

# C/P/R EXAMS 2019

300078

## Computer Science/Application ( Technical Paper )

Time : 3 hours ]

[ Full Marks : 100

### PART—I

( Marks : 20)

**Notes :** (i) Answer *all* questions.(ii) Each question carries *1* mark.

1. What is the purpose of the COCOMO model?
2. Identify the desirable characteristics for design of modular software in terms of cohesion and coupling.
3. Consider the following statements related to regression testing in software development:  
P. Regression testing is used on failed test cases only.  
Q. Regression testing cannot be automated.  
R. Regression testing does not verify software defects.

Which of the above statement(s) is/are true?

4. Specify the TCP/UDP port numbers of the following services :

(i) SMTP

(ii) HTTPS

(iii) DNS

(iv) TELNET

5. In JAVA, which operator is used to free the memory of an object when it is no longer needed?
6. The preorder and inorder traversals of a binary tree are given below :

Pre-order : 5, 8, 7, 6, 1, 2, 4, 3

In-order : 7, 8, 1, 6, 5, 4, 3, 2

Find the correct post-order traversal.

7. What is the output of the following C++ program?

```
#include <iostream>
using namespace std;
int main()
{
    auto i = 'A' + 1;
    cout << i << endl;
}
```



8. Consider the following statements about HTML POST method :

P. POST method can be used to send data to a server to update a resource.

Q. Results obtained from POST method can be bookmarked.

R. POST method limits the length of values to be sent.

Which of the above statement(s) is/are true?

9. Consider the following JavaScript program below :

```
var text = '{"employees":['+
  '{"FName":"Tana", "LName":"Taku"},'+
  '{"FName":"Das", "LName":"Anita"},'+
  '{"FName":"Riba", "LName":"Karpi"}]}' ;
JSON.parse(text);
```

What does the program do?

10. A processor has a TLB (Translation Lookaside Buffer) that can store 256 page table entries. TLB is 4-way associative. If page size is 2KB and virtual addresses generated by the processor are 32-bit wide, then find the minimum size of TLB tag.

11. What is the output of the following C program?

```
#include <stdio.h>
void increment (int i) { i = i + 1; }
int main()
{
    int i = 10; printf("%d",i);
    increment(i); printf("%d",i);
    increment(i+1); printf("%d",i);
}
```

12. Explain the purpose of the JAVA Server Socket accept() method and illustrate its usage with a sample JAVA program.

13. In a database, give two examples of data integrity constraints.

14. Prove that the sum of a full-adder circuit with inputs A, B and C can be given by the Boolean function  $A \oplus B \oplus C$ .

15. What does the term SSD stand for? How is it used in modern computers today?

16. In a database, explain the purpose of trigger procedures with a suitable example.

17. Define the term 'foreign key' in a database and illustrate it with a suitable example.

18. Consider the following C program :

```
int main() {  
    printf("A\n");  
    if (fork() == 0) {  
        printf("B\n");  
        fork();  
        printf("C\n");  
    }  
}
```

How many times are A, B and C printed?

19. Why is MongoDB called NoSQL database?
20. Differentiate between TCP and UDP in computer networks.

## PART—II

( Marks : 80)

- Notes :** (i) Answer all questions.  
(ii) Each question carries 10 mark.

1. (a) Write the binary search algorithm in pseudocode or a programming language of your choice. Illustrate its behaviour using a suitable example. 4+2  
(b) Derive the asymptotic time complexity of the binary search algorithm and express it in big O notation. 4
2. Design a 4-bit synchronous binary UP counter using T flip-flops. Elaborate your design by employing state transition diagram and excitation table for T flip-flop. Use K-map for circuit minimization, if required. 10
3. (a) Compare and contrast the OSI architecture and TCP/IP architecture of computer networks. 4  
(b) A block of IPv4 addresses is allocated to an organization. The address of one host is 126.133.112.34/19. Find the—  
(i) network address;  
(ii) broadcast address of the given subnet;  
(iii) number of hosts. 2+2+2

4. The relational database schema of an employee database is given below :  
 EMPLOYEE(EmpID : integer, EmpName: string, age: integer, Salary : real)  
 WORKS(EmpID : integer, DeptID: integer, since : date)  
 DEPARTMENT(DeptID: integer, DeptName : name, Budget: real, ManagerID: integer)
- (a) Write the SQL statements to create the above relations, taking care to specify primary key and foreign key constraints. 6
- (b) Write the SQL statement to add employee named 'Tana Tatung', aged 35 and drawing a salary of ₹27,000 per month. 2
- (c) Write the SQL statement to implement a pay hike of 8% to all employees with salaries below ₹20,000. 2
5. Design a Web page that uses HTML form to take two input values—user name and password. It should also have a 'Login' button which will send the given values to the server for verification. 'For your password?' and 'Register' are other two options provided by your Web page. Explain how CSS can be used for Web site design. 8+2
6. Write a C++ or JAVA program that illustrates—
- (a) parameterized constructor;  
 (b) copy constructor;  
 (c) method/function overloading;  
 (d) class variable;  
 (e) instance variable.
- Illustrate the working of your program with suitable examples. 2×5
7. (a) Consider an operating system that uses paging for memory management. Assume that there are 4 page frames which are initially empty. If the page reference string is 5, 1, 2, 3, 4, 7, 2, 1, 5, 3, 2, 4, 6, compute the number of page faults using—
- (i) LRU;  
 (ii) optimal replacement algorithms. 3+5
- (b) Explain the term 'Belady's anomaly'. 2
8. (a) Write a C++ program to illustrate—
- (i) pass by value;  
 (ii) pass by pointer;  
 (iii) pass by reference mechanisms that can be used in functions. 3×3
- (b) Define the term 'rvalue reference' in C++. 1

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