Roll No:
Application No:
Name:
Exam Date: **08-Oct-2020**
Exam Time: **15:00-18:00**
Examination: **1. Course Code - M. Tech.;M.P.H.;P.G. Diploma in Bigdata**
2. Field of Study - COMPUTER & SYSTEM SCIENCES (MTCT)

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Exam Day Photo

SECTION 1 - SECTION 1

Question No.1 (Question Id - 84)
Pick the correct statements about Flooding :

A. It is a type of isolated routing.

B. It is a method in which every incoming packet is sent out on every routing line except the one by which it arrived.

C. Flooding does not always select the shortest path.

D. Selective Flooding is a type in which the packets are sent to those lines that going approximately in the right direction.

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

(A) ○ A, B, C only
(B) ○ B, C, D only
(C) ○ **A, B, D only (Correct Answer)**
(D) ○ A, B, C, D only

Question No.2 (Question Id - 7)
Read the following information and answer the question given below it.
A is the father of C. But C is not his son. E is the daughter of C. F is the spouse of A. B is the brother of C. D is the son of B. G is the spouse of B. H is the father of G. Who is the grandmother of D ?

(A) ○ A
(B) ○ C
(C) ○ **F (Correct Answer)**
(D) ○ H

Question No.3 (Question Id - 64)

Consider the following set of processes that arrive at time 0, with the length of CPU-burst time given in milli-seconds :

Process	Burst Time
P_1	24
P_2	3
P_3	3

What is the average waiting time in milli-seconds when we use the Round Robin (RR) scheduling algorithm with time quantum of 4 milli-seconds ?

(A) ○ **5.66 (Correct Answer)**
(B) ○ 10
(C) ○ 15.66
(D) ○ 2

Question No.4 (Question Id - 98)
While applying pumping lemma over a language L, we consider a string w that belongs to L and fragment it into _____ parts.

(A) ○ **3 (Correct Answer)**
(B) ○ 4
(C) ○ 5
(D) ○ 6

Question No.5 (Question Id - 93)

The explict formula for the sequence defined by the recurrence relation $b_n = 2b_{n-1} + 1$ with initial condition $b_1 = 7$ is :

(A) ○ $b_n = 7 \cdot 2^{n-1} + 2^{n+1} - 1$

(B) ○ **$b_n = 7 \cdot 2^{n-1} + 2^{n-1} - 1$ (Correct Answer)**

(C) ○ $b_n = 7 \cdot 2^{n-1} + 2^{n-1} + 1$

(D) ○ $b_n = 7 \cdot 2^{n+1} + 2^{n-1} + 1$

Question No.6 (Question Id - 15)

The solution of integration $\int e^x \sin x dx$ is :

(A) ○ $e^x \sin x \cos x + C$, where C is a constant

(B) ○ $e^x(\sin x - \cos x) + C$, where C is a constant

(C) ○ $\frac{e^x}{2}(\sin x - \cos x) + C$, where C is a constant **(Correct Answer)**

(D) ○ $\frac{e^x}{2}(\sin x + \cos x) + C$, where C is a constant

Question No.7 (Question Id - 14)

What is the value of $\int_0^3 [x]\, dx$?

(A) ○ $\frac{9}{2}$

(B) ○ 6

(C) ○ **3 (Correct Answer)**

(D) ○ $\frac{3}{2}$

Question No.8 (Question Id - 22)

Find the Eigen values of A.

$$A = \begin{pmatrix} 1 & -3 & 3 \\ 3 & -5 & 3 \\ 6 & -6 & 4 \end{pmatrix}$$

(A) ○ (2, 3)

(B) ○ **(-2, 4) (Correct Answer)**

(C) ○ (2, -4)

(D) ○ (-2, 3)

Question No.9 (Question Id - 77)

The Universal Serial Bus (USB) type, which is reversible is :

(A) ○ USB Type A

(B) ○ USB Type B

(C) ○ **USB Type C (Correct Answer)**

(D) ○ All of the above

Question No.10 (Question Id - 70)

Which of the following statements are **False** ?

A. Date-of-birth is a single-valued and atomic attribute.

B. A weak entity has always total participation in identifying relationship.

C. Key of a database relation cannot contain more than one attribute.

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

(A) ○ A and B only

(B) ○ **A and C only (Correct Answer)**

(C) ○ B and C only

(D) ○ A, B and C only

Question No.11 (Question Id - 95)

Which one of the following is **not** a tautology ?

(A) ○ $(p \wedge q) \rightarrow q$

(B) ○ $p \rightarrow (p \vee q)$

(C) ○ **$(\sim p) \vee q$ (Correct Answer)**

(D) ○ $\sim(p \rightarrow q) \rightarrow p$

Question No.12 (Question Id - 45)

Consider a complete undirected graph with vertex set {1, 2, 3, 4, 5}. Entry W_{ij} in the matrix W below is the weight of the edge {i, j}.

$$W = \begin{bmatrix} 0 & 2 & 4 & 3 & 0 \\ 2 & 0 & 0 & 1 & 5 \\ 4 & 0 & 0 & 5 & 0 \\ 3 & 1 & 5 & 0 & 4 \\ 0 & 5 & 0 & 4 & 0 \end{bmatrix}$$

How many paths of length 3 are available from vertex 1 to 5 and what is the max. weight of the path of length 3 from vertex 1 to 5 ?

(A) ○ No. of paths : 2, weight : 9

(B) ○ No. of paths : 4, weight : 9

(C) ○ **No. of paths : 3, weight : 13 (Correct Answer)**

(D) ○ No. of paths : 3, weight : 7

Question No.13 (Question Id - 5)

Rohit walked 25 metres towards South. Then he turned to his left and walked 25 metres. He then turned to his left and walked 25 metres. He again turned to his right and walked 15 metres. At what distance is he from the starting point and in which direction ?

(A) ○ 35 metres East

(B) ○ 35 metres North

(C) ○ **40 metres East (Correct Answer)**

(D) ○ 60 metres East

Question No.14 (Question Id - 85)

A TCP machine is sending full window of 65,535 bytes over a 1-Gbps channel that has a 10 msec one way delay. The maximum throughput achievable and the line efficiency are :

(A) ○ 3.0 million bytes/sec, 2.0%

(B) ○ 3.1 million bytes/sec, 2.2%

(C) ○ 3.2 million bytes/sec, 2.4%

(D) ○ **3.3 million bytes/sec, 2.6% (Correct Answer)**

Question No.15 (Question Id - 12)

What is the n^{th} derivative of $y=x^n$?

(A) ○ **n ! (Correct Answer)**

(B) ○ 2^n

(C) ○ 0

(D) ○ 1

Question No.16 (Question Id - 3)

In this question, one term in the number series is wrong. Find out the wrong term.
5, 10, 40, 80, 320, 550, 2560

(A) ○ 80

(B) ○ 320

(C) ○ **550 (Correct Answer)**

(D) ○ 2560

Question No.17 (Question Id - 11)

What is the derivative of $y=x^{\sin x}$?

(A) ○ $x^{\sin x} \cos x$

(B) ○ $x^{\sin x} \cos x \log x$

(C) ○ $x^{\sin x}\left(\cos x \log x + \frac{\sin x}{x}\right)$ **(Correct Answer)**

(D) ○ $x^{\sin x}\left(\cos x \log x + \frac{\cos x}{x}\right)$

Question No.18 (Question Id - 28)

An approximate value of π is given by $X_1 = \frac{22}{7} = 3.1428571$ and its true value is X = 3.1415926. The relative error is :

(A) ◯ - 0.0012645
(B) ◯ + 0.0012645
(C) ◯ **- 0.000402 (Correct Answer)**
(D) ◯ + 0.000402

Question No.19 (Question Id - 40)

A box of fuses contains 20 fuses of which 5 are defective. If 3 of the fuses are selected at random and removed from box in succession without replacement, what is the Probability that all 3 fuses are defective ?

(A) ◯ $\frac{5}{20}$
(B) ◯ $\frac{1}{17}$
(C) ◯ $\frac{12}{342}$
(D) ◯ $\boxed{\frac{1}{114}}$ **(Correct Answer)**

Question No.20 (Question Id - 46)

A list of N elements requires no more than _____ iterations to get it sorted using bubble sort.

(A) ◯ N + 1
(B) ◯ **N - 1 (Correct Answer)**
(C) ◯ N
(D) ◯ 2N

Question No.21 (Question Id - 17)

If set of integers, with operation defined by m*n = m + n - 1 forms a group, what is the identity of group ?

(A) ◯ 0
(B) ◯ **1 (Correct Answer)**
(C) ◯ - n
(D) ◯ - n + 2

Question No.22 (Question Id - 32)

If $\bar{X}$ and S^2 are the sample mean and sample variance of a random sample of size n from a normal population with mean μ and standard deviation σ, then :

A. $\bar{X}$ and S^2 are independent.

B. The random variable $\frac{(n-1)S^2}{\sigma^2}$ follows a χ^2 - distribution with n - 1 degrees of freedom.

C. The random variable $\frac{(n-1)S^2}{\sigma^2}$ follows a t - distribution with n - 1 degrees of freedom.

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

(A) ◯ A only
(B) ◯ A and B only
(C) ◯ **A and C only (Correct Answer)**
(D) ◯ B only

Question No.23 (Question Id - 35)

Suppose a hospital has large quantities of packaged doses of a particular drug A. The individual dose of A is 100 cc. We also know that body will harmlessly pass off excessive doses of A, and insufficient doses of A do not produce the desired effect. The hospital has purchased this drug from same manufacturer for long time and knows the standard deviation for population is 2 cc. After inspecting 50 doses of A at random, the mean of this sample is found to be 99.75 cc. Which of the following tests should be used by hospital to accept or reject this shipment ?

(A) ◯ left-tailed t-test
(B) ◯ **left-tailed z-test (Correct Answer)**
(C) ◯ two-tailed t-test
(D) ◯ two-tailed z-test

Question No.24 (Question Id - 67)

The column of a table is referred to as the :

(A) ○ Tuple
(B) ○ **Attribute (Correct Answer)**
(C) ○ Entity
(D) ○ Degree

Question No.25 (Question Id - 19)
Which one is the right ideal in the ring M_2 of 2 x 2 matrices over integers ?

(A) ○ $S = \left\{ \begin{pmatrix} a & b \\ 0 & 0 \end{pmatrix} : a, b \text{ are integers} \right\}$ **(Correct Answer)**

(B) ○ $S = \left\{ \begin{pmatrix} a & b \\ 0 & c \end{pmatrix} : a, b, c \text{ are integers} \right\}$

(C) ○ $S = \left\{ \begin{pmatrix} a & 0 \\ b & 0 \end{pmatrix} : a, b \text{ are integers} \right\}$

(D) ○ $S = \left\{ \begin{pmatrix} a & 0 \\ b & c \end{pmatrix} : a, b, c \text{ are integers} \right\}$

Question No.26 (Question Id - 87)
According to cryptography principles :

A. Principle 1 : Message must contain some redundancy.

B. Principle 2 : Some method is needed to foil replay attack.

C. Principle 1 is known redundancy.

D. Principle 2 is known freshness.

E. Principles 1 and 2 are known freshness.

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

(A) ○ **A, B, C, D only (Correct Answer)**
(B) ○ B, C, D, E only
(C) ○ C, D, E only
(D) ○ A, B, E only

Question No.27 (Question Id - 62)
A process executes the following code
for (i=0; i<n; i++)
fork ( ) ;
The total number of child processes created is :
(A) ○ n^2
(B) ○ **$2^n - 1$ (Correct Answer)**
(C) ○ 2^n
(D) ○ 2^{n+1}

Question No.28 (Question Id - 96)
For a given Moore Machine, if input = '101010', then the output would be of length :
(A) ○ **7 (Correct Answer)**
(B) ○ 6
(C) ○ 5
(D) ○ 4

Question No.29 (Question Id - 61)
A program in execution is called :
(A) ○ Program
(B) ○ **Process (Correct Answer)**
(C) ○ Procedure
(D) ○ Routine

Question No.30 (Question Id - 34)
A random variable is uniformly distributed over the interval (a, b) where a < b. Then the expected value E[X] and variance Var(X) are :

(A) ○ $\frac{a+b}{2}$ and $\frac{(b-a)^2}{2}$

(B) ○ $a+b$ and $\frac{(b-a)^2}{2}$

(C) ○

(D) ○ $\frac{a+b}{12}$ and $\frac{(b-a)^2}{2}$

$\frac{a+b}{2}$ and $\frac{(b-a)^2}{12}$ **(Correct Answer)**

Question No.31 (Question Id - 76)

In zero address addressing mode for a computer system, the operands are stored in :

(A) ○ Accumulator Register

(B) ○ Buffer Register

(C) ○ **Stack Memory (Correct Answer)**

(D) ○ Cache Memory

Question No.32 (Question Id - 48)

What is the time complexity of the binary tree sort algorithm in worst case (sorted input) ?

(A) ○ O (n logn)

(B) ○ **O (n^2) (Correct Answer)**

(C) ○ O (n)

(D) ○ O (log n)

Question No.33 (Question Id - 88)

A bit string, 0111101111101111110 needs to be transmitted at the data link layer. What is the string actually transmitted after bit stuffing ?

(A) ○ 011110111110011110010

(B) ○ **0111101111110011111010 (Correct Answer)**

(C) ○ 011110011110011111010

(D) ○ 011110101110101111010

Question No.34 (Question Id - 65)

A computer system has 4K word cache organized in a block set associative manner, with 4 blocks per set, 64 words per block. The number of bits in the SET and WORD field of the main memory address format is :

(A) ○ 15, 4

(B) ○ 6, 4

(C) ○ 7, 2

(D) ○ **4, 6 (Correct Answer)**

Question No.35 (Question Id - 10)

Statements : Some trucks are scooters.
No scooter is cycle.

Conclusions : (A) No truck is cycle.
(B) No scooter is truck.
(C) Some trucks are cycles.
(D) Some scooters are trucks.

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

(A) ○ (A) and (C) only

(B) ○ (B) and (C) only

(C) ○ **(D) only (Correct Answer)**

(D) ○ (A), (B) and (C) only

Question No.36 (Question Id - 30)

The function $y = \sin x$ is tabulated below :

x	0	π/4	π/2
$y = \sin x$	0	0.70711	1.0

Using Lagrange's Interpolation formula, what is the value of sin (π /6) ?

(A) ○ 0.50743

(B) ○ **0.51743 (Correct Answer)**

(C) ○ 0.52701

(D) ○ 0.5304

Question No.37 (Question Id - 47)

Consider a list of size 512. If you want to search a key value in the list using binary search, what will be the maximum number of comparisons ?

(A) ○ 8
(B) ○ 256
(C) ○ 512
(D) ○ **9 (Correct Answer)**

Question No.38 (Question Id - 94)

Let $A = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$ compute $A \wedge B$:

(A) ○ $\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

(B) ○ $\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{bmatrix}$

(C) ○ $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ **(Correct Answer)**

(D) ○ $\begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix}$

Question No.39 (Question Id - 33)

The mode of a data set is :

(A) ○ The most central item in the data set.
(B) ○ The sum of the values in the data set divided by the number of observations.
(C) ○ **The value that is repeated most often in the data set. (Correct Answer)**
(D) ○ A measure of dispersion of the data set.

Question No.40 (Question Id - 41)

If the sequence of operations - push(3), push(5), pop(), push(3), push(5), pop(), pop(), pop(), push(5), pop(), are performed on a stack, the sequence of popped out values are :

(A) ○ **5, 5, 3, 3, 5 (Correct Answer)**
(B) ○ 5, 5, 3, 5, 5
(C) ○ 5, 3, 5, 5, 1
(D) ○ 5, 3, 5, 5, 5

Question No.41 (Question Id - 54)

In 'C' automatic and register variables are initialized :

(A) ○ **Every time the function or block is entered. (Correct Answer)**
(B) ○ Before the program execution starts.
(C) ○ Only once where the function or block is entered.
(D) ○ By the compiler during compilation.

Question No.42 (Question Id - 80)

Match the following :

List - I	List - II
A. DMA	I. Hard Disk
B. Interrupt I/O	II. Printer
C. Flag Register	III. High Speed RAM
D. Cache	IV. ALU

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

(A) ○ A - I, B - II, C - III, D - IV
(B) ○ **A - I, B - II, C - IV, D - III (Correct Answer)**
(C) ○ A - II, B - III, C - IV, D - I
(D) ○ A - III, B - I, C - II, D - IV

Question No.43 (Question Id - 4)

If DELHI is coded as 73541 and CALCUTTA is coded as 82589662, how can CALICUT be coded ?

(A) ○ 5279431

(B) ○ 5978213

(C) ○ **8251896 (Correct Answer)**

(D) ○ 8543691

Question No.44 (Question Id - 81)

Match **List - I** with **List - II** :

List - I	List - II
A. Data Link Layer	I. Encryption
B. Network layer	II. Dialog Control
C. Session Layer	III. Routing
D. Presentation Layer	IV. Data Frames

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

(A) ○ A - II, B - III, C - IV, D - I

(B) ○ A - III, B - IV, C - I, D - II

(C) ○ **A - IV, B - III, C - II, D - I (Correct Answer)**

(D) ○ A - I, B - II, C - III, D - IV

Question No.45 (Question Id - 90)

BSC (Binary Synchronization Communication) protocol is :

A. Character oriented protocol

B. Bit oriented protocol

C. Full duplex protocol

D. Half duplex protocol

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

(A) ○ A, B only

(B) ○ A, C only

(C) ○ **A, D only (Correct Answer)**

(D) ○ B, C only

Question No.46 (Question Id - 39)

Which of the following statement(s) regarding the kurtosis of a distribution is true ?

A. It is a measure of central tendency of the distribution.

B. It is a measure of dispersion of the distribution.

C. It is the degree of peakedness of the distribution.

D. It is the degree of difference from a uniform frequency distribution.

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

(A) ○ A and D only

(B) ○ B, C and D only

(C) ○ A and C only

(D) ○ **C only (Correct Answer)**

Question No.47 (Question Id - 74)

Consider an ordered file with r = 30,000 records stored on a disk with block size B = 1024 bytes. File records are fixed size and are unspanned, with record length R = 100 bytes. Suppose that the ordering key field of the file is V = 9 bytes long, a block pointer is P = 6 bytes long, and we have constructed a primary index for the file. How many block accesses will be needed to search for a record using the primary index ?

(A) ○ 5

(B) ○ **7 (Correct Answer)**

(C) ○ 9

(D) ○ 6

Question No.48 (Question Id - 72)

A file has r = 20,000 student records of fixed length. Each record has the following fields :
name (30 bytes), SSN (9 bytes), address (40 bytes), phone (9 bytes), birthdate (8 bytes), sex (1 byte).
The file is stored on the disk whose block size B = 512 bytes.
Assuming an unspanned organization, what is the blocking factor 'bfr' and the number of file blocks 'b' ?

(A) ◯ **bfr = 5, b = 4000 (Correct Answer)**
(B) ◯ bfr = 6, b = 4000
(C) ◯ bfr = 6, b = 3333
(D) ◯ bfr = 10, b = 3333

Question No.49 (Question Id - 2)
Four words have been given, out of which three are alike in some manner and the fourth one is different. Choose out the odd one.

(A) ◯ Pen
(B) ◯ **Calculator (Correct Answer)**
(C) ◯ Pencil
(D) ◯ Ink

Question No.50 (Question Id - 100)
If d is not defined on the current state and the current tape symbol, then the turning machine _____.

(A) ◯ does not halt
(B) ◯ **halts (Correct Answer)**
(C) ◯ goes into loop forever
(D) ◯ none of the above

Question No.51 (Question Id - 25)
Let T : $R^3 \rightarrow R^3$ be the linear mapping defined by T $(x, y, z) = (x + 2y - z, y + z, x + y - 2z)$. Find a basis of the image U of T.
(A) ◯ {(1, 1, 0), (1, 0, -1)}
(B) ◯ {(0, 1, 1), (1, 0, 1)}
(C) ◯ **{(1, 0, 1), (0, 1, -1)} (Correct Answer)**
(D) ◯ {(0, 0, -1), (1, -1, 0)}

Question No.52 (Question Id - 6)
Study the given information carefully and answer the question that follow :

(i) A, B, C, D, E, F and G are sitting on a wall and all of them are facing last.

(ii) C is on the immediate right of D.

(iii) B is at an extreme end and has E as his neighbour.

(iv) G is between E and F.

(v) D is sitting third from the south end.

Which of the following pairs of people are sitting at the extreme ends ?

(A) ◯ **AB (Correct Answer)**
(B) ◯ AE
(C) ◯ CB
(D) ◯ FB

Question No.53 (Question Id - 60)
Which of the following statements related to C++ constructor is/are FALSE ?

A. It is not valid to declare a constructor to return a value of any type, including void.

B. Constructors can be declared static or virtual.

C. When a constructor is declared to accept no arguments, it is called a "default" constructor.

D. More than three constructors cannot be declared for a class, even they take different types and numbers of arguments.

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

(A) ◯ A and C only
(B) ◯ B and D only
(C) ◯ **None of these (Correct Answer)**

(D) ○ C and D only

Question No.54 (Question Id - 79)

More than one device attempting to access the hardware in a pipelined processor is a :

(A) ○ **Structural hazard (Correct Answer)**

(B) ○ Branch hazard

(C) ○ Data dependence

(D) ○ Deadlock

Question No.55 (Question Id - 27)

Which of the methods is direct method for solving simultaneous algebraic equations ?

(A) ○ Jacobi's method

(B) ○ Relaxation method

(C) ○ **Cramer's rule (Correct Answer)**

(D) ○ Gauss seidel method

Question No.56 (Question Id - 63)

Match **List - I** with **List - II** :

List - I	List - II
A. Process Arrival time	I. Ratio of the turn-around time of a job/process to its own service time.
B. Weighted turn-around	II. Time when a user submits a job/process.
C. Service time	III. Time when the system starts considering a job/ process for scheduling.
D. Admission time	IV. The total of CPU time and I/O time required by a job/process or subrequest to complete its operation.

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

(A) ○ A - IV, B - I, C - III, D - II

(B) ○ **A - II, B - I, C - IV, D - III (Correct Answer)**

(C) ○ A - II, B - IV, C - I, D - III

(D) ○ A - I, B - II, C - III, D - IV

Question No.57 (Question Id - 50)

Consider an algorithm whose time complexity is defined using the following recurrence function :

$T(n) = 3T(n/2) + \log^2 n$

What will be the value of T(n) in asymptotic notation ?

(A) ○ $T(n) = \theta(n^2)$

(B) ○ $T(n) = \theta(n \log_2 3)$

(C) ○ $T(n) = \theta\left(n^{\log_2 3}\right)$ **(Correct Answer)**

(D) ○ $T(n) = \theta(n \log_2 n)$

Question No.58 (Question Id - 73)

Consider the relation R = {A, B, C, D, E, F, G, H, I, J} and the set of functional dependencies F = {AB → C, A → DE, B → F, F → GH, D → IJ}

Which of the following options gives the key of R ?

(A) ○ BC

(B) ○ CD

(C) ○ BCD

(D) ○ **AB (Correct Answer)**

Question No.59 (Question Id - 21)

Consider the linear transformation T : $\mathbf{R}^4 \rightarrow \mathbf{R}^4$ given by

$T(x, y, z, u) = (x, y, 0, 0), \forall (x, y, z, u) \in \mathbf{R}^4$. Then which one of the following is correct ?

(A) ○ Rank T = Nullity T = 3

(B) ○ **Rank T = Nullity T = 2 (Correct Answer)**

(C) ○ Rank T > Nullity T

(D) ○ Rank T < Nullity T

Question No.60 (Question Id - 59)

Which of the following C++ statements are true ?

A. A static member function can be declared as virtual.

B. A constructor can be declared as virtual.

C. Friend relationship is not inheritable.

D. Abstract class must have pure virtual function.

E. Assignment operator cannot be overloaded using friend function.

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

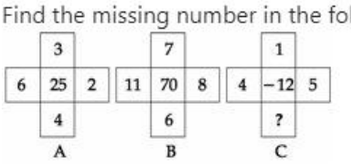
(A) ○ A, B, C only
(B) ○ B, C, D only
(C) ○ **C, D, E only (Correct Answer)**
(D) ○ A, C, D only

Question No.61 (Question Id - 58)
Which of the following statements about the friend function in C++ is false ?
(A) ○ A function can only be declared as friend by a class itself.
(B) ○ Friend functions are not members of a class, they are associated with it.
(C) ○ **Friend functions are members of a class. (Correct Answer)**
(D) ○ It can have access to all members of the class, even private ones.

Question No.62 (Question Id - 53)
In C++, cin and cout are called as :
(A) ○ Streams
(B) ○ Functions
(C) ○ Classes
(D) ○ **Objects (Correct Answer)**

Question No.63 (Question Id - 8)

Find the missing number in the following patterns.



(A) ○ 10
(B) ○ 6
(C) ○ **2 (Correct Answer)**
(D) ○ 1

Question No.64 (Question Id - 23)
The unit digit in 7^{124} is :
(A) ○ **1 (Correct Answer)**
(B) ○ 2
(C) ○ 3
(D) ○ 4

Question No.65 (Question Id - 42)
Which of the following statement will be used to check the overflow condition of circular queue ? Here F denotes the FRONT, R denotes the Rear of queue and n is the size of queue.
(A) ○ If (F = = R + 1)
(B) ○ If ((F = = 0) && (R = = n - 1))
(C) ○ **If (F = = (R + 1)%n) (Correct Answer)**
(D) ○ If (R = = (F + 2)%n)

Question No.66 (Question Id - 97)
Which of the following does **not** represents the given language {0, 01} ?
(A) ○ 0 + 01
(B) ○ {0} ∪ {01}
(C) ○ {0} ∪ {0} · {1}
(D) ○ **{0} ∩ {01} (Correct Answer)**

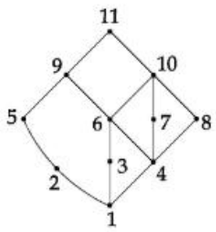
Question No.67 (Question Id - 26)
Which one of the following method converges more rapidly ?
(A) ○ Bisection Method
(B) ○ Iteration Method
(C) ○ Method of False Position
(D) ○ **Newton - Raphson Method (Correct Answer)**

Question No.68 (Question Id - 29)
How many assumptions are there in Jacobi's Method ?

(A) ◯ **2 (Correct Answer)**
(B) ◯ 3
(C) ◯ 4
(D) ◯ 5

Question No.69 (Question Id - 92)

Let A = {1, 2, 3, 4, 5, ... 11} be the poset whose Hasse diagram is shown in given figure. Find the Greatest Lower bound of B = {6, 7, 10}, if it exists.



(A) ◯ 1
(B) ◯ 2
(C) ◯ 3
(D) ◯ **4 (Correct Answer)**

Question No.70 (Question Id - 43)

Which of the following abstract data types can be used to represent a many to many relations ?

A. Stack

B. Queue

C. Graph

D. Tree

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

(A) ◯ A, B only
(B) ◯ D only
(C) ◯ B, C only
(D) ◯ **C, D only (Correct Answer)**

Question No.71 (Question Id - 51)

If a class is derived from more than one base class then it is termed as :

(A) ◯ Single Inheritance
(B) ◯ Multi-level Inheritance
(C) ◯ **Multiple Inheritance (Correct Answer)**
(D) ◯ Inheritance Tree

Question No.72 (Question Id - 91)

With respect to predicate Calculus, which of the following are statements ?

A. The earth is round

B. 2 + 3 = 5

C. Do you speak english ?

D. Take two as prints

E. Shut the door

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

(A) ◯ **A, B only (Correct Answer)**
(B) ◯ B, C only
(C) ◯ C, D only
(D) ◯ D, E only

Question No.73 (Question Id - 52)

In C/C++, the “continue” statement cannot be used with _____ statement.

(A) ◯ for
(B) ◯ **switch (Correct Answer)**
(C) ◯ while
(D) ◯ do

Question No.74 (Question Id - 38)

If X has the Probability density

$$f(x) = \begin{cases} e^x & \text{for } x>0 \\ 0 & \text{elsewhere} \end{cases}$$

find the expected value of $g(X) = e^{3X/4}$.

(A) ○ 2
(B) ○ **4 (Correct Answer)**
(C) ○ 6
(D) ○ 8

Question No.75 (Question Id - 78)

The flip-flop which is a similar sub-type with JK flip-flop is :

(A) ○ Clocked RS Flip-flop
(B) ○ Edge Triggered D Flip-flop
(C) ○ **Edge Triggered T Flip-flop (Correct Answer)**
(D) ○ None of the above

Question No.76 (Question Id - 83)

The maximum channel utilization of pure ALOHA is :

(A) ○ 9%
(B) ○ **18% (Correct Answer)**
(C) ○ 27%
(D) ○ 36%

Question No.77 (Question Id - 68)

What is the highest normal form satisfied by the following relation schema ?
Singer (name, song)

(A) ○ 1NF
(B) ○ 2NF
(C) ○ 3NF
(D) ○ **BCNF (Correct Answer)**

Question No.78 (Question Id - 89)

What is the sub network address for a host with the IP address 200.10.5.68/28 ?

(A) ○ 200.10.5.56
(B) ○ 200.10.5.32
(C) ○ **200.10.5.64 (Correct Answer)**
(D) ○ 200.10.5.0

Question No.79 (Question Id - 49)

Which of the given options presents the increasing order of the following time complexities ?

$N^2, \sqrt{N}, N^N, 2^N, N^{1.5}$

(A) ○ $\sqrt{N}, N^{1.5}, N^2, N^N, 2^N$
(B) ○ $\sqrt{N}, N^{1.5}, N^N, N^2, 2^N$
(C) ○ $\sqrt{N}, N^{1.5}, N^2, 2^N, N^N$ **(Correct Answer)**
(D) ○ $N^{1.5}, N^2, \sqrt{N}, 2^N, N^N$

Question No.80 (Question Id - 55)

What would be the output of following block of 'C' language code ?

```
void main ( )
  {
    int a = 10 ;
    if (a = 10)
      puts ("Hello") ;
    puts ("Bye") ;
  }
```

(A) ○ Hello
(B) ○ **Hello**

Bye

(Correct Answer)
(C) ○ Bye
(D) ○ Bye

Hello

Question No.81 (Question Id - 13)

If $y = \sin 2x$, then :

(A) ○ $\frac{dy}{dx} = \cos 2x$

(B) ○ $\frac{dy}{dx} = \cos 2x.2$ **(Correct Answer)**

(C) ○ $\frac{dy}{dx} = \sin 2x.2$

(D) ○ $\frac{dy}{dx} = \sin 2x$

Question No.82 (Question Id - 24)

Let W be the subspace of R^4 generated by the vectors (1, -2, 5, -3), (2, 3, 1, - 4) and (3, 8, -3, -5). Find the dimension of W.

(A) ○ 5

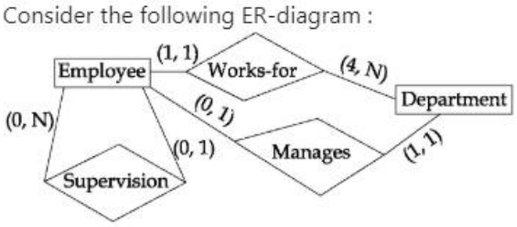
(B) ○ 3

(C) ○ 4

(D) ○ **2 (Correct Answer)**

Question No.83 (Question Id - 69)

Consider the following ER-diagram :



What are the total numbers of partial and total participations ?

(A) ○ Partial : 4, Total : 5

(B) ○ Partial : 4, Total : 4

(C) ○ Partial : 3, Total : 5

(D) ○ **Partial : 3, Total : 3 (Correct Answer)**

Question No.84 (Question Id - 99)

Given Grammar : S → A, A → aA, A → λ, B → bA which among the following productions is useless production ?

(A) ○ S → A

(B) ○ A → aA

(C) ○ A → λ

(D) ○ **B → bA (Correct Answer)**

Question No.85 (Question Id - 44)

Consider the inorder and postorder traversals of a binary tree as given below :
Inorder : C A E X F B L K M
Postorder : C E A F L M K B X
What will be the preorder traversal of the binary tree ?

(A) ○ XACE BFLKM

(B) ○ **XACE BFKLM (Correct Answer)**

(C) ○ XAEC BFKML

(D) ○ XAEC BFLKM

Question No.86 (Question Id - 1)

Bread : Yeast : : Curd : __?__.

(A) ○ Fungi

(B) ○ **Bacteria (Correct Answer)**

(C) ○ Germs

(D) ○ Virus

Question No.87 (Question Id - 56)

The statement
char name [ ] = “JNUEE” is equivalent to :

(A) ○ char name [ ] = {‘J’, ‘N’, ‘U’, ‘E’, ‘E’} ;

(B) ○ **char name [ ] = {‘J’, ‘N’, ‘U’, ‘E’, ‘E’, ‘\o’} ; (Correct Answer)**

(C) ○ char name [ ] = {‘J’, ‘N’, ‘U’, ‘E’, ‘E’, ‘\n’} ;

(D) ○ char name [ ] = {'J', 'N', 'U', 'E', 'E', '\t'} ;

Question No.88 (Question Id - 66)

Consider a relationship "supply" associating three entity types namely "supplier", "part" and "project" with 4, 5 and 6 instances, respectively. What will be the degree of the "supply" relationship ?

(A) ○ **3 (Correct Answer)**
(B) ○ 4
(C) ○ 15
(D) ○ 120

Question No.89 (Question Id - 71)

Which of the following Relational Algebra operators needs union compatibility ?

(A) ○ Cartesian product
(B) ○ Division
(C) ○ **Intersection (Correct Answer)**
(D) ○ Natural Join

Question No.90 (Question Id - 37)

Suppose that we want to determine on the following data whether there is a relationship between the time, in minutes, it takes a secretary to complete a certain form in morning (x) and in the late afternoon (y) :

Morning x	Afternoon y
8.2	8.7
9.6	9.6
7.0	6.9
9.4	8.5
10.9	11.3
7.1	7.6
9.0	9.2
6.6	6.3
8.4	8.4
10.5	12.3

Compute the sample correlation coefficient.

(A) ○ 0.867
(B) ○ 0.888
(C) ○ **0.936 (Correct Answer)**
(D) ○ 0.988

Question No.91 (Question Id - 82)

Television channels are 6 MHz wide. How many bits/sec can be sent if four-level digit signals are used ? Assume a noiseless channel.

(A) ○ 6 Mbps
(B) ○ 12 Mbps
(C) ○ 18 Mbps
(D) ○ **24 Mbps (Correct Answer)**

Question No.92 (Question Id - 86)

According to IPv4 header Don't Fragment (DF) field length is :

(A) ○ **1 bit (Correct Answer)**
(B) ○ 2 bits
(C) ○ 3 bits
(D) ○ 1 byte

Question No.93 (Question Id - 31)

The normal approximation of the binomial distribution with parameters n and p (with q =1 -p), is used whenever :

(A) ○ Either np or nq is greater than 5

(B) ○ n is greater than 30

(C) ○ n is greater than 5

(D) ○ **Both np and nq are greater than 5 (Correct Answer)**

Question No.94 (Question Id - 57)

What is the value of the following 'C' language expression ?

- 24% 9/3 ? 5 : 7

(A) ○ **5 (Correct Answer)**

(B) ○ 7

(C) ○ - 6

(D) ○ 2

Question No.95 (Question Id - 36)

Given the joint Probability density function

$$f(x, y) = \begin{cases} \frac{3}{5}x(y+x) \text{for } 0<x<1, 0<y<2 \\ 0 \qquad\qquad \text{otherwise} \end{cases}$$

of two random variable X and Y, find P[(X, Y)∈ A], where A is the region $\{(x, y)|0 < x < \frac{1}{2}, 1 < y < 2\}$.

(A) ○ $\frac{3}{5}$

(B) ○ $\frac{3}{50}$

(C) ○ $\frac{10}{80}$

(D) ○ $\boxed{\frac{11}{80}}$ **(Correct Answer)**

Question No.96 (Question Id - 75)

Consider the instances of a relation R(A, B, C) given below :

A	B	C
a_1	b_1	c_1
a_1	b_1	c_2
a_2	b_2	c_3
a_2	b_1	c_2

After applying the following Relational Algebra expressions over R and resultant relations, what will be the cardinality of the relation R_3 ?

$R_1 \leftarrow \pi_{A, B}(R)$

$R_2 \leftarrow \pi_{B, C}(R)$

$R_3 \leftarrow R_1 * R_2$

(A) ○ 3

(B) ○ 4

(C) ○ **5 (Correct Answer)**

(D) ○ 7

Question No.97 (Question Id - 16)

In (**Z**, +), m**Z** denotes the subgroups of all integral multiples of m and a**Z** = b**Z** ∪ c**Z** (where a, b, c are any integers) then what will be the value of a ?

(A) ○ b x c

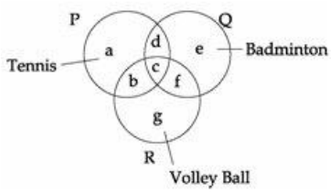
(B) ○ LCM of b and c

(C) ○ **gcd (b, c) (Correct Answer)**

(D) ○ b + c

Question No.98 (Question Id - 9)

The figure given below consists of three intersecting circles which represent sets of students who play Tennis, Badminton and Volley Ball. Each region in the figure is represented by a small letter.



Which letter represents the set of persons who play Tennis and Volley Ball but not Badminton ?

(A) ○ g
(B) ○ e
(C) ○ c
(D) ○ **b (Correct Answer)**

Question No.99 (Question Id - 20)

Let M is the set of all 2 x 2 matrices over the reals. The operation addition and multiplication on M defined as follows :

If $A = [a_{ij}]$, $B = [b_{ij}]$ then $A + B = [a_{ij} + b_{ij}]$ and $A \cdot B = [a_{ij} \cdot b_{ij}]$.

Which one of the following is true for $(M, +, \cdot)$?

(A) ○ M is a field.
(B) ○ M is an integral domain which is not a field.
(C) ○ **M is a commutative ring which is not an integral domain. (Correct Answer)**
(D) ○ M is non-commutative ring.

Question No.100 (Question Id - 18)

If in a Group G, $a^5 = e$ and $aba^{-1} = b^2$ for a, b $\in$ G then what is the order b ?

(A) ○ **31 (Correct Answer)**
(B) ○ 5
(C) ○ 2
(D) ○ 32

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