భారతీయ సాంకేతిక విజ్ఞాన సంస్థ హైదరాబాద్
भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology Hyderabad

Application Number of the Candidate

Name of the Post: JT/JTS/TS for CSE   **Pay Level:** 3/6/8

Date & Time of the Exam: 19-Dec-2023, 9.30am   **Duration:** 01 hr. 30 min

Scheme of the Exam: Written Exam

Topic	Number of Question	Maximum Marks
General English/Aptitude	10	10
Work Related Topics	50	50

Instructions to fill the responses in the OMR answer sheet:

1. Candidate must write his/her **application number** in the designated box on the top of the OMR answer sheet. If applied for multiple positions, all the application numbers must be captured in the OMR sheet and the question paper.
2. Candidates must write the postcode and Question paper code in the designated boxes on the top of the OMR answer sheet.
3. Candidates must sign in the box provided in the OMR answer sheet.
4. Each answer sheet must be signed by the invigilator in the space printed in the OMR answer sheet.
5. Only one response to be selected & marked. In case more than one response is marked for a single question or no response is marked for a question, no marks will be awarded for that question.
6. Partially filled circles shall not be considered as responses.
7. Erasing or changing of answer is not allowed.
8. Negative marking -0.25
9. Candidate must use Blue/Black ball point pen to fill his/her responses.
10. Rough work should not be done on the OMR answer sheet.
11. Candidates can use the designated page(s) of the question booklet for the purpose of rough work.

General English/Aptitude

1. He saw me by chance and _____ the car.

    a) stops

    b) stopped

    c) stopping

    d) was stopping

2. What is the synonym for "meticulous"?

a) Careless

b) Sloppy

c) Precise

d) Lazy

3. What will be the sum of 44, 42, 40, …, 0 ?

a) 502

b) 506

c) 510

d) 508

4. Find the number of different 8-letter arrangements that can be made from the letters of the word DAUGHTER so that all vowels do not occur together.

a) 4320

b) 8660

c) 36000

d) 40320

5. We should turn off the car engine when the car is _____.

a) Ideal

b) Idol

c) Idle

d) Idel

6. A dealer incurs a loss of 10% if he sells an article for Rs. 1710. What price must he sell the article so as to gain 5% on that article?

a) 1995
b) 2050
c) 1945
d) 2000

7. How many numbers greater than 1000000 can be formed by using the digits 1, 2, 0, 2, 4, 2, 4?

a) 180
b) 360
c) 540
d) 720

8. Given the sequence of terms, AD, CG, FK, JP, the next term is

a) OW
b) OV
c) PV
d) PW

9. A tourist covers half of his journey by train at 30 km/h, half of the remainder by bus at 15 km/h and the rest by cycle at 5 km/h. The average speed of the tourist in km/h during his entire journey is:

a) 18
b) 9
c) 25
d) 12

10. A rewording of something written or spoken is a _____.

a) Paradox
b) Paraphrase

c) Paradigm

d) Parallel

WORK RELATED TOPICS

11: How many child processes are created by the C program given below when it's executed on a Linux machine?

int main()

{

fork(); fork(); fork(); fork(); fork();

return 0;

}

a) 5
b) 31
c) 63
d) None of the above

12: Which of the following is TRUE regarding the boot process in the Linux system?

a) BIOS directly loads GRUB
b) On boot, BIOS runs first
c) *init* is the grand parent of all processes in Linux
d) All of the above

13: In personal computer systems, which kinds of jobs are given higher priorities by the CPU schedulers?
a) Background jobs
b) CPU-bound jobs
c) I/O-bound jobs
d) All of the above

14: How many disk failures can RAID 5 and RAID 6 tolerate without losing data?
a) 1 & 2
b) 2 & 3
c) 3 & 4
d) 5 & 6

15: Which of the following commands increases the priority of a process with PID 1234 in a Linux system?

a) nice -n 10 -p 1234
b) nice -n -10 -p 1234
c) renice -n 10 -p 1234
d) renice -n -10 -p 1234

16: What does the **kill** command do with a process by default in Linux Systems?

a) Suspends the process
b) Terminates the process immediately
c) Sends a SIGTERM signal to the process
d) Restarts the process

17: Which of the following tools can be used to monitor network traffic of a specific interface?

a) top
b) netstat
c) tcpdump
d) ps

18: Which file in the /proc directory of a running process (PID 1234) would most likely contain information about the process's open files?

a) /proc/1234/fd
b) /proc/1234/status
c) /proc/1234/environ
d) /proc/1234/cwd

19: Which of the following cache misses is NOT seen in a fully-associative cache?

a) Compulsory miss
b) Conflict miss
c) Capacity miss
d) Conflict and capacity miss

20: Branch instructions lead to _____ hazard in a pipelined processor.

a) Data
b) Control
c) Structural
d) Deadlock

21: Consider a 6-stage pipelined processor with delays of 4 ns, 3 ns, 2 ns, 7 ns, 5 ns, and 6 ns for the six stages. The minimum clock period that ensures correct functioning of this processor is:

a) 2 ns (minimum of all stages)
b) 27 ns (sum of all stages)
c) 4.5 ns (average of all stages)
d) 7 ns (maximum of all stages)

22: Which of the following becomes better with the use of pipelining?

a) Throughput (number of instructions per unit time)
b) Latency to execute a single instruction
c) Both throughput and latency
d) Depends upon whether it is 3-stage or 5-stage pipelining

23: Which kind of locality is depicted by the variable **p** in the given C code snippet.
```
int main(){
        int i, a[100], b[100], p;
        for (i=0;i<100;i++)
                b[99-i] = a[i] + p;
}
```

a) Temporal
b) Spatial
c) Temporal and spatial
d) Neither temporal nor spatial

24: Which of the following correctly represents the increasing order of access times when the processor accesses any data?

a) L1 cache, L2 cache, CPU registers, Main memory
b) CPU registers, L2 cache, L1 cache, Main memory
c) L1 cache, CPU registers, L2 cache, Main memory
d) CPU registers, L1 cache, L2 cache, Main memory

25: What is the binary equivalent of 29, in an 8-bit representation?

a) 00110101
b) 00011101
c) 00011111
d) 00011001

26: Which of the following is a typical characteristic of a RISC processor?

a) Variable length instructions
b) Complex instructions
c) Load-store architecture
d) Large number of instructions

27: Which of the following events will NOT generate an interrupt/exception to the CPU?

a) Invalid memory address
b) System call
c) A key-stroke on a keyboard
d) Calling another user-defined function inside main function in C language

28: A processor system contains a single-level cache. The cache has an access time of 30 ns and main memory has an access time of 150 ns. What is the average memory access time if the cache hit rate is 80%?

a) 80 ns
b) 60 ns
c) 150 ns
d) 30 ns

29) Which of the following database systems use RDMS?

a) Oracle
b) Microsoft SQLServer
c) IBM-DB2
d) All of the above

30) Consider the following two relations: **Student** and **Enroll**

   Student(roll_number, name, course_number, marks)
   Enroll(course_number, course_name)

 The **Student** relation has m tuples, and **Enroll** relation has n tuples. If the natural join is applied between these two relations, then what will be the maximum possible number of tuples in the resulting relation?

a) m+n
b) mn
c) m-n
d) m-n-1

31) Which of the following is the correct output for the given query?

   (**SELECT** databaseid
FROM RDBMS
WHERE SECTION = 'c')
EXCEPT
(**SELECT** databaseid
FROM RDBMS
WHERE id < 10);

 a) All the values of the databaseid for which section is c and id > 10
 b) All the values of the databaseid for which section not c and id > 10
 c) All the values of the databaseid for which section is c and id < 10
 d) All the values of the databaseid for which section, not c and id < 10

32) The dependency rules specified by the database designer are known as _____

 a) Functional dependencies
 b) Designer dependencies
 c) Database rules
 d) None of the mentioned

33) What is a foreign key?

 a) A foreign key is a primary key of a relation, which is an attribute in another relation
 b) A foreign key is a superkey of a relation which is an attribute in more than one other relations
 c) A foreign key is an attribute of a relation that is a primary key of another relation
 d) A foreign key is the primary key of a relation that does not occur anywhere else in the schema

34) Which forms are based on the concept of functional dependency:

 a) 1NF
 b) 2NF
 c) 3NF
 d) 4NF

35) The situation where no transaction can proceed with normal execution is known as

_____

 a) Roadblock
 b) Deadlock
 c) Execution halt
 d) Abortion

36) NoSQL databases are used mainly for handling large volumes of _____ data.

   a) unstructured
   b) structured
   c) semi-structured
   d) all of the mentioned

37: What content will this webpage display in the browser?

```
<html><head>
  <style>
     #div1{color:red;}      h2{color:green;}
  </style>
</head>
<body style="color:black;">
  <div id="div1">
    <h2 id="head2">[Hello IITH]</h2>
    [I-am-Robot]
  </div>
</body></html>
```

a) **[Hello IITH]** in black and **[I-am-Robot]** in black

b) **[Hello IITH]** in red and **[I-am-Robot]** in red

c) **[Hello IITH]** in green and **[I-am-Robot]** in red

d) **[Hello IITH]** in black and **[I-am-Robot]** in red

38: What will this webpage display after clicking the button given in the webpage?
```
<html><head>
  <script>
    function myFun() {
        document.getElementById("head2").innerHTML = "Welcome to CSE@IITH";
    }
  </script>
</head>
<body>
  <div id="div1" style="color:green;">
    <h2 id="head2" style="color:green;">[Hello IITH]</h2>    </div>
  <button type="button" onclick="myFun()">Click Here</button>
</body></html>
```

a) Welcome to CSE@IITH [Hello IITH]
b) [Hello IITH]Welcome to CSE@IITH
c) No change because HTML doesn't understand function calls.
d) Welcome to CSE@IITH

39: Suppose you need to design a simple web-page which displays the grades of IITH students. Assume that there is a text field in the page to enter the roll number of the student. After clicking the submit button the same webpage shows the grades of the student in tabular format.

Which of the following statements related to the technology required to design this page is correct?

Important Notes: The grades of the students are already stored in a database. Also no need to check any input data validity. Assume that PHP is the only server-side scripting language known to the developer.

a) PHP is not essential, only HTML and JavaScript are enough.
b) PHP is essential but SQL is not required.
c) PHP is essential but JavaScript is not essential.
d) PHP is essential but no server (or localhost) is required.

40: Assume that a PHP page **mypage.php** is stored in a server. A user (client computer) tried to access the page by entering the appropriate URL of the page in its web browser. Which of the following is not true in this context.

a) The PHP file (mypage.php**)** will be sent directly from the server to the client computer and the local browser will display it in the client computer.
b) The server will prepare a dynamic HTML page and send it to the client computer to display on its local browser.
c) The PHP file (mypage.php**)** will be sent to the client computer and the browser on the client computer will convert it to HTML before displaying.
d) None of the above is correct.

41: Which of the following is not a valid syntax to embed CSS in HTML. In all the following options assume **head2** as the id of an **H2** tag in the HTML.

a) <h2 id="head2" style="color: green;"> Hello </h2>
b) <head><style> h2{color: green;} </style></head>
c) <head><style> .head2{color: green;} </style></head>
d) <head><style> #head2{color: green;} </style></head>

42: Which of the following technologies can be used in web applications to send and retrieve data from a server asynchronously (in the background) without interfering with the display of the existing page?

    a) Ajax
    b) CSS
    c) PHP
    d) MySQL

43: Which of the following HTML statements is correct for opening a link in a new window.
Assume that the HTML page has a text called "**Visit IITH",** where once you click, the webpage
of IIT Hyderabad opens in a new window.

    a) Visit IITH
    b) Visit IITH
    c) Visit IITH
    d) Visit IITH

44: In PHP, how can you set a session variable?

    a) set_session()
    b) create_session()
    c) $_SESSION['variable'] = value;
    d) session_set('variable', value);

45: What does the regular expression `\d` match?
    a) Any character
    b) Any digit (0-9)
    c) Any whitespace character
    d) Any word character

46: Which character is used to represent the start of a line in a regular expression?
    a) `^`
    b) `$`
    c) `*`
    d) `#`

Networking concepts: Internet, Wi-Fi, socket programming; Topics in Network and Systems
Administration and Cybersecurity;

47: How do you know the MAC address of an Interface card in a Linux machine?

a) use *getmac* command
b) use ifconfig command
c) use ping command
d) check */etc/hosts* file

48: What is the size of the IPv6 address?

a) 4 bytes
b) 8 bytes
c) 16 bytes
d) 32 bytes

49: You want to implement a mechanism that automates the IP configuration, including IP address allocation, subnet mask, default gateway, and DNS information. Which protocol will you use to accomplish this?

a) DNS
b) ARP
c) DHCP
d) All of the above

50: Which one of the following protocol uses TCP port 443?

a) DNS
b) HTTPS
c) TFTP
d) Telnet

51: Which order completes the Protocol Data Unit Encapsulation on the Internet?

 a) Bits, frames, packets, segments, data
 b) Data, bits, segments, frames, packets
 c) Data, Packets, frames, segments, bits
 d) Data, segments, packets, frames, bits

52: Social engineering cyber attacks are best countered by:

a) Spam filters
b) Critical thinking
c) Firewalls
d) Anti-virus software

53: Natively, which device can look at all protocol headers up to the transport layer?

a) Router
b) Switch
c) Firewall
d) Hub

54: What does a Layer-2 switch do when a frame is received on an interface and the destination MAC address is unknown or not available in its switch table?

a) Drops the frame
b) Forwards the frame to the first available link
c) Floods the frame on to all the ports excluding the port from which it received the frame
d) Sends back a message to the originating station asking for a name resolution

55. The time taken to search an element in a linked list of length n is
   (a) $O(\log_2 n)$
   (b) $O(n^2)$
   (c) $O(1)$
   (d) $O(n)$

56. For merging two sorted list of sizes m and n into a sorted list of size m + n, we require comparisons of
a) O(m)
b) O(n)
c) O(m + n)
d) O(log m + log n)

57. For the following C function swap ( ):

```
void swap (int a, int b)
{
    int t;
    t = a;
    a = b;
    b = t;
}
```

In order to exchange the values of two variables w and z
a) call swap(*w, *z)
b) call swap(&w, &z)
c) swap( ) cannot be used as it does not return any value
d) swap( ) cannot be used as parameters are passed by value

58. What is the output of the following program:
```
#include<stdio.h>
int xyz(int n){
   if(n < 2){
     xyz(xyz(xyz(++n)));
   }
    printf("%d", n);
   return n;
}
int main(){
   xyz(1);
   return 0;
}
```

a) 2222
b) 1222
c) 1111
d) 2121

59. A single array A[1..SIZE] is used to implement two stacks. The two stacks grow from opposite ends of the array. Variables top1 and top2 (top1 < top2) point to the location of the topmost element in each of the stacks. If the space is to be used efficiently, the condition for "stack full" is:

a) (top1 = SIZE/2) and (top2 = SIZE/2+1)
b) top1 + top2 = SIZE
c) (top1= SIZE/2) or (top2 = SIZE)
d) top1= top2 -1

60. What is the output of the below function, assuming that it was given a single linked-list with the first node as the Head node?

next: next node pointer, val: unique int value of the node.

```
void fun1(Node* Head) {
  If (!Head) {
    return;
  }
  fun1(Head->next);
  printf("%d->", Head->val);
}
```

a) Prints all nodes of linked lists
b) Prints all nodes of linked list in reverse order
c) Prints alternate nodes of Linked List
d) Prints forward and reverse order of the nodes in the single linked list.