University of Engineering and Management, Kolkata

Term - II Examination, November, 2023

Programme Name: B.Tech (CSE, CSE(IOT, BCT & CS), CSE(AIML))

Semester: 5th

Course Name: Essential Studies for Professionals - V

Course Code: HSMC(CS)502

Full Marks: 30 Time: 1hour

Part A

Attempt any 4 out of 7 questions

Each question carries 2 Marks (2 X 4)

1. Define some properties of AVL Tree. 2

2. What is the worst-case time complexity of binary search algorithm for **n** elements? Show an example. 2

3. What is Page Fault? What is the access principle of a linked list? 2

4. What is dirty read problem in transaction? Show the example. 2

5. Let E1 and E2 be two entities in an ER diagram with simple single valued attributes; R1 and R2 are two relationships between E1 and E2, where R1 is one to many and R2 is many to many. R1 and R2 do not having any attributes. What is the minimum no of table required to represent in relational model? 2

6. Evaluate the recurrence relation for Fibonacci Series. Show an example. 2

7. Consider the following declaration of a two-dimensional array in C: 2

   Char a[100][100]

   Assuming that the main memory is byte-addressable and that array is stored starting from memory address 0, the address of a [40] [50] is to be mentioned.

Part B

Attempt any 1 out of 2 questions

Each question carries 3 Marks (3 X 1)

8. Consider a double hashing scheme in which the primary hash function is $h_1(k)=k \bmod 23$, and the secondary hash function is $h_2(k)=4+(k \bmod 19)$. Assume that the table size is **26**. Then the address returned by probe **6** in the probe sequence (assume that the probe sequence begins at probe 0) for key-value **k=87** is _____. 3

9. What is the maximum height of any AVL-tree with 7 nodes? Assume that the height of a tree with a single node is 0. 3

Part - C

Attempt any 1 out of 2 questions

Each question carries 4 Marks (4 X 1)

10 Consider the following C function 4

```
int f(int n)
{static int i=1;
if (n>=5) return n;
n=n+i;
i++;
return f(n);
}
```

The value returned by f(1) is :

11 A function **f** defined on stacks of integers satisfies the following properties. **f(∅) = 0** and **f (push (S, i)) = max (f(S), 0) + i** for all stacks S and integers **i.** If a stack S contains the integers 2, -3, 2, -1, 2 in order from bottom to top, what is **f(S)**? 4

SDP-V

Attempt any 5 out of 8 questions

Each question carries 3 Marks (3 X 5)

12. In the questions, the sentence is split into four parts and named A, B, C and D. These four parts are not given in their proper order. Read the sentence and find out which of the four combinations is correct. 3

I). A get some peace(A)/ he left home(B)/ his parents could (C)/ in order that(D)

A. DCAB
B. ADCB
C. BDCA
D. CBDA

II). In the wintertime (A)/ the 2022 World Cup in Qatar (B) / would best be staged (C) / will not be held in June and July but (D)

A. BCAD
B. CDAB
C. ADCB
D. BDCA

13. **Direction: In the following question, a sentence is given with two blanks that indicate that some parts are missing. Identify the correct pair of words that fit in the sentence to make it grammatically and contextually correct.** 3

If you look at the number of districts, then the areas under the _____ of left - wing extremism have shrunk _____ more than 40% in the last three years.

A. Existence, with
B. Ecstasy, about
C. Influence, by
D. Confidence, off

14. A man reaches his office 20 min late, if he walks from his home at 3 km per hour and reaches 30 min early if he walks 4 km per hour. How far is his office from his house? (in Km) 3

A. 20
B. 16
C. 14
D. 10

15. When they work alone, B needs 25% more time to finish a job than A does. They two finish the job in 13 days in the following manner: A works alone till half the job is done, then A and B work together for four days, and finally B works alone to complete the remaining 5% of the job. In how many days can B alone finish the entire job? 3

A. 16
B. 22
C. 20
D. 18

16. Which one will replace the question mark? 3

A_2	C_4	E_6
G_3	I_5	?
M_5	O_9	Q_{14}

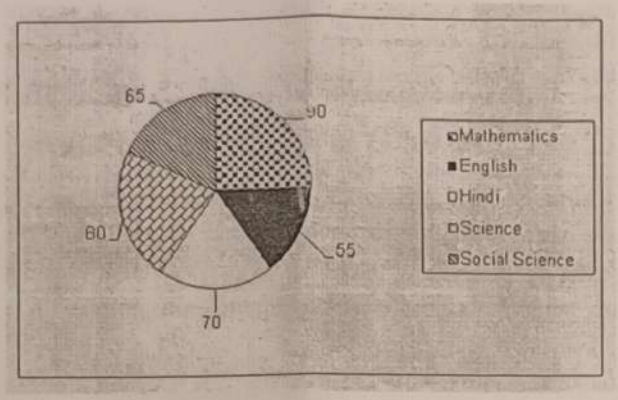
A. L_{10}
B. K_{15}
C. I_{15}
D. K_8

17. A bank offers 5% compound interest calculated on half-yearly basis. A customer deposits Rs.1600 each on 1st January and 1st July of a year. At the end of the year, the amount he would have gained by way of interest is: 3

A. Rs.120
B. Rs.121
C. Rs.122
D. Rs.123

Directions (18-19): Study the following pie chart carefully and answer the questions given beside.

The given pie chart shows the marks scored by a student in different subjects- English, Hindi, Mathematics, Science and Social Science in an examination. The values given are in degrees. Assumption: Total marks obtained in the examination are 900.



18. If the total marks were 3000, then marks in Mathematics would be 3

A. 800
B. 750
C. 850
D. 900

19. In a certain store, the profit is 320% of the cost. If the cost increasesby25% but the selling price remains constant, approximately what percentage of the selling price is the profit? 3

A. 30%
B. 70%
C. 100%
D. 250%