Question Paper – for DHPCAP course

Total Questions: 45 Duration: 60 Min.

1. **GPU are based on which of the following in Flynn's taxonomy**
   A. SIMD
   B. SISD
   C. None of the above
   D. Either A or B

2. **The maximum FLOPS achieved till now is in**
   A. Teraflops range
   B. Petaflops range
   C. Exaflops range
   D. Zetaflops range

3. **Which of the network topologies is/are generally not used in HPC**
   A. Dragonfly
   B. Torus
   C. Ring
   D. Fat-tree

4. **Which of the following is/are the interconnects used in HPC**
   A. Infiniband
   B. Ethernet
   C. Tofu-D
   D. All of the above

5. **Which of the following statements is/are true**
   A. HBM stands for High Bandwidth Memory
   B. HBM3 is slower than DDR5
   C. HBM generally offers high memory bandwidth with smaller memory size
   D. HBM generally offers high memory bandwidth with larger memory size

6. **Which of the following is not a valid clause for "task" construct in OpenMP**
   A. mergeable
   B. private
   C. final
   D. threadprivate

7. Which of the following is a valid clause for "for" construct in OpenMP

A. firstprivate
B. threadprivate
C. nowait
D. All of the above

8. Which of the following statement/s are true for OpenMP

A. Atomic constructs can include multiple lines of code
B. Critical construct is much faster than Atomic construct
C. Critical construct is same as atomic construct in terms of performance
D. Atomic construct are faster due to hardware support

9. Precedence of the OpenMP methods for setting the number of threads

A. environment variable > function call > clause
B. clause > environment variable > function call
C. clause > function call > environment variable
D. function call > clause > environment variable

10. Which of the following is not a scheduling method in OpenMP

A. static
B. dynamic
C. runtime
D. fairshare

11. Which of the following is not a clause in OpenMP

A. for
B. private
C. shared
D. default

12. Which of the following is not a construct in OpenMP

A. for
B. barrier
C. flush
D. reduction

13. Which of the following is/are True about MPI

A. MPI_Send and MPI_Recv are non-blocking communication calls
B. MPI_Isend and MPI_Irecv are blocking communication calls
C. MPI_Scatterv and MPI_Gatherv are collective MPI calls
D. MPI_Scatter and MPI_Gather are synchronization MPI calls

14. Which of the following statements is/are true about MPI

A. MPI_Barrier is used for synchronization
B. We cannot use character datatype for sending & receiving data using MPI_Send & MPI_Recv
C. MPI_LONG_LONG_INT is a valid datatype
D. MPI_LONG_FLOAT is a valid datatype

15. Which of the following statements is/are true

A. MPI_COMM_WORLD is a collection of all the processes that have been spawned
B. mpirun command is used for executing a MPI program
C. mpiexec command is used for executing a MPI program
D. None of the above

16. Which of the following statements is/are true

A. Not all calls have a return code
B. All MPI calls have a return code
C. MPI_Finalize has a return code
D. None of the MPI calls have a return code

17. Which of the following statements is/are true

A. Ranks of MPI processes start from 0
B. When compiling a MPI program using mpicc we can provide optimization flags
C. Mpicc is a wrapper over a base compiler
D. Mpicc is a compiler itself

18. Which of the following statements is/are true

A. CUDA programming is used by GPU's only
B. CUDA programming is used by CPU only
C. CUDA programming is used by GPU & CPU
D. None of the above

19. Which of the following languages is/are supported by CUDA

A. python
B. C++
C. HTML
D. Scala

20. PTX stands for

A. Parallel Memory Transfer
B. Parallel Thread Execution
C. Print Tile Index
D. Parallel Tile Execution

21. Write the formula to access a thread id of a thread for a vector

A. (blockDim.x * blockIdx.x) + threadIdx.x
B. blockDim.x + (blockIdx.x * threadIdx.x)
C. (blockIdx.x * threadIdx.x) + blockDim.x
D. (blockIdx.x + threadIdx.x) * blockDim.x

22. Which of the following statements is/are true

A. SYCL is a programming language that can only be used with OneAPI tools
B. SYCL is a standard
C. SYCL programs can be written in C, C++ and C#
D. SYCL is used for heterogeneous programming

23. SYCL allows memcpy instructions to move data between all devices

A. True for CPU to GPU
B. False for all devices
C. True for GPU to GPU
D. True for CPU to IPU

24. Which object is used to submit tasks in SYCL?

A. queue
B. commandgroup
C. kernel
D. submit

25. Which of the following is/are true for OpenACC programming

A. Used for CPU/GPU programming
B. Can be used with AMD and Nvidia GPU's
C. Can be used with only Nvidia GPU's
D. None of the above

26. The clauses supported for data construct

A. cut
B. copy
C. paste
D. move

27. To enable debugging which of the following flags are used while compiling a program

A. –g
B. –gdwarf-4
C. -gdb
D. –d

28. To enable profiling which of the following flags are used while compiling a program

A. –g
B. –p
C. -prof
D. None of the above

29. Which of the following is not an option that can be used in SLURM script

A. --nodelist
B. --nodes
C. --exclusive
D. None of the above

30. Which of the following is/are job schedulers used in HPC

A. SLURM
B. LSF
C. Moab
D. None of the above

31. What is the storage class for variable A in below code?

```
int main()
{
int A;
A = 10;
printf("%d", A);
return 0;
}
```

A. extern
B. auto
C. register
D. static

32. What is output of below code?

```
int main()
{
char name[]="CDACKP";
int len;
int size;
len = strlen(name);
size = sizeof(name);
printf("%d,%d",len,size);
return 0;
}
```

A. 6,6
B. 6,7
C. 7,7
D. 0,0

33.What is the output of the following program

```
main()
{
    int ret;
    ret = fork();
    if (!ret)
    {
        ret = fork();
        printf("c");
    }
    else
    {
        ret = fork();
        ret = fork();
        printf("b");
    }
}
```

A. ccbbbb
B. ccbbccccbbbb
C. ccbb
D. None of the above

34. What is the output of the following program? (Assuming that int is 4 bytes long)

```
int increment ( void)
{
        static  int count = 0x0f;
        return count++;
}
int main() {
        int total;
        total = increment() – increment() * increment();
        printf( “%d”, total);
        return 0;
}
```

A. -290
B –65537
C -257
D -240

35. What does following code performs?.

```
typedef struct node {
        int data;
        struct node *ptr;
} node;
node *abc(){
    node *b,*m,*f;
        b=NULL;
        m=head;
         f=m->ptr;
        if(head==NULL){
           return;
         }
        while(1){
              m->ptr=b;
              if(f==NULL) break;
              b=m;
              m=f;
                   f=f->ptr;
        }
    head=m;
    return head;
}
```

A. Reversing the list

B. Traversing alll nodes of the List

C. Deleting nodes one by one

D. Traversing alternative nodes of the List

36. Which one of the following best describes POSIX call wait()?

A. Pauses for a given amount of time.
B. Waits for parent process to resume or issue an I/O call.
C. Waits for any child process to complete.
D. Waits for any child process to issue an I/O call.

37. Output of the following program

```
#include<iostream>
using namespace std;
class Test
{
        public:
        int a;
         Test(int x=2)
        {
              a=x;
        }
};
int main()
{
     Test *ob=new Test(1);
     Test *ob1;
     delete ob;
     ob1=ob;
     cout<<ob1->a;
     return 0;
}
```

A.0 B. 1 C. 2 D. Error

38. Output of the following program is

```
#include<iostream>
using namespace std;
class Test{
        public:
        void upDate() const;
        private:
        int Val=0;
};
void Test::upDate() const
{
        Val=10;
        cout<<Val;
}
int main ()
{
        Test t;     t.upDate();  return 0;
}
```

A. 0 B. 10 C. Runtime errors D. Compile Time Errors

39.The correct syntax of inheritance is

A. class sub-class-name : base-class-name

B. class sub-class-name : access specifier base-class-name

C. class sub-class-name : access specifier class base-class-name

D. class sub-class-name : class base-class-name

40.Which of the following statement is true about *this* pointer?

A. Friend Functions have *this* pointer

B. Member Functions have *this* pointer

C. There is nothing called *this* pointer in C++

D. Both Friend Functions and Member Functions have *this* pointer

41.What is the difference between struct and class in C++?

A. Both are same

B. The default access specifiers are different

C. The object creation method

D. The Member functions

42. Output of the following program is

```
#include <iostream>
using namespace std;
class A{
   public:
     int a;
     A(): a(10) { }
     void display() { cout <<a;} };

class B : public A{
    public:
     int b;
     B(): b(20) { }
    void display() { cout<<b; } };

int main()
{
        B ob;
        A &ob1=ob;
        ob1.display();
        return 0;
}
```

A. 20
B.10
C. Compile Time Error
D. Runtime Error

43. For the following class implementation, choose the correct option that creates an object with memory allocation done in the HEAP area?

```
class Test{

        public:

        int a;

        Test(int x)

        {  a=x; }

};
```

A. Test *bj = new Test(1);

B. Test bj = new Test(1);

C. Test bj(1);

D. Test *bj(1);

44.The program code in the line number 4 is called as

```
Line 1: class A{ }
Line 2: void main() {
Line 3: A a,b;
Line 4: A c=b; }
```

A. Copy Constructor

B. Object Assignment

C. Copy Object

D. New Object Creation

45. Output of the following program is

```
#include <iostream>
using namespace std;
void stTest()
{
   static int a = 0;    ++a;    cout << a << endl;
}
int main()
{
   stTest();
   int a=0;
   stTest();
   return 0;
}
```

A. 1 & 2 B. 1 & 1 C.0 & 0 D.1 & 0