

Please read the following instructions carefully.

1. Fill in Roll No. and other personal details on OMR answersheet. Please sign in the designated space.
2. Do NOT open question paper booklet unless instructed.
3. Please note that calculators are not allowed.
4. No mobile devices, bluetooth devices and similar electronic communication devices are permitted.
5. Each question carries only one correct answer.
6. Please mark answers on the OMR sheet.
7. Use BLACK BALL POINT Pen for marking answers on OMR sheet. Gel pens are not allowed.
8. This examination has negative marking. Each incorrect question carries a penalty of -1/4 marks.
9. Please do not retain question paper booklet. Handover question paper booklet and OMR sheet to invigilator at end of examination.
10. You may keep copy of OMR answersheet for your reference.

Time: 1 Hour

Max. Marks: 50

Please note that each incorrect question carries a penalty of -1/4 marks.

Questions 1-5 are based on the following paragraphs.

Coral reefs are one of the most fragile, biologically complex, and diverse marine ecosystems on Earth. This ecosystem is one of the fascinating paradoxes of the biosphere: how do clear, and thus nutrient-poor, waters support such prolific and productive communities? Part of the answer lies within the tissues of the corals themselves. Symbiotic cells of algae known as zooxanthellae carry out photosynthesis using the metabolic wastes of the corals, thereby producing food for themselves, for their coral hosts, and even for other members of the reef community. This symbiotic process allows organisms in the reef community to use sparse nutrient resources efficiently.

Unfortunately for coral reefs, however, a variety of human activities are causing worldwide degradation of shallow marine habitats by adding nutrients to the water. Agriculture, slash-and-burn land clearing, sewage disposal, and manufacturing that creates waste by-products all increase nutrient loads in these waters. Typical symptoms of reef decline are destabilized herbivore populations and an increasing abundance of algae and filter-feeding animals. Declines in reef communities are consistent with observations that nutrient input is increasing in direct proportion to growing human populations, thereby threatening reef communities sensitive to subtle changes in nutrient input to their waters.

- 1 The passage is primarily concerned with B
  - (A) describing the effects of human activities on algae in coral reefs
  - (B) explaining how human activities are posing a threat to coral reef communities
  - (C) discussing the process by which coral reefs deteriorate in nutrient-poor waters
  - (D) explaining how coral reefs produce food for themselves
  
- 2 The passage suggests which of the following about coral reef communities? A
  - (A) Coral reef communities may actually be more likely to thrive in waters that are relatively low in nutrients.
  - (B) The nutrients on which coral reef communities thrive are only found in shallow waters.
  - (C) Human population growth has led to changing ocean temperatures, which threatens coral reef communities.
  - (D) The growth of coral reef communities tends to destabilize underwater herbivore populations.
  
- 3 The author refers to “filter-feeding animals” in order to A
  - (A) provide an example of a characteristic sign of reef deterioration
  - (B) explain how reef communities acquire sustenance for survival
  - (C) identify a factor that helps herbivore populations thrive
  - (D) indicate a cause of decreasing nutrient input in waters that reefs inhabit
  
- 4 According to the passage, which of the following is a factor that is threatening the survival of coral reef communities? D
  - (A) The waters they inhabit contain few nutrient resources.
  - (B) The degraded waters of their marine habitats have reduced their ability to carry out photosynthesis.
  - (C) They are too biologically complex to survive in habitats with minimal nutrient input.
  - (D) Waste by-products result in an increase in nutrient input to reef communities.

- 5 It can be inferred from the passage that the author describes coral reef communities as paradoxical most likely for which of the following reasons? C
- (A) They are thriving even though human activities have depleted the nutrients in their environment.
  - (B) They are able to survive in spite of an over-abundance of algae inhabiting their waters.
  - (C) They are able to survive in an environment with limited food resources.
  - (D) Their metabolic wastes contribute to the degradation of the waters that they inhabit.

**Questions 6-10 are based on the following paragraphs.**

Fear can be good for business. Just ask the multibillion dollar insurance industry, for example. Or companies such as Lifelock and TrustedID, which monitor people's credit reports for fraudulent transactions to protect against identity theft.

So it comes as no surprise that, after years of headlines and horror stories about predators, cyberbullies, and other dangers to children online, a crop of subscription services has emerged to help parents monitor their child's activities on social networks. These start-ups aim to distinguish themselves from the older category of software products like Netnanny. Such products sit on a user's hard drive, primarily to block various websites.

The new companies include Safetyweb, based in Denver, Socialshield, of San Mateo, and Mychild, a service of Reputationdefender, in Redwood city. These services scour the web to create easily digestible reports for parents of everything a child is doing online. The companies charge for subscriptions; the lowest cost \$ 10 a month or \$ 100 a year. For harried parents, the question is: are they worth it?

Certainly not for people who are web-savvy. The services gather data that can be freely collected with a bit of ardent web searching. But many parents are overworked and generally overwhelmed by the rapid pace of technological change and the continuing introduction of social web sites. For these people, a simple internet cheat sheet on their child – even at \$100 a year- could be a useful tool.

- 6 The expression ' ... fear can be good ' serves to suggest that: C
- (A) without fear no business can be run
  - (B) fear is always useful in business
  - (C) sometimes even fear can have advantages
  - (D) a fearful approach towards business is advantageous
- 7 The latest online subscription services differ from earlier software products as: C
- (A) they do not charge anything
  - (B) they block the unwanted sites altogether
  - (C) they monitor the child's activities
  - (D) they do not block various sites
- 8 Which of the following statements cannot be inferred from the passage: A
- (A) more and more children are becoming addicted to net surfing
  - (B) many parents are worried about their child's social networking
  - (C) companies offer many services to monitor child's activities
  - (D) these companies charge for their services

- 9 Which of the following is not a synonym of the word 'Scour' as used in the passage: C  
(A) search  
(B) scan  
(C) scourge  
(D) surf
- 10 Which of the following best describes the style of the passage: A  
(A) informative  
(B) abstract  
(C) technical  
(D) narrative
- 11 If the day before yesterday was SATURDAY, what would be day after tomorrow B  
(A) TUESDAY  
(B) WEDNESDAY  
(C) THURSDAY  
(D) FRIDAY
- 12 If EARTH is encoded as IUSBF, MARS shall be encoded as A  
(A) TSBN  
(B) ISBN  
(C) NSBT  
(D) NBST
- 13 Which of the following field of the TCP header tells how many bytes may be sent starting at the byte acknowledged? B  
(A) TCP header length  
(B) Window size  
(C) Acknowledgement number  
(D) Urgent pointer
- 14 Which of the following combinational logic can evaluate minimum of three 1-bit numbers? C  
(A) 3-input NAND gate  
(B) 3-input NOR gate  
(C) 3-input AND gate  
(D) 3-input OR gate
- 15 Static data members B  
(A) Are constant variables  
(B) Are shared by all class objects  
(C) Cannot be assigned an initial value  
(D) All of the above
- 16 Consider an undirected graph G with 100 nodes. The maximum number of edges to be included in G so that the graph is not connected is C  
(A) 2451  
(B) 4950  
(C) 4851  
(D) 9900

- 17 Let the content of Address part of instruction is 1234H and the content of base register is 0236H. Give the address of memory location addressed if base register addressing mode is used. C
- (A) 1234H  
 (B) 1470H  
 (C) 146AH  
 (D) 146BH
- 18 #define MYSTERY(a, b) ((a % 2) ? b : b+1)  
 MYSTERY(MYSTERY(6, 19), MYSTERY(3, 13)) shall evaluate to D
- (A) 13  
 (B) 19  
 (C) 12  
 (D) 14
- 19 Which of the following instructions always mark beginning of a basic block. C
- (A) Unconditional and conditional branch  
 (B) instructions which may throw an exception  
 (C) Targets of jumps or branches  
 (D) the return instruction
- 20 In an examination, a right answer is awarded +1 and a wrong answer is awarded -1/2. A candidate attempts all 100 questions and gets a score of 52. How many questions did he answer correctly? B
- (A) 64  
 (B) 68  
 (C) 70  
 (D) 72
- 21 While traversing a graph in Depth First Search way, arrival and departure time for every node is recorded. For two vertices P and Q, which one of following is NOT correct? B
- (A)  $P_{\text{arrival}} < Q_{\text{arrival}} < Q_{\text{departure}} < P_{\text{departure}}$   
 (B)  $P_{\text{arrival}} < Q_{\text{arrival}} < P_{\text{departure}} < Q_{\text{departure}}$   
 (C)  $P_{\text{arrival}} < P_{\text{departure}} < Q_{\text{arrival}} < Q_{\text{departure}}$   
 (D)  $Q_{\text{departure}} > P_{\text{departure}} > P_{\text{arrival}} > Q_{\text{arrival}}$
- 22 While stacking 12 books on different subjects in a row on a shelf, how many arrangements are possible in which the books on Mathematics and Geography are not placed side-by-side. B
- (A)  $12! - 11!$   
 (B)  $12! - 2 \times 11!$   
 (C)  $\frac{12!}{2!}$   
 (D)  $2 \times 11!$

- 23 In a XOR gate with two inputs A and B, A is stuck at one (because of some fault). Output of this XOR gate is C
- (A) not affected
  - (B) always one
  - (C) Complement of B
  - (D) Complement of A
- 24 Which of the following requires switching to kernel (privileged) mode in operating system? D
- (A) Function Call
  - (B) Subroutine Call
  - (C) Procedure Call
  - (D) System Call
- 25 The SQL expression A
- ```
Select distinct T.branch_name
from branch T, branch S
where T.assets>S.assets and S.branch_city="Mumbai"
```
- finds the names of
- (A) All branches that have greater assets than some branch located in Mumbai.
  - (B) All branches that have greater assets than all branches in Mumbai.
  - (C) The branch that has greatest asset in Mumbai.
  - (D) Any branch that has greater assets than any branch in Mumbai
- 26 Given x is an unsigned int in C. What shall be outcome of following C code? A
- ```
int f(int x) {
    if(x==0)
        return 0;
    else
        return((x%10) + f(x/10));
}
```
- (A) The function f computes the sum of all digits in the decimal representation of x.
  - (B) The function f computes the logarithm of x to the base 10.
  - (C) The function f will cause infinite recursion for certain values of x.
  - (D) None of the above.
- 27 How many address/ data lines are required to access 64k x 8 memory? A
- (A) 16/8
  - (B) 16/16
  - (C) 8/16
  - (D) 8/8
- 28 Garbage collection system software C
- (A) frees all allocated space
  - (B) compacts all allocated but unused spaces
  - (C) frees all allocated but unused spaces
  - (D) compacts unused spaces

- 29 B+ trees are preferred to binary trees in databases because C
- (A) Disk capacities are greater than memory capacities  
 (B) Disks are more reliable than memory  
 (C) Disk data transfer rates are much less than memory data transfer rates  
 (D) None of the above
- 30 Which is not a software life cycle model? B
- (A) Spiral Model  
 (B) Capability maturity Model  
 (C) Prototyping Model  
 (D) Waterfall Model
- 31 For which values of  $x$  and  $y$ , the following matrix multiplication is satisfied C
- $$\begin{pmatrix} 3 & 1 & 2 \\ 2 & x & -1 \\ 4 & 6 & 6 \end{pmatrix} \cdot \begin{pmatrix} 1 & 1 & 3 \\ 4 & 2 & 1 \\ y & 2 & 3 \end{pmatrix} = \begin{pmatrix} 11 & 9 & 16 \\ -12 & -6 & 0 \\ 40 & 28 & 36 \end{pmatrix}$$
- (A)  $x = -3, y = -2$   
 (B)  $x = 3, y = -2$   
 (C)  $x = -3, y = 2$   
 (D)  $x = 3, y = 2$
- 32 Consider a  $n$ -input OR gate and its truth table. For how many input permutations, output in truth table is TRUE. B
- (A)  $n - 1$   
 (B)  $2^n - 1$   
 (C)  $2^{(n-1)}$   
 (D)  $2^n + 1$
- 33 Class B is derived from base class A through public inheritance. Also class C is derived from class B through protected inheritance. Then a class C member function can access B
- (A) Only the protected and public data of class B, none of class A  
 (B) Protected and public data of class A and B  
 (C) Private data in class A and B  
 (D) Public data of class A and private data of class B
- 34 In \_\_\_\_\_ CSMA protocol, after the station finds the line idle, it sends or refrains from sending based on the outcome of a random number generator. D
- (A) Non-persistent  
 (B) 0-persistent  
 (C) 1-persistent  
 (D)  $p$ -persistent
- 35 If SPADE is written as 79628, SPEED shall be written as A
- (A) 97728  
 (B) 97782  
 (C) 29887  
 (D) 27988

- 36 Consider the following code fragment A
- ```
for (digit =0; digit <9;digit++) {  
    digit = 2*digit;  
    digit--;  
}
```
- How many times loop will be executed :
- (A) Infinite
  - (B) Nine
  - (C) Four
  - (D) Zero
- 37 Minimum and maximum height of a binary search tree of  $n$  nodes is respectively A
- (A)  $\log_2 n, n$
  - (B)  $\log_2 n, n^2$
  - (C)  $n, n^2$
  - (D)  $\log_2 n, \log_2 n$
- 38 Regular expression for the language  $L = \{ w \in \{a, b\}^* \mid w \text{ has no pair of consecutive } a \}$  is D
- (A)  $(b + aba)^*$
  - (B)  $(ab + ba)^*$
  - (C)  $(b + aba)^* (a + \lambda)$
  - (D)  $(b + ab)^* (a + \lambda)$
- 39 An Operating System reserves one block to store pointers to file blocks. If one block is 1024 bytes and a disk address requires 32 bits, maximum file size that can be supported is C
- (A) 32 Kilobytes
  - (B) 64 Kilobytes
  - (C) 256 Kilobytes
  - (D) 1 Megabytes
- 40 The Translation look aside buffer (TLB) takes advantage of which principle? A
- (A) Principle of Locality
  - (B) Principle of Optimality
  - (C) Principle of Duality
  - (D) Principle of Dynamic Programming
- 41 In C++, a pure virtual function D
- (A) Is related to static binding
  - (B) Is defined only in the base class
  - (C) Facilitates compile time polymorphism
  - (D) Should be defined in the derived class

- 42 Consider a tree in which every node has a value greater than value of any node in its left subtree but less than value of all nodes in its right subtree. An inorder traversal of this tree shall result in A
- (A) a sorted sequence in ascending order
  - (B) a sorted sequence in descending order
  - (C) concatenation of two sequences – first sequence in ascending order and second sequence in descending order
  - (D) Insufficient information
- 43 Which of the following HTML constructs is used for embedding a hyperlink? A
- (A) `<a> </a>`
  - (B) `<aref> </aref>`
  - (C) `<hlink> </hlink>`
  - (D) `<hyperlink> </hyperlink>`
- 44 System quality relates to its D
- (A) Reliability
  - (B) Efficiency
  - (C) Maintainability
  - (D) All of the above
- 45 A is sister of B, C is father of A, D is mother of C and F is daughter of B. How are D and A related to F. C
- (A) Grandfather, Aunt
  - (B) Grandmother, Uncle
  - (C) Greatgrandmother, Aunt
  - (D) Greatgrandmother, Uncle
- 46 For the following system of linear equations A
- $$\begin{aligned} 2x + 3y &= 2 \\ 6x + 9y &= 8 \end{aligned}$$
- (A) Solution does not exist.
  - (B) Infinitely many solutions exist.
  - (C) A unique solution exists.
  - (D) Finite number of solutions exist.
- 47 A's expenses are 20% less than B's expenses. How much percent more are B's expenses than A's expenses? B
- (A) 20%
  - (B) 25%
  - (C) 15%
  - (D) 10%
- 48 Which of the following software is not a web server? B
- (A) Apache
  - (B) Python
  - (C) Internet Information Services (IIS)
  - (D) Mongoose

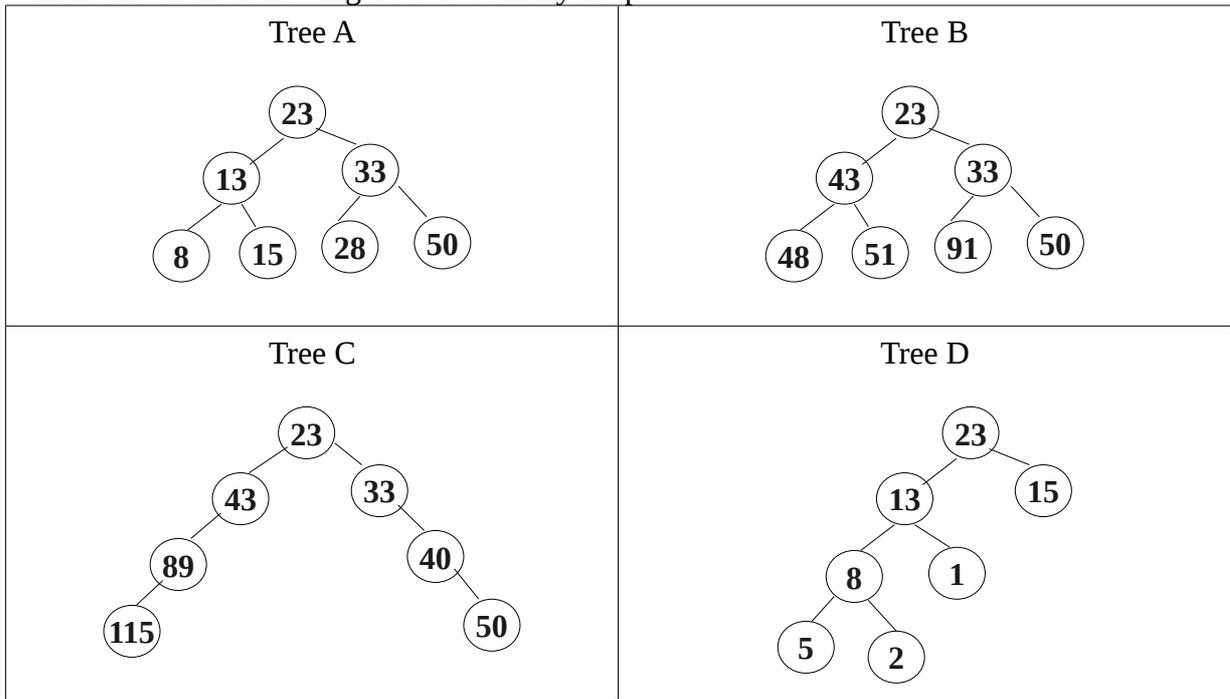
49 Matrix B is inverse of a matrix A. Two rows –  $m^{\text{th}}$  and  $n^{\text{th}}$  – of matrix A are exchanged to generate matrix P. Inverse of matrix P can be obtained by

D

- (A) swapping  $m^{\text{th}}$  and  $n^{\text{th}}$  rows of matrix A
- (B) swapping  $m^{\text{th}}$  and  $n^{\text{th}}$  columns of matrix A
- (C) swapping  $m^{\text{th}}$  and  $n^{\text{th}}$  rows of matrix B
- (D) swapping  $m^{\text{th}}$  and  $n^{\text{th}}$  columns of matrix B

50 Which one of the following trees is a binary heap?

B



- (A) Tree A
- (B) Tree B
- (C) Tree C
- (D) Tree D