Graduate Aptitude Test in Engineering 2017

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Organizing Institute:

Indian Institute of Technology Roorkee



Question Number : 1 Correct : 1 Wrong : -0.33

The representation of the value of a 16-bit unsigned integer X in hexadecimal number system is BCA9. The representation of the value of X in octal number system is

(A) 571244 (B) 736251 (C) 571247 (D) 136251

Question Number : 2 Correct : 1 Wrong : -0.33

Match the following:

(P) `static char var;`	(i) Sequence of memory locations to store addresses
(Q) `m = malloc(10); m = NULL;`	(ii) A variable located in data section of memory
(R) `char *ptr[10];`	(iii) Request to allocate a CPU register to store data
(S) `register int var1;`	(iv) A lost memory which cannot be freed

(A) P → (ii), Q → (iv), R → (i), S → (iii)
(B) P → (ii), Q → (i), R → (iv), S → (iii)
(C) P → (ii), Q → (iv), R → (iii), S → (i)
(D) P → (iii), Q → (iv), R → (i), S → (ii)

Question Number : 3 Correct : 1 Wrong : -0.33

Match the algorithms with their time complexities:

Algorithm	Time complexity
(P) Towers of Hanoi with n disks	(i) $\Theta(n^2)$
(Q) Binary search given n sorted numbers	(ii) $\Theta(n \log n)$
(R) Heap sort given n numbers at the worst case	(iii) $\Theta(2^n)$
(S) Addition of two $n \times n$ matrices	(iv) $\Theta(\log n)$

(A) P → (iii), Q → (iv), R → (i), S → (ii)
(B) P → (iv), Q → (iii), R → (i), S → (ii)
(C) P → (iii), Q → (iv), R → (ii), S → (i)
(D) P → (iv), Q → (iii), R → (ii), S → (i)

Question Number : 4 **Correct : 1 Wrong : -0.33**

Let L_1, L_2 be any two context-free languages and R be any regular language. Then which of the following is/are CORRECT?

I. $L_1 \cup L_2$ is context-free.
II. $\overline{L_1}$ is context-free.
III. $L_1 - R$ is context-free.
IV. $L_1 \cap L_2$ is context-free.

(A) I, II and IV only (B) I and III only (C) II and IV only (D) I only

Question Number : 5 **Correct : 1 Wrong : -0.33**

Match the following according to input (from the left column) to the compiler phase (in the right column) that processes it:

(P) Syntax tree	(i) Code generator
(Q) Character stream	(ii) Syntax analyzer
(R) Intermediate representation	(iii) Semantic analyzer
(S) Token stream	(iv) Lexical analyzer

(A) P → (ii), Q → (iii), R → (iv), S → (i)
(B) P → (ii), Q → (i), R → (iii), S → (iv)
(C) P → (iii), Q → (iv), R → (i), S → (ii)
(D) P → (i), Q → (iv), R → (ii), S → (iii)

Question Number : 6 **Correct : 1 Wrong : -0.33**

Which of the following statements about parser is/are CORRECT?

I. Canonical LR is more powerful than SLR.
II. SLR is more powerful than LALR.
III. SLR is more powerful than Canonical LR.

(A) I only (B) II only (C) III only (D) II and III only

Question Number : 7 **Correct : 1 Wrong : -0.33**

Which of the following is/are shared by all the threads in a process?

I. Program counter
II. Stack
III. Address space
IV. Registers

(A) I and II only (B) III only (C) IV only (D) III and IV only

Question Number : 8 **Correct : 1 Wrong : -0.33**

In a file allocation system, which of the following allocation scheme(s) can be used if no external fragmentation is allowed?

I. Contiguous
II. Linked
III. Indexed

(A) I and III only (B) II only (C) III only (D) II and III only

Question Number : 9 **Correct : 1 Wrong : -0.33**

Consider the following statements about the routing protocols, Routing Information Protocol (RIP) and Open Shortest Path First (OSPF) in an IPv4 network.

I: RIP uses distance vector routing
II: RIP packets are sent using UDP
III: OSPF packets are sent using TCP
IV: OSPF operation is based on link-state routing

Which of the statements above are CORRECT?

(A) I and IV only
(B) I, II and III only
(C) I, II and IV only
(D) II, III and IV only

Question Number : 10 **Correct : 1 Wrong : -0.33**

If $f(x) = R\ sin\left(\frac{\pi x}{2}\right) + S$, $f'\left(\frac{1}{2}\right) = \sqrt{2}$ and $\int_0^1 f(x)dx = \frac{2R}{\pi}$, then the constants R and S are, respectively

(A) $\frac{2}{\pi}$ and $\frac{16}{\pi}$

(B) $\frac{2}{\pi}$ and 0

(C) $\frac{4}{\pi}$ and 0

(D) $\frac{4}{\pi}$ and $\frac{16}{\pi}$

Question Number : 11 **Correct : 1 Wrong : -0.33**

Let p, q, r denote the statements "*It is raining*", "*It is cold*", and "*It is pleasant*", respectively. Then the statement "*It is not raining and it is pleasant, and it is not pleasant only if it is raining and it is cold*" is represented by

(A) $(\neg p \wedge r) \wedge (\neg r \rightarrow (p \wedge q))$

(B) $(\neg p \wedge r) \wedge ((p \wedge q) \rightarrow \neg r)$

(C) $(\neg p \wedge r) \vee ((p \wedge q) \rightarrow \neg r)$

(D) $(\neg p \wedge r) \vee (r \rightarrow (p \wedge q))$

Question Number : 12 **Correct : 1 Wrong : -0.33**

Given the following binary number in 32-bit (single precision) IEEE-754 format:

00111110011011010000000000000000

The decimal value closest to this floating-point number is

(A) 1.45×10^{1} (B) 1.45×10^{-1} (C) 2.27×10^{-1} (D) 2.27×10^{1}

Question Number : 13 **Correct : 1 Wrong : -0.33**

A circular queue has been implemented using a singly linked list where each node consists of a value and a single pointer pointing to the next node. We maintain exactly two external pointers **FRONT** and **REAR** pointing to the front node and the rear node of the queue, respectively. Which of the following statements is/are CORRECT for such a circular queue, so that insertion and deletion operations can be performed in $O(1)$ time?

I. Next pointer of front node points to the rear node.
II. Next pointer of rear node points to the front node.

(A) I only

(B) II only

(C) Both I and II

(D) Neither I nor II

Question Number : 14 **Correct : 1 Wrong : -0.33**

Consider the following function implemented in C:

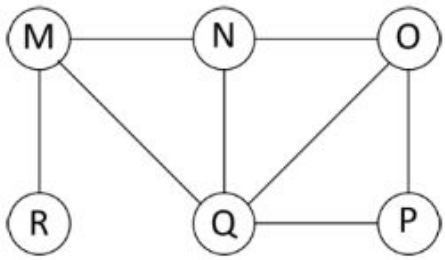
```
void printxy(int x, int y) {
        int *ptr;
        x = 0;
        ptr = &x;
        y = *ptr;
        *ptr = 1;
        printf("%d,%d",x,y);
}
```

The output of invoking `printxy(1,1)` is

(A) 0,0 (B) 0,1 (C) 1,0 (D) 1,1

Question Number : 15 **Correct : 1 Wrong : -0.33**

The Breadth First Search (BFS) algorithm has been implemented using the queue data structure. Which one of the following is a possible order of visiting the nodes in the graph below?



(A) MNOPQR
(B) NQMPOR
(C) QMNROP
(D) POQNMR

Question Number : 16 Correct : 1 Wrong : -0.33

Identify the language generated by the following grammar, where S is the start variable.

$$S \rightarrow XY$$
$$X \rightarrow aX \mid a$$
$$Y \rightarrow aYb \mid \epsilon$$

(A) $\{a^m b^n \mid m \geq n,\ n > 0\}$
(B) $\{a^m b^n \mid m \geq n,\ n \geq 0\}$
(C) $\{a^m b^n \mid m > n,\ n \geq 0\}$
(D) $\{a^m b^n \mid m > n,\ n > 0\}$

Question Number : 17 Correct : 1 Wrong : -0.33

An ER model of a database consists of entity types A and B. These are connected by a relationship R which does not have its own attribute. Under which one of the following conditions, can the relational table for R be merged with that of A?

(A) Relationship R is one-to-many and the participation of A in R is total.

(B) Relationship R is one-to-many and the participation of A in R is partial.

(C) Relationship R is many-to-one and the participation of A in R is total.

(D) Relationship R is many-to-one and the participation of A in R is partial.

Question Number : 18 Correct : 1 Wrong : -0.33

Consider socket API on a Linux machine that supports connected UDP sockets. A connected UDP socket is a UDP socket on which `connect` function has already been called. Which of the following statements is/are CORRECT?

I. A connected UDP socket can be used to communicate with multiple peers simultaneously.

II. A process can successfully call `connect` function again for an already connected UDP socket.

(A) I only
(B) II only
(C) Both I and II
(D) Neither I nor II

Question Number : 19 Correct : 1 Wrong : 0

Consider the following tables T1 and T2.

T1

P	Q
2	2
3	8
7	3
5	8
6	9
8	5
9	8

T2

R	S
2	2
8	3
3	2
9	7
5	7
7	2

In table T1, **P** is the primary key and **Q** is the foreign key referencing **R** in table T2 with on-delete cascade and on-update cascade. In table T2, **R** is the primary key and **S** is the foreign key referencing **P** in table T1 with on-delete set NULL and on-update cascade. In order to delete record $\langle 3, 8 \rangle$ from table T1, the number of additional records that need to be deleted from table T1 is _____.

Question Number : 20 Correct : 1 Wrong : 0

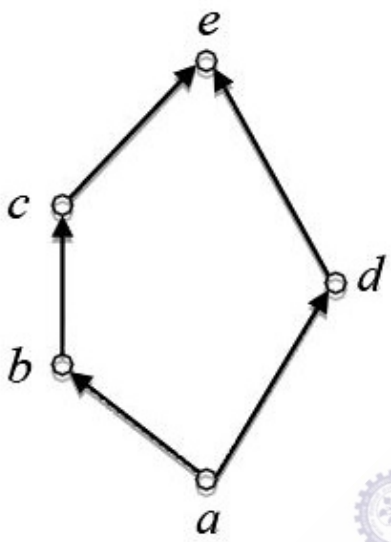
The maximum number of IPv4 router addresses that can be listed in the record route (RR) option field of an IPv4 header is _____.

Question Number : 21 **Correct : 1 Wrong : 0**

Consider the set $X=\{a,b,c,d,e\}$ under the partial ordering

$R=\{(a,a),(a,b),(a,c),(a,d),(a,e),(b,b),(b,c),(b,e),(c,c),(c,e),(d,d),(d,e),(e,e)\}$.

The Hasse diagram of the partial order (X,R) is shown below.



The minimum number of ordered pairs that need to be added to R to make (X,R) a lattice is _____ .

Question Number : 22 **Correct : 1 Wrong : 0**

Let $P=\begin{bmatrix}1 & 1 & -1\\ 2 & -3 & 4\\ 3 & -2 & 3\end{bmatrix}$ and $Q=\begin{bmatrix}-1 & -2 & -1\\ 6 & 12 & 6\\ 5 & 10 & 5\end{bmatrix}$ be two matrices.

Then the rank of $P+Q$ is _____.

Question Number : 23 **Correct : 1 Wrong : 0**

G is an undirected graph with n vertices and 25 edges such that each vertex of G has degree at least 3. Then the maximum possible value of n is _____.

Question Number : 24 **Correct : 1 Wrong : 0**

Consider a quadratic equation $x^2 - 13x + 36 = 0$ with coefficients in a base b. The solutions of this equation in the same base b are $x = 5$ and $x = 6$. Then $b =$ _____.

Question Number : 25 **Correct : 1 Wrong : 0**

The minimum possible number of states of a deterministic finite automaton that accepts the regular language $L = \{w_1 a w_2 \mid w_1, w_2 \in \{a, b\}^*, |w_1| = 2, |w_2| \geq 3\}$ is _____.

Question Number : 26 **Correct : 2 Wrong : -0.66**

P and Q are considering to apply for a job. The probability that P applies for the job is $\frac{1}{4}$, the probability that P applies for the job given that Q applies for the job is $\frac{1}{2}$, and the probability that Q applies for the job given that P applies for the job is $\frac{1}{3}$. Then the probability that P does not apply for the job given that Q does not apply for the job is

(A) $\frac{4}{5}$ (B) $\frac{5}{6}$ (C) $\frac{7}{8}$ (D) $\frac{11}{12}$

Question Number : 27 **Correct : 2 Wrong : -0.66**

If w, x, y, z are Boolean variables, then which one of the following is INCORRECT?

(A) $\overline{wx + w(x + y) + x(x + y)} = x + wy$
(B) $w\bar{x}(y + \bar{z}) + \bar{w}x = \bar{w} + x + \bar{y}z$
(C) $(w\bar{x}(y + x\bar{z}) + \bar{w}\bar{x})y = x\bar{y}$
(D) $(w + y)(wxy + wyz) = wxy + wyz$

Question Number : 28 **Correct : 2 Wrong : -0.66**

Given $f(w,x,y,z) = \sum_m(0,1,2,3,7,8,10) + \sum_d(5,6,11,15)$, where d represents the *don't-care* condition in Karnaugh maps. Which of the following is a minimum product-of-sums (POS) form of $f(w,x,y,z)$?

(A) $f = (\bar{w} + \bar{z})(\bar{x} + z)$
(B) $f = (\bar{w} + z)(x + z)$
(C) $f = (w + z)(\bar{x} + z)$
(D) $f = (w + \bar{z})(\bar{x} + z)$

Question Number : 29 **Correct : 2 Wrong : -0.66**

In a two-level cache system, the access times of L_1 and L_2 caches are 1 and 8 clock cycles, respectively. The miss penalty from the L_2 cache to main memory is 18 clock cycles. The miss rate of L_1 cache is twice that of L_2. The average memory access time (AMAT) of this cache system is 2 cycles. The miss rates of L_1 and L_2 respectively are:

(A) 0.111 and 0.056
(B) 0.056 and 0.111
(C) 0.0892 and 0.1784
(D) 0.1784 and 0.0892

Question Number : 30 **Correct : 2 Wrong : -0.66**

Consider the recurrence function

$$T(n) = \begin{cases} 2T(\sqrt{n}) + 1, & n > 2 \\ 2, & 0 < n \leq 2 \end{cases}$$

Then $T(n)$ in terms of Θ notation is

(A) $\Theta(\log \log n)$
(B) $\Theta(\log n)$
(C) $\Theta(\sqrt{n})$
(D) $\Theta(n)$

Question Number : 31 **Correct : 2 Wrong : -0.66**

For any discrete random variable X, with probability mass function $P(X=j)=p_j,\ p_j \geq 0,\ j \in \{0,\ldots,N\}$, and $\sum_{j=0}^{N} p_j = 1$, define the polynomial function $g_X(z)=\sum_{j=0}^{N} p_j z^j$. For a certain discrete random variable Y, there exists a scalar $\beta \in [0,1]$ such that $g_Y(z)=(1-\beta+\beta z)^N$. The expectation of Y is

(A) $N\beta(1-\beta)$

(B) $N\beta$

(C) $N(1-\beta)$

(D) Not expressible in terms of N and β alone

Question Number : 32 **Correct : 2 Wrong : -0.66**

Consider the following expression grammar G :

```
E -> E - T | T
T -> T + F | F
F -> (E) | id
```

Which of the following grammars is not left recursive, but is equivalent to G?

(A)
```
E -> E - T | T
T -> T + F | F
F -> (E) | id
```

(B)
```
E -> TE'
E' -> -TE' | ϵ
T -> T + F | F
F -> (E) | id
```

(C)
```
E -> TX
X -> -TX |ϵ
T -> FY
Y -> +FY |ϵ
F -> (E) | id
```

(D)
```
E -> TX | (TX)
X -> -TX | +TX | ϵ
T -> id
```

Question Number : 33 Correct : 2 Wrong : -0.66

A system shares 9 tape drives. The current allocation and maximum requirement of tape drives for three processes are shown below:

Process	Current Allocation	Maximum Requirement
P1	3	7
P2	1	6
P3	3	5

Which of the following best describes current state of the system?

(A) Safe, Deadlocked
(B) Safe, Not Deadlocked
(C) Not Safe, Deadlocked
(D) Not Safe, Not Deadlocked

Question Number : 34 Correct : 2 Wrong : -0.66

Consider a binary code that consists of only four valid codewords as given below:

$$00000, 01011, 10101, 11110$$

Let the minimum Hamming distance of the code be p and the maximum number of erroneous bits that can be corrected by the code be q. Then the values of p and q are

(A) p=3 and q=1
(B) p=3 and q=2
(C) p=4 and q=1
(D) p=4 and q=2

Question Number : 35 Correct : 2 Wrong : -0.66

Consider two hosts X and Y, connected by a single direct link of rate 10^6 bits/sec. The distance between the two hosts is 10,000 km and the propagation speed along the link is 2×10^8 m/sec. Host X sends a file of 50,000 bytes as one large message to host Y continuously. Let the transmission and propagation delays be p milliseconds and q milliseconds, respectively. Then the values of p and q are

(A) p=50 and q=100
(B) p=50 and q=400
(C) p=100 and q=50
(D) p=400 and q=50

Question Number : 36 Correct : 2 Wrong : -0.66

The pre-order traversal of a binary search tree is given by 12, 8, 6, 2, 7, 9, 10, 16, 15, 19, 17, 20. Then the post-order traversal of this tree is:

(A) 2, 6, 7, 8, 9, 10, 12, 15, 16, 17, 19, 20
(B) 2, 7, 6, 10, 9, 8, 15, 17, 20, 19, 16, 12
(C) 7, 2, 6, 8, 9, 10, 20, 17, 19, 15, 16, 12
(D) 7, 6, 2, 10, 9, 8, 15, 16, 17, 20, 19, 12

Question Number : 37 Correct : 2 Wrong : -0.66

Consider the C program fragment below which is meant to divide `x` by `y` using repeated subtractions. The variables `x`, `y`, `q` and `r` are all `unsigned int`.

```
while (r >= y) {
  r = r - y;
  q = q + 1;
}
```

Which of the following conditions on the variables `x`, `y`, `q` and `r` before the execution of the fragment will ensure that the loop terminates in a state satisfying the condition `x == (y*q + r)`?

(A) `(q == r) && (r == 0)`

(B) `(x > 0) && (r == x) && (y > 0)`

(C) `(q == 0) && (r == x) && (y > 0)`

(D) `(q == 0) && (y > 0)`

Question Number : 38 Correct : 2 Wrong : -0.66

Consider the following C function.

```
int fun(int n) {
        int i, j;
        for(i = 1; i <= n; i++) {
                for(j = 1; j < n; j += i) {
                        printf(" %d %d",i,j);
                }
        }
}
```

Time complexity of `fun` in terms of Θ notation is

(A) $\Theta(n\sqrt{n})$ (B) $\Theta(n^2)$ (C) $\Theta(n \log n)$ (D) $\Theta(n^2 \log n)$

Question Number : 39 **Correct : 2 Wrong : -0.66**

Let δ denote the transition function and $\hat{\delta}$ denote the extended transition function of the ϵ-NFA whose transition table is given below:

δ	ϵ	a	b
$\rightarrow q_0$	$\{q_2\}$	$\{q_1\}$	$\{q_0\}$
q_1	$\{q_2\}$	$\{q_2\}$	$\{q_3\}$
q_2	$\{q_0\}$	$\emptyset$	$\emptyset$
q_3	$\emptyset$	$\emptyset$	$\{q_2\}$

Then $\hat{\delta}(q_2, aba)$ is

(A) $\emptyset$ (B) $\{q_0, q_1, q_3\}$ (C) $\{q_0, q_1, q_2\}$ (D) $\{q_0, q_2, q_3\}$

Question Number : 40 **Correct : 2 Wrong : -0.66**

Consider the following languages.

$L_1 = \{a^p \mid p \text{ is a prime number}\}$
$L_2 = \{a^n b^m c^{2m} \mid n \geq 0, m \geq 0\}$
$L_3 = \{a^n b^n c^{2n} \mid n \geq 0\}$
$L_4 = \{a^n b^n \mid n \geq 1\}$

Which of the following are CORRECT?

I. L_1 is context-free but not regular.
II. L_2 is not context-free.
III. L_3 is not context-free but recursive.
IV. L_4 is deterministic context-free.

(A) I, II and IV only (B) II and III only (C) I and IV only (D) III and IV only

Question Number : 41 Correct : 2 Wrong : -0.66

Let $L(R)$ be the language represented by regular expression R. Let $L(G)$ be the language generated by a context free grammar G. Let $L(M)$ be the language accepted by a Turing machine M. Which of the following decision problems are undecidable?

I. Given a regular expression R and a string w, is $w \in L(R)$?
II. Given a context-free grammar G, is $L(G) = \emptyset$?
III. Given a context-free grammar G, is $L(G) = \Sigma^*$ for some alphabet Σ ?
IV. Given a Turing machine M and a string w, is $w \in L(M)$?

(A) I and IV only (B) II and III only (C) II, III and IV only (D) III and IV only

Question Number : 42 Correct : 2 Wrong : -0.66

The next state table of a 2-bit saturating up-counter is given below.

Q_1	Q_0	Q_1^+	Q_0^+
0	0	0	1
0	1	1	0
1	0	1	1
1	1	1	1

The counter is built as a synchronous sequential circuit using T flip-flops. The expressions for T_1 and T_0 are

(A) $T_1 = Q_1 Q_0$, $T_0 = \bar{Q}_1 \bar{Q}_0$

(B) $T_1 = \bar{Q}_1 Q_0$, $T_0 = \bar{Q}_1 + \bar{Q}_0$

(C) $T_1 = Q_1 + Q_0$, $T_0 = \bar{Q}_1 + \bar{Q}_0$

(D) $T_1 = \bar{Q}_1 Q_0$, $T_0 = Q_1 + Q_0$

Question Number : 43 **Correct : 2 Wrong : 0**

Consider the following snippet of a C program. Assume that `swap(&x, &y)` exchanges the contents of `x` and `y`.

```
int main() {
      int array[] = {3, 5, 1, 4, 6, 2};
      int done = 0;
      int i;

      while (done == 0) {
            done = 1;
            for (i=0; i<=4; i++) {
                  if (array[i] < array[i+1]) {
                        swap(&array[i], &array[i+1]);
                        done = 0;
                  }
            }
            for (i=5; i>=1; i--) {
                  if (array[i] > array[i-1]) {
                        swap(&array[i], &array[i-1]);
                        done = 0;
                  }
            }

      }
      printf("%d",array[3]);
}
```

The output of the program is _____.

Question Number : 44 Correct : 2 Wrong : 0

Two transactions T_1 and T_2 are given as

$$T_1: r_1(X)w_1(X)r_1(Y)w_1(Y)$$
$$T_2: r_2(Y)w_2(Y)r_2(Z)w_2(Z)$$

where $r_i(V)$ denotes a *read* operation by transaction T_i on a variable V and $w_i(V)$ denotes a *write* operation by transaction T_i on a variable V. The total number of conflict serializable schedules that can be formed by T_1 and T_2 is _____.

Question Number : 45 Correct : 2 Wrong : 0

The read access times and the hit ratios for different caches in a memory hierarchy are as given below.

Cache	Read access time (in nanoseconds)	Hit ratio
I-cache	2	0.8
D-cache	2	0.9
L2-cache	8	0.9

The read access time of main memory is 90 nanoseconds. Assume that the caches use the referred-word-first read policy and the write back policy. Assume that all the caches are direct mapped caches. Assume that the dirty bit is always 0 for all the blocks in the caches. In execution of a program, 60% of memory reads are for instruction fetch and 40% are for memory operand fetch. The average read access time in nanoseconds (up to 2 decimal places) is _____.

Question Number : 46 **Correct : 2 Wrong : 0**

Consider the following database table named *top_scorer*.

top_scorer

player	country	goals
Klose	Germany	16
Ronaldo	Brazil	15
G Müller	Germany	14
Fontaine	France	13
Pelé	Brazil	12
Klinsmann	Germany	11
Kocsis	Hungary	11
Batistuta	Argentina	10
Cubillas	Peru	10
Lato	Poland	10
Lineker	England	10
T Müller	Germany	10
Rahn	Germany	10

Consider the following SQL query:

```
SELECT ta.player FROM top_scorer AS ta
WHERE ta.goals >ALL (SELECT tb.goals
             FROM top_scorer AS tb
             WHERE tb.country = 'Spain')
AND ta.goals >ANY (SELECT tc.goals
             FROM top_scorer AS tc
             WHERE tc.country = 'Germany')
```

The number of tuples returned by the above SQL query is _____.

Question Number : 47 **Correct : 2 Wrong : 0**

If the ordinary generating function of a sequence $\{a_n\}_{n=0}^{\infty}$ is $\frac{1+z}{(1-z)^3}$, then $a_3 - a_0$ is equal to _____.

Question Number : 48 Correct : 2 Wrong : 0

If a random variable X has a Poisson distribution with mean 5, then the expectation $E[(X+2)^2]$ equals _____.

Question Number : 49 Correct : 2 Wrong : 0

In a B+ tree, if the search-key value is 8 bytes long, the block size is 512 bytes and the block pointer size is 2 bytes, then the maximum order of the B+ tree is _____.

Question Number : 50 Correct : 2 Wrong : 0

A message is made up entirely of characters from the set $X = \{P, Q, R, S, T\}$. The table of probabilities for each of the characters is shown below:

Character	Probability
P	0.22
Q	0.34
R	0.17
S	0.19
T	0.08
Total	1.00

If a message of 100 characters over X is encoded using Huffman coding, then the expected length of the encoded message in bits is _____.

Question Number : 51 Correct : 2 Wrong : 0

Consider the set of processes with arrival time (in milliseconds), CPU burst time (in milliseconds), and priority (0 is the highest priority) shown below. None of the processes have I/O burst time.

Process	Arrival Time	Burst Time	Priority
P_1	0	11	2
P_2	5	28	0
P_3	12	2	3
P_4	2	10	1
P_5	9	16	4

The average waiting time (in milliseconds) of all the processes using preemptive priority scheduling algorithm is _____.

Question Number : 52 Correct : 2 Wrong : 0

If the characteristic polynomial of a 3×3 matrix M over $\mathbb{R}$ (the set of real numbers) is $\lambda^3 - 4\lambda^2 + a\lambda + 30$, $a \in \mathbb{R}$, and one eigenvalue of M is 2, then the largest among the absolute values of the eigenvalues of M is _____.

Question Number : 53 Correct : 2 Wrong : 0

Consider a machine with a byte addressable main memory of 2^{32} bytes divided into blocks of size 32 bytes. Assume that a direct mapped cache having 512 cache lines is used with this machine. The size of the tag field in bits is _____.

Question Number : 54 **Correct : 2 Wrong : 0**

Consider the following C Program.

```
#include<stdio.h>
int main() {
        int m = 10;
        int n, n1;
        n = ++m;
        n1 = m++;
        n--;
        --n1;
        n -= n1;
        printf("%d", n);
        return 0;
}
```

The output of the program is _____.

Question Number : 55 **Correct : 2 Wrong : 0**

Consider the following C Program.

```
#include<stdio.h>
#include<string.h>
int main() {
        char* c = "GATECSIT2017";
        char* p = c;
        printf("%d", (int)strlen(c+2[p]-6[p]-1));
        return 0;
}
```

The output of the program is _____.

Question Number : 56 **Correct : 1 Wrong : -0.33**

Choose the option with words that are not synonyms.

(A) aversion, dislike
(B) luminous, radiant
(C) plunder, loot
(D) yielding, resistant

Question Number : 57 **Correct : 1 Wrong : -0.33**

Saturn is _____ to be seen on a clear night with the naked eye.

(A) enough bright (B) bright enough (C) as enough bright (D) bright as enough

Question Number : 58 **Correct : 1 Wrong : -0.33**

There are five buildings called V, W, X, Y and Z in a row (not necessarily in that order). V is to the West of W. Z is to the East of X and the West of V. W is to the West of Y. Which is the building in the middle?

(A) V (B) W (C) X (D) Y

Question Number : 59 **Correct : 1 Wrong : -0.33**

A test has twenty questions worth 100 marks in total. There are two types of questions. Multiple choice questions are worth 3 marks each and essay questions are worth 11 marks each. How many multiple choice questions does the exam have?

(A) 12 (B) 15 (C) 18 (D) 19

Question Number : 60 **Correct : 1 Wrong : -0.33**

There are 3 red socks, 4 green socks and 3 blue socks. You choose 2 socks. The probability that they are of the same colour is

(A) 1/5 (B) 7/30 (C) 1/4 (D) 4/15

Question Number : 61 **Correct : 2 Wrong : -0.66**

"We lived in a culture that denied any merit to literary works, considering them important only when they were handmaidens to something seemingly more urgent – namely ideology. This was a country where all gestures, even the most private, were interpreted in political terms."

The author's belief that ideology is not as important as literature is revealed by the word:

(A) 'culture' (B) 'seemingly' (C) 'urgent' (D) 'political'

Question Number : 62 **Correct : 2 Wrong : -0.66**

There are three boxes. One contains apples, another contains oranges and the last one contains both apples and oranges. All three are known to be incorrectly labelled. If you are permitted to open just one box and then pull out and inspect only one fruit, which box would you open to determine the contents of all three boxes?

(A) The box labelled 'Apples'
(B) The box labelled 'Apples and Oranges'
(C) The box labelled 'Oranges'
(D) Cannot be determined

Question Number : 63 **Correct : 2 Wrong : -0.66**

X is a 30 digit number starting with the digit 4 followed by the digit 7. Then the number X^3 will have

(A) 90 digits (B) 91 digits (C) 92 digits (D) 93 digits

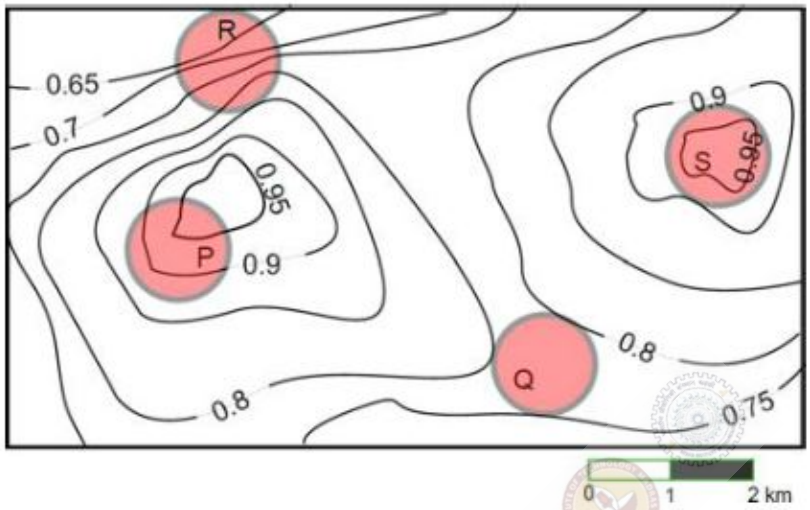
Question Number : 64 **Correct : 2 Wrong : -0.66**

The number of roots of $e^x + 0.5x^2 - 2 = 0$ in the range $[-5, 5]$ is

(A) 0 (B) 1 (C) 2 (D) 3

Question Number : 65 **Correct : 2 Wrong : -0.66**

An air pressure contour line joins locations in a region having the same atmospheric pressure. The following is an air pressure contour plot of a geographical region. Contour lines are shown at 0.05 bar intervals in this plot.



If the possibility of a thunderstorm is given by how fast air pressure rises or drops over a region, which of the following regions is most likely to have a thunderstorm?

(A) P (B) Q (C) R (D) S

Q. No.	Type	Section	Key	Marks
1	MCQ	CS-2	D	1
2	MCQ	CS-2	A	1
3	MCQ	CS-2	C	1
4	MCQ	CS-2	B	1
5	MCQ	CS-2	C	1
6	MCQ	CS-2	A	1
7	MCQ	CS-2	B	1
8	MCQ	CS-2	D	1
9	MCQ	CS-2	C	1
10	MCQ	CS-2	C	1
11	MCQ	CS-2	A	1
12	MCQ	CS-2	C	1
13	MCQ	CS-2	B	1
14	MCQ	CS-2	C	1
15	MCQ	CS-2	D	1
16	MCQ	CS-2	C	1
17	MCQ	CS-2	C	1
18	MCQ	CS-2	B	1
19	NAT	CS-2	0.0 to 0.0	1
20	NAT	CS-2	9.0 to 9.0	1
21	NAT	CS-2	-0.01 to 0.01	1
22	NAT	CS-2	2.0 to 2.0	1
23	NAT	CS-2	16.0 to 16.0	1
24	NAT	CS-2	8.0 to 8.0	1
25	NAT	CS-2	8.0 to 8.0	1
26	MCQ	CS-2	A	2
27	MCQ	CS-2	C	2
28	MCQ	CS-2	A	2
29	MCQ	CS-2	A	2
30	MCQ	CS-2	B	2
31	MCQ	CS-2	B	2
32	MCQ	CS-2	C	2
33	MCQ	CS-2	B	2
34	MCQ	CS-2	A	2
35	MCQ	CS-2	D	2
36	MCQ	CS-2	B	2

37	MCQ	CS-2	C	2
38	MCQ	CS-2	C	2
39	MCQ	CS-2	C	2
40	MCQ	CS-2	D	2
41	MCQ	CS-2	D	2
42	MCQ	CS-2	B	2
43	NAT	CS-2	3.0 to 3.0	2
44	NAT	CS-2	54.0 to 54.0	2
45	NAT	CS-2	4.72 to 4.72	2
46	NAT	CS-2	7.0 to 7.0	2
47	NAT	CS-2	15.0 to 15.0	2
48	NAT	CS-2	54.0 to 54.0	2
49	NAT	CS-2	52.0 to 52.0	2
50	NAT	CS-2	225.0 to 225.0	2
51	NAT	CS-2	29.0 to 29.0	2
52	NAT	CS-2	5.0 to 5.0	2
53	NAT	CS-2	18.0 to 18.0	2
54	NAT	CS-2	0.0 to 0.0	2
55	NAT	CS-2	2.0 to 2.0	2
56	MCQ	GA	D	1
57	MCQ	GA	B	1
58	MCQ	GA	A	1
59	MCQ	GA	B	1
60	MCQ	GA	D	1
61	MCQ	GA	B	2
62	MCQ	GA	B	2
63	MCQ	GA	A	2
64	MCQ	GA	C	2
65	MCQ	GA	C	2