct Answer)
- (B) ☐ $\frac{68}{135}$ (Chosen option)
- (C) ☐ $\frac{77}{135}$
- (D) ☐ $\frac{87}{135}$

Question No.49 (Question Id - 28)

Which kind of multiplexing scheme is adopted by Von-Newmann Architecture especially for program and data fetching purposes ?

- (A) ☐ Time Division Multiplexing (Correct Answer)
- (B) ☐ Frequency Division Multiplexing
- (C) ☐ Statistical Time Division Multiplexing
- (D) ☐ Code Division Multiplexing

Question No.50 (Question Id - 34)

The result of evaluating the postfix expression

5 4 6 + * 4 9 3 1 + *

- (A) ☐ 600
- (B) ☐ 350 (Correct Answer)
- (C) ☐ 650
- (D) ☐ 588

Question No.51 (Question Id - 24)

The functional capacity for SSI devices is :

- (A) ☐ 1 to 11 gates (Correct Answer)
- (B) ☐ 12 to 99 gates
- (C) ☐ 100 to 10000 gates
- (D) ☐ More than 10000 gates

Question No.52 (Question Id - 12)

Statements : All trains are not planes.
All planes are cars.

Conclusions : (A) Some cars are not trains.
(B) Some trains are cars.

Choose the **correct** answer from the options given below.

- (A) ☐ (A) only (Correct Answer)
- (B) ☐ (B) only
- (C) ☐ (A) and (B) only
- (D) ☐ (A) or (B) only

Question No.53 (Question Id - 71)

The position vector of the point which divides the join of points with position vectors $\vec{a} + \vec{b}$ and $2\vec{a} - \vec{b}$ in the ratio 1 : 2 is :

- (A) ☐ $\frac{3\vec{a} + 2\vec{b}}{3}$
- (B) ☐ \vec{a}
- (C) ☐ $\frac{5\vec{a} - \vec{b}}{3}$

(D) ☐ $\frac{\vec{a} + \vec{b}}{3}$ (Correct Answer) (Chosen option)

Question No.54 (Question Id - 100)

Solve the inequality $\frac{(x-3)^2(x+7)}{(4-x)} < 0$.

Choose the **correct** answer from below.

- (A) ☐ $x < -7$ or $x > 4$ (Correct Answer)
(B) ☐ $x > -7$ or $x < 4$
(C) ☐ $x < -3$ or $x > 4$
(D) ☐ $x > -3$ or $x < 4$

Question No.55 (Question Id - 14)

Let $X_k = (P_1 P_2 \dots P_k) + 1$, where P_1, P_2, \dots, P_k are the first k primes. Consider the following :

- A. X_k is a prime number
B. X_k is a composite number
C. X_k+1 is always an even number

Choose the **correct** answer from the options given below.

- (A) ☐ A only
(B) ☐ B only
(C) ☐ C only
(D) ☐ A and C only (Correct Answer)

Question No.56 (Question Id - 3)

The base of the triangle is increased by 40%. What can be the maximum percentage increase in the length of the height so that the increase in area is restricted to a maximum of 60% ?

- (A) ☐ 14.95%
(B) ☐ 14.98%
(C) ☐ 14.28% (Correct Answer)
(D) ☐ 14.45%

Question No.57 (Question Id - 88)

A point moves such that its distance from the point (4, 0) is half that of its distance from the line $x = 16$. The locus of the point is :

- (A) ☐ $3x^2 + 4y^2 = 192$ (Correct Answer)
(B) ☐ $4x^2 + 3y^2 = 192$
(C) ☐ $x^2 + y^2 = 192$
(D) ☐ None of these

Question No.58 (Question Id - 65)

If $f(x) = ce^{-(x^2-6x+9)/32}$, $-\infty < x < \infty$, represents a normal distribution, find the value of c , the mean μ and the variance σ^2 of the distribution.

- (A) ☐ $\mu = 3, \sigma^2 = 16, c = \frac{1}{4\sqrt{2\pi}}$ (Correct Answer) (Chosen option)
(B) ☐ $\mu = 4, \sigma^2 = 16, c = \frac{1}{4\sqrt{2\pi}}$
(C) ☐

$$\mu = 3, \sigma^2 = 15, c = \frac{1}{4\sqrt{2\pi}}$$

(D) ☐ $\mu = 3, \sigma^2 = 16, c = \frac{1}{2\sqrt{2\pi}}$

Question No.59 (Question Id - 17)

The perimeter of a rectangular field is 480 metres and the ratio between the length and the breadth is

5 : 3. The area is :

- (A) ☐ 1350 sq.m.
 (B) ☐ 1550 sq.m.
 (C) ☐ **13500 sq.m. (Correct Answer)**
 (D) ☐ 15500 sq.m.

Question No.60 (Question Id - 81)

If $x \cos \theta - y \sin \theta = \sqrt{x^2 + y^2}$ and $\frac{\cos^2 \theta}{a^2} + \frac{\sin^2 \theta}{b^2} = \frac{1}{x^2 + y^2}$, then the correct relation is :

- (A) ☐ $\frac{x^2}{b^2} - \frac{y^2}{a^2} = 1$
 (B) ☐ $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ (Correct Answer) (Chosen option)
 (C) ☐ $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$
 (D) ☐ $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$

Question No.61 (Question Id - 45)

What will be the maximum number of centre in a Tree ?

- (A) ☐ One
 (B) ☐ **Two (Correct Answer)**
 (C) ☐ Three
 (D) ☐ Infinite

Question No.62 (Question Id - 19)

Choose the 'ODD' man out : UW, DF, GI, LP.

- (A) ☐ UW
 (B) ☐ DF
 (C) ☐ GI
 (D) ☐ **LP (Correct Answer)**

Question No.63 (Question Id - 36)

If the MAX_SIZE is the size of the array used in the implementation of circular queue, assume array index start with 0, front points towards the first element in the queue, and rear points towards the last element in the queue. Which of the following condition specify that circular queue is Full ?

- (A) ☐ Front = rear = - 1
 (B) ☐ **Front = (rear + 1)%MAX_SIZE (Correct Answer)**
 (C) ☐ Rear = front + 1
 (D) ☐ Rear = (front + 1)%MAX_SIZE

Question No.64 (Question Id - 9)

YSDG : GDSY :: _____ : IOTU.

- (A) ☐ **UTOI (Correct Answer)**
 (B) ☐ VUPJ
 (C) ☐ TVSJ

(D) ☐ STIO

Question No.65 (Question Id - 30)

The minimum number of NAND gates required to implement Boolean Function :

$A + A\bar{B} + A\bar{B}C$ is equal to :

- (A) ☒ Zero (Correct Answer)
(B) ☐ 1
(C) ☐ 4
(D) ☐ 7

Question No.66 (Question Id - 76)

If G be a group such that $a^2 = e, \forall a \in G$, then G is :

- (A) ☒ abelian (Correct Answer)
(B) ☐ non-abelian group
(C) ☐ ring
(D) ☐ field

Question No.67 (Question Id - 39)

What will be the output of following 'C' code ?

```
main( )  
{  
    int i = 1, j = 2;  
    switch (i)  
    {  
        case i : printf ("GOOD");  
            break;  
        case j : printf ("BYE");  
            break;  
    }  
}
```

- (A) ☐ GOOD
(B) ☐ GOODBYE
(C) ☒ Compilation Error (Correct Answer)
(D) ☐ Runtime Error

Question No.68 (Question Id - 59)

The third divided difference of $\frac{1}{x}$ based on the points x_0, x_1, x_2, x_3 is :

- (A) ☒ $\frac{-1}{x_0 x_1 x_2 x_3}$ (Correct Answer)
(B) ☐ $\frac{1}{x_0 x_1 x_2 x_3}$ (Chosen option)
(C) ☐ $\frac{-1}{x_0 x_1 x_2}$
(D) ☐ $\frac{1}{x_0 x_1 x_2}$

Question No.69 (Question Id - 56)

Let a quadratic function be defined on $[a, b]$ by $f(x) = \alpha x^2 + \beta x + \gamma, \alpha \neq 0$. Then, the real number 'c' guaranteed by Lagrange's mean value theorem is equal to :

- (A) ☒ $\frac{a+b}{2}$ (Correct Answer)
(B) ☐ \sqrt{ab}
(C) ☐

$$\frac{2ab}{a+b} \text{ (Chosen option)}$$

(D) ☐ $\frac{a}{b} + \frac{b}{a}$

Question No.70 (Question Id - 20)

Find the value of y in $y^2 - 10y + 24 = 0$.

(A) ☒ **6 or 4 (Correct Answer)**

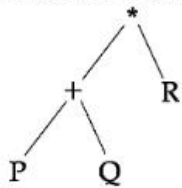
(B) ☐ 4 or 3

(C) ☐ 3 or 2

(D) ☐ 1 or 5

Question No.71 (Question Id - 37)

Which of the following is represented by parse tree ?



(A) ☐ $P * R + Q$

(B) ☐ $P + Q * R$

(C) ☐ $P + * Q R$

(D) ☒ **$(P + Q) * R$ (Correct Answer)**

Question No.72 (Question Id - 89)

The equation of the straight line passing through (1, 2) and perpendicular to the line $x + y + 7 = 0$ is :

(A) ☒ **$x - y = -1$ (Correct Answer)**

(B) ☐ $x + y = 1$

(C) ☐ $x + 2y = 1$

(D) ☐ $x - 3y = 1$

Question No.73 (Question Id - 54)

Find the value of $f\left(\frac{1}{\sqrt{3}}\right)$ when $\int_{\sin x}^1 t^2 f(t) dt = 1 - \sin x, \forall x \in \left[0, \frac{\pi}{2}\right]$.

(A) ☒ **3 (Correct Answer)**

(B) ☐ 2

(C) ☐ 4

(D) ☐ 1

Question No.74 (Question Id - 63)

If three unbiased coins are tossed, find the probability of getting (i) at least two tails, and (ii) at most two tails.

(A) ☐ $\frac{1}{2}, \frac{3}{8}$

(B) ☐ $\frac{1}{2}, \frac{5}{8}$ (Chosen option)

(C) ☒ **$\frac{1}{2}, \frac{7}{8}$ (Correct Answer)**

(D) ☐ $\frac{1}{2}, \frac{1}{8}$

Question No.75 (Question Id - 27)

A cache has 64 blocks with block size of 16 bytes. A block in main memory having address 1200 has

to be mapped into cache using direct mapping method. What would be the corresponding block number in cache ?

- (A) ☐ 11 (Correct Answer)
(B) ☐ 12
(C) ☐ 13
(D) ☐ None of the above

Question No.76 (Question Id - 40)

Consider the following 'C' declaration.

```
Struct node {  
    int i;  
    float j;  
};
```

```
struct node *s[10];
```

Of the following, how to define s ?

- (A) ☐ An array, each element of which is a pointer to a structure of type node. (Correct Answer)
(B) ☐ A structure of 2 fields, each field being a pointer to an array of 10 elements.
(C) ☐ A structure of 3 fields; an integer, a float and an array of 10 elements.
(D) ☐ An array, each element of which is a structure of type node.

Question No.77 (Question Id - 7)

A man said to a woman, 'I am your husband's father-in-law's wife's only son'. How can the woman be related to the man ?

- (A) ☐ Daughter
(B) ☐ Aunt
(C) ☐ Daughter-in-law
(D) ☐ Sister (Correct Answer)

Question No.78 (Question Id - 68)

If \vec{a} , \vec{b} , \vec{c} are unit vectors such that $\vec{a} + \vec{b} + \vec{c} = 0$, then the value of $\vec{a} \cdot \vec{b} + \vec{b} \cdot \vec{c} + \vec{c} \cdot \vec{a}$ is :

- (A) ☐ 1
(B) ☐ -3
(C) ☐ $-\frac{3}{2}$ (Correct Answer) (Chosen option)
(D) ☐ None of these

Question No.79 (Question Id - 61)

The moment generating function of the random variable X, whose moments are $\mu_r' = r! 2^r$, is :

- (A) ☐ $(1 - 2t)^{-1}$ (Correct Answer)
(B) ☐ $(1 - 2t)^{-2}$
(C) ☐ $(1 - 2t)^{-3}$
(D) ☐ $\frac{1}{2t}$

Question No.80 (Question Id - 42)

Statement I:

'C' Programming language allows the recursion of a function.

Statement II:

Recursion of main() function in 'C' language is possible.

In the light of the above statements, choose the **correct** answer from the options given below.

- (A) ☐ Both **Statement I** and **Statement II** are true (Correct Answer)
(B) ☐ Both **Statement I** and **Statement II** are false
(C) ☐ **Statement I** is correct, but **Statement II** is false
(D) ☐ **Statement I** is incorrect, but **Statement II** is true

Question No.81 (Question Id - 8)

Find the next term in the series.

1, 2, 6, 15, 31, ?

- (A) ☐ 49
(B) ☐ 52
(C) ☐ **56 (Correct Answer)**
(D) ☐ 57

Question No.82 (Question Id - 90)

Statement I:

Circle on which the co-ordinates of any point are $(2 + 4\cos\theta, -1 + 4\sin\theta)$, where θ is parameter, is given by

$$(x - 2)^2 + (y + 1)^2 = 16.$$

Statement II:

The equation of the circle which passes through the point (4, 5) and has its centre at (2, 2) is

$$(x - 2)^2 + (y - 2)^2 = 11.$$

In the light of the above statements, choose the **correct** answer from the options given below.

- (A) ☐ Both **Statement I** and **Statement II** are true.
(B) ☐ Both **Statement I** and **Statement II** are false.
(C) ☐ **Statement I is correct, but Statement II is false. (Correct Answer)**
(D) ☐ **Statement I** is incorrect, but **Statement II** is true.

Question No.83 (Question Id - 15)

The price of 357 mangoes is ₹ 1517.25. What will be the approximate price of 49 dozens of such mangoes ?

- (A) ☐ 3000
(B) ☐ 3500
(C) ☐ 4000
(D) ☐ **2500 (Correct Answer)**

Question No.84 (Question Id - 41)

Consider the following 'C' declaration,

```
int *A [10], B[10][10];
```

Of the following expression, which will not give compile-time errors if used as left hand sides of assignment statements ? A. $A[2]$

B. $A[2][3]$

C. $B[1]$

D. $B[2][3]$

Choose the **correct** answer from the options given below.

- (A) ☐ **A, B and D only (Correct Answer)**
(B) ☐ B, C and D only
(C) ☐ C and D only
(D) ☐ D only

Question No.85 (Question Id - 73)

Given below are two statements.

Statement I:

The order of every element of a finite group is infinite.

Statement II:

If there is no positive integer n such that $a^n = e$, then the order of a denoted by $O(a)$, is infinite or zero.

In the light of the above statements, choose the **most appropriate** answer from the options given below.

- (A) ☐ Both **Statement I** and **Statement II** are correct
 (B) ☐ Both **Statement I** and **Statement II** are incorrect
 (C) ☐ **Statement I** is correct, but **Statement II** is incorrect
 (D) ☒ **Statement I is incorrect but Statement II is correct (Correct Answer)**

Question No.86 (Question Id - 92)

The equation of the circle having centre $(1, -2)$ and passing through the point of intersection of the lines $3x + y = 14$ and $2x + 5y = 18$ is :

- (A) ☒ **$x^2 + y^2 - 2x + 4y - 20 = 0$ (Correct Answer)**
 (B) ☐ $x^2 + y^2 - 2x - 4y - 20 = 0$
 (C) ☐ $x^2 + y^2 + 2x - 4y - 20 = 0$
 (D) ☐ $x^2 + y^2 + 2x + 4y - 20 = 0$

Question No.87 (Question Id - 74)

Let G be a group of order 30. Let A and B be normal subgroups of order 2 and 5, respectively. Then, the order of the group $\frac{G}{AB}$ is :

- (A) ☐ 10
 (B) ☒ **3 (Correct Answer)**
 (C) ☐ 2
 (D) ☐ 5

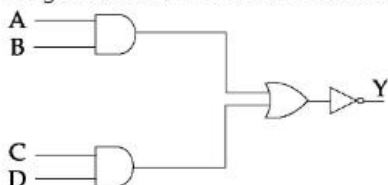
Question No.88 (Question Id - 31)

Assuming that only the X and Y logic inputs are available and their complements \bar{X} and \bar{Y} are not available, what is the minimum number of two input NAND gates required to implement $X \oplus Y$?

- (A) ☐ 2
 (B) ☐ 3
 (C) ☒ **4 (Correct Answer)**
 (D) ☐ 5

Question No.89 (Question Id - 21)

In figure below, what is the Boolean equation ?



- (A) ☐ $Y = \overline{AB} + \overline{CD}$
 (B) ☒ **$Y = \overline{AB + CD}$ (Correct Answer) (Chosen option)**

(C) ☐ $Y = (\overline{A+B}) \cdot (\overline{C+D})$

(D) ☐ None of the above

Question No.90 (Question Id - 10)

If $x^6 - y^6 = 0$, what is the value of $x^3 - y^3$?

(I) x is positive

(II) y is greater than 1

(A) ☐ (I) only

(B) ☐ (II) only

(C) ☐ (I) and (II) both are necessary (Correct Answer)

(D) ☐ Either (I) or (II)

Question No.91 (Question Id - 86)

The value of the determinant $\begin{vmatrix} \operatorname{cosec}^2 \theta & \cot^2 \theta & 1 \\ \cot^2 \theta & \operatorname{cosec}^2 \theta & -1 \\ 42 & 40 & 2 \end{vmatrix}$ is :

(A) ☐ 0 (Correct Answer)

(B) ☐ 1

(C) ☐ -1

(D) ☐ None of these

Question No.92 (Question Id - 23)

The boolean expression $AB + A\bar{B} + \bar{A}C + AC$ is independent of the boolean variable :

(A) ☐ A

(B) ☐ B (Correct Answer)

(C) ☐ C

(D) ☐ None of the above

Question No.93 (Question Id - 13)

Statements : All the fools are genius.

No genius is a cricketer.

Conclusions : (A) All the geniuses are fools.

(B) Some fools are not cricketers.

(C) No fool is a cricketer.

(D) All cricketers are fools.

Choose the **correct** answer from the options given below :

(A) ☐ (C) only

(B) ☐ (B), (C), (D) only

(C) ☐ (B) and (C) only (Correct Answer)

(D) ☐ (A) and (D) only

Question No.94 (Question Id - 44)

Consider these 'C' code to swap two integers.

```
void swap (int *x, *y)
```

```
{  
    *x = *x - *y;  
    *y = *x + *y;  
    *x = *y - *x;  
}
```

A. Will generate a compilation error.

B. May generate a segmentation fault at runtime depending upon the arguments passed.

C. Correctly implements the swap procedure for all input pointers referring to integers stored in memory locations accessible to processes.

D. Implements the swap procedure correctly for some but not all valid input pointers.

E. May add or subtract integers and pointers.

Choose the **correct** answer from the options given below.

- (A) ☐ A only
(B) ☒ **B and C only (Correct Answer)**
(C) ☐ B and D only
(D) ☐ B and E only

Question No.95 (Question Id - 96)

Solve the inequality $\frac{2x+7}{|x|+1} < 3$.

Choose the **correct** answer from below.

- (A) ☐ $x \in (-\infty, 4) \cup (7, \infty)$
(B) ☐ $x \in \left(-\infty, -\frac{4}{5}\right) \cup (1, \infty)$ (Chosen option)
(C) ☒ $x \in \left(-\infty, -\frac{4}{5}\right) \cup (4, \infty)$ (Correct Answer)
(D) ☐ $x \in (-\infty, 1) \cup (4, \infty)$

Question No.96 (Question Id - 77)

If $G = \{1, -1, i, -i\}$ is a multiplicative group, then order of $(-i)$ is :

- A. 1
B. 2
C. 3
D. 4
E. none of these

Choose the **most appropriate** answer from the options given below.

- (A) ☐ A only
(B) ☐ B, C only
(C) ☒ **D only (Correct Answer)**
(D) ☐ E only

Question No.97 (Question Id - 99)

Given below are two Statements.

Statement I:

The interval of values of x for which $f(x) = 3x^2 - 6x + 2$ is decreasing is $(-\infty, \infty)$.

Statement II:

The interval of values of x for which $g(x) = 4x^3 + 7x - 2$ is increasing is $(-\infty, \infty)$.

In the light of the above statements, choose the **correct** answer from the options given below.

- (A) ☐ Both **Statement I** and **Statement II** are true
(B) ☐ Both **Statement I** and **Statement II** are false
(C) ☐ **Statement I** is correct, but **Statement II** is false.
(D) ☒ **Statement I is incorrect, but Statement II is true. (Correct Answer)**

Question No.98 (Question Id - 29)

4 Variable Boolean Function is given as :

$F(A, B, C, D) = \Sigma(2, 3, 4, 5, 6, 7, 11, 14, 15)$

Simplify the above function in POS (Product Of Sum) form by a 4 Variable map.

- (A) ☐ $(A + C)$
(B) ☐ $(A + B)$

- (C) ☐ (A' + C) (B+ C) (A' + B + D) (Correct Answer)
(D) ☐ None of the above

Question No.99 (Question Id - 62)

If X is a Poisson variate such that $P(X = 2) = 9P(X = 4) + 90P(X = 6)$, then the mean of the distribution is :

- (A) ☐ 1 (Correct Answer)
(B) ☐ 2
(C) ☐ 3
(D) ☐ 4

Question No.100 (Question Id - 66)

Given the following frequency distribution of income of employees.

Income ₹/month	No. of employees
0 - 250	12
250 - 500	20
500 - 750	23
750 - 1,000	15
1,000 - 1,250	10
1,250 - 1,500	20

The median income of employees is :

- (A) ☐ 625.00
(B) ☐ 760.25
(C) ☐ 695.65 (Correct Answer)
(D) ☐ 800.15