Date of Examination:	**29-04-2022**	Time:	2 Hrs
Name of the Post:	**Technical Officer**		

Name of the Candidate:										
Application No:										

Candidate's Signature **Invigilator's Signature**

Instructions to the Candidate:

1. Use of Calculators, Cell Phones and Other Electronic Devices are not permitted inside the examination hall.
2. Candidate should fill the details on both question paper booklet and OMR sheet carefully without any corrections.
3. Candidate should carefully read the instructions given on the question paper booklet and OMR sheet
4. Candidate should mark correct answer only on OMR sheet.
5. **Question paper consists of 80 questions in total for 100 marks. Each question carries 1 ¼ marks (1.25 marks).**
6. Wrong answer per each question carries negative of 0.3125 marks.
7. Clarifications on Questions are not permitted.
8. Rough works can be done in the blank space provided at the end of the question paper booklet.
9. No Candidate is allowed to leave the examination hall till the examination is completed.
10. **Candidate should return both question paper booklet and OMR sheet after completion of the examination to the Invigilator.**

Technical Officer – Level 1 Examination

Date of Examination: 29th April 2022; **Time: 2 Hrs** **Max Marks: 100**

1. There are 80 Questions, each carries 1 ¼ marks (1.25 marks).
2. Wrong answer per each question carries negative of 0.3125 marks.

1. Consider the following C program code:

```
int x = 10, *p;
p = &x;
*p++;
```

Suppose integer occupies 4 bites and variable x is located in memory location, say 2062, then after the execution of the statement *p++, the p points to:

A) 2066 B) 2063 C) 2062 D) Error

2. What is the output of this C code (on a 32-bit machine)?

```
#include <stdio.h>
  int main()
  {
     int x = 10000;
     double y = 56;
     int *p = &x;
     double *q = &y;
     printf("p and q are %d and %d", sizeof(p), sizeof(q));
     return 0;
  }
```

A) p and q are 4 and 4
B) p and q are 4 and 8
C) p and q are 2 and 8
D) Compiler error

3. Which of the following is not a valid variable name declaration?

A) float PI = 3.14; B) double PI = 3.14; C) int PI = 3.14; D) #define PI 3.14

4. What will be the output of the C program?

```
#include<stdio.h>
void ptr(char**);
int main() {
        char *argv[] = { "Mon", "Tue", "Wed", "Thu", "Fri", "Sat" };
        ptr(argv);
        return 0;
}
void ptr(char **p) {
        char *t;
        t = (p += sizeof(int))[-1];
        printf("%s\n", t);
}
```

A) Wed B) Thu C) Fri D) Sat

5.	What will be the output of the C program?
	#include<stdio.h>
	#include<stdlib.h>
	int main()
	{
	int *numbers = (int*)calloc(4, sizeof(int));
	numbers[0] = 9;
	free(numbers);
	printf("\nStored integers are ");
	printf("\nnumbers[%d] = %d ", 0, numbers[0]);
	return 0;
	}
	A) Garbage value
	B) 0
	C) 9
	D) Compilation error

6.	What will be the output of the C program?
	#include<stdio.h>
	int main()
	{
	char *ptr = "2braces.com";
	printf("%c\n",*&*ptr);
	return 0;
	}
	
	A) Address of 2
	B) ac
	C) 2
	D) Run time error

7.	What will be the output of the C program?
	#include<stdio.h>
	int main(){
	int num = 10;
	printf("num = %d address of num = %u", num, &num);
	num++;
	printf("\n num = %d address of num = %u", num, &num);
	return 0;
	}
	
	A) Compilation error
	B) num = 10 address of num = 2293436
	num = 11 address of num = 2293438
	C) num = 10 address of num = 2293436
	num = 11 address of num = 2293440
	D) num = 10 address of num = 2293436
	num = 11 address of num = 2293436

8.	What will be the output of the C program?
	#include<stdio.h>
	int main() {
	printf("%d", sizeof(5.2));
	return 0;
	}
	A) 2 B) 4 C) 8 D) 10

9.	The following code gives error (or prints garbage value). Which type of error it corresponds to.
	
	void main()
	{
	int a[3] = {1,2,3};
	int out = a[3];
	printf("%d", out)
	}
	A) Syntax Error C) Logical Error
	B) Run-time Error D) The code executes without any error

10.	What will be the output of the C program?
	#include<stdio.h>
	void function(char**);
	int main()
	{ char *arr[] = { "jan", "feb", "mar", "apr", "may", "june" };
	function(arr);
	return 0;
	}
	void function(char **ptr)
	{ char *ptr1;
	ptr1 = (ptr += sizeof(int))[-2];
	printf("%s\n", ptr1);
	}
	A) mar B) feb C) apr D) may

11.	Which combination of the integer variables x, y and z makes the variable *a* get the value 4 in the following expression? *a* = (x > y) ? ((x > z) ? x : z) : ((y > z) ? y : z) A) x = 6, y = 3, z = 5 B) x = 5, y = 4, z = 5 C) x = 3, y = 4, z = 2 D) x = 6, y = 5, z = 3
12.	Which of the following mechanism is used for repetitive computations in which each action is stated in terms of previous result: A) Passing arguments by value B) Passing arguments by reference C) Recursion D) Structures

13.	Consider a two-dimensional array "*arr*" with the dimensions 10 and 10. Which of the following is correct form while passing two-dimensional array as argument to a function *func*: A) void func(int arr[ ][10]); B) void func(int arr[10][ ]); C) void func(int arr[ ] [ ]); D) Two-dimensional array cannot be passed as a function argument in C.
14.	Which of the following mechanism is used for repetitive computations in which each action is stated in terms of previous result: A) Passing arguments by value B) Passing arguments by reference C) Recursion D) Structures
15.	Which of the following is essential for converting an infix expression to the postfix form efficiently? A) An operand stack B) An operator stack C) An operator stack and an operand stack D) A parse tree
16.	The following sequence of operations is performed on a stack: PUSH (10), PUSH (20), POP, PUSH (10), PUSH (20), POP, POP, POP, PUSH (20), POP. The sequence of values popped out (for each POP) is: A) 20, 20, 10, 10, 20 B) 20, 10, 20, 10, 20 C) 10, 20, 20, 10, 20 D) 20, 20, 10, 20, 10
17.	The following postfix expression with single digit operands in evaluated using a stack 8 2 3 ^ / 2 3* + 5,1* – Note that ^ is the exponentiation operator. The top two elements of the stack after the first* is evaluated are A) 6, 1 B) 5, 7 C) 3, 2 D) 1, 5
18.	In Queue, the end from which an item is deleted is called: A) REAR B) FRONT C) TOP D) BEGIN
19.	The number of elements in a Queue at any given time is equal to A) rear – front - 1 B) rear – (front - 1) C) rear – front +2 D) rear – front – 2
20.	In a Linked List data structure, each component within a structure holds _____ that indicates where the next component is located. A) Address of itself B) Value of next component C) Pointer to next component D) Value of itself

21.	A binary tree T has n leaf nodes. The number of nodes of degree 2 in T is A) $\log_2 n$ B) n C) 2^n D) n-1
22.	The following numbers are inserted into an empty binary search tree in the given order: 10,1,3,5, 15, 12, 16. What is the height of the binary search tree (the height is the maximum distance of a leaf node from the root)? A) 2 B) 3 C) 8 D) 6
23.	How many distinct binary search trees can be created out of 5 distinct keys? A) 5 B) 14 C) 24 D) 42
24.	Which of the following is useful in implementing heap sort? A) Set B) List C) Queue D) Stack
25.	The number of edges of a complete graph with *n* vertices is A) n(n-1) B) n^2 C) n(n-2) D) n(n-1)/2
26.	In a time-sharing operating system, when the time slot given to a process is completed, the process goes from the RUNNING state to the _____ A) BLOCKED state B) SUSPENDED state C) READY state D) TERMINATED state
27.	Starvation can be avoided by which of the following statements: I. By using shortest job first resource allocation policy. II. By using first-come, first serve resource allocation policy. A) I B) II C) Both I and II D) None of the above
28.	If a system contains CPU bound processes then which of the following scheduling algorithm produces maximum efficiency of the CPU. A) First In First Out B) Round robin C) Shortest Job First D) Priority
29.	Semaphores are used to solve the problem of A) Race Condition and Process Synchronization B) Process Synchronization and Mutual Exclusion C) Race Condition, Process Synchronization and Mutual Exclusion D) Thread creation
30.	Fragmentation is A) Dividing the secondary memory into equal sized fragments B) Dividing the main memory into equal-size fragments C) Fragments of memory words used in a page D) Fragments of memory words unused in a page

31.	Let m[0]...m[4] be mutexes (binary semaphores) and P[0] .... P[4] be processes. Suppose each process P[i] executes the following: wait (m[i]; wait (m[(i+1) mode 4]); ..... signal (m[i]); signal (m[(i+1)mod 4]); This could cause A) Thrashing B) Deadlock C) Starvation, but not deadlock D) System Crash
32.	A system uses LRU policy for page replacement. It has 4 page frames with no pages loaded to begin with. The system first accesses 20 distinct pages in some order and then accesses the same 20 pages but now in the reverse order. How many page faults will occur? A) 36 B) 32 C) 37 D) 35
33.	An operating system uses Shortest Remaining Time first (SRT) process scheduling algorithm. Consider the arrival times and execution times for the following processes: Process Execution Time Arrival Time P1 20 0 P2 25 15 P3 10 30 P4 15 45 What is the total waiting time for process P2? A) 5 B) 15 C) 40 D) 55
34.	Entity – Relationship (ER) Model is a A) Conceptual Model B) Logical Model C) Physical Model D) System Model
35.	In ER Model, a weak relationship is represented by A) Double Rectangle B) Double Diamond C) Double Ellipse D) Dotted Rectangle
36.	The set of permitted values for each attribute is called its A) Attribute set B) Attribute range C) Domain D) Group
37.	An attribute of the table matching the primary key of another table, is called as A) Foreign key B) Secondary key C) Candidate key D) Composite key
38.	Which of the following is true about the HAVING clause? A) Similar to the WHERE clause but is used for columns rather than groups. B) Similar to WHERE clause but is used for rows rather than columns. C) Similar to WHERE clause but is used for groups rather than rows. D) Similar to FROM clause but is used for referring more than one table.

39.	Select the correct statement from the following on referential integrity. A) Referential integrity constraints check whether the primary key values are unique. B) Referential integrity constraints are specified between two relations in a schema. C) Referential integrity constraints check whether an attribute value lies in the given range. D) Referential integrity constraints are specified between entities having recursive relationships.
40.	Which of the following commands is used to delete all rows from a table and free up space? A) TRUNCATE B) DROP C) DELETE D) REMOVE
41.	DELETE FROM EMPLOYEE WHERE AGE = 16; ROLLBACK; What does the above SQL code do ? A) Delete the records that have age is 16 from table EMPLOYEE B) Delete all the records from table EMPLOYEE C) Perform an UNDO operation on the DELETE operation D) Throw Error
42.	NATURAL JOIN of two tables is a A) Combination of a Selection and filtered Cartesian Product B) Combination of a Projection and filtered Cartesian Product C) Combination of a Union and filtered Cartesian Product D) Combination of a Union and a Selection
43.	If every non-key attribute is functionally dependent on the primary key, then the relation will be in A) First normal form B) Second normal form C) Third normal form D) Fourth normal form
44.	The column of a table is referred to as the A) Tuple B) Attribute C) Entity D) Degree
45.	Consider the following relational schema: Suppliers (sid: integer, sname: string, city: string, street: string) Parts (pid: integer, pname: string, colour: string) Catalog (sid: integer, pid: integer, cost: real) Assume that, in the suppliers relation above, each supplier and each street within a city has a unique name, and (sname, city) forms a candidate key. No other functional dependencies are implied other than those implied by primary and candidate keys. Which one of the following is TRUE about the above schema? A) The schema is in BCNF B) The schema is in 3NF but not in BCNF C) The schema is in 2NF but not in 3NF D) The schema is not in 2NF
46.	Let R = (A, B, C, D, E, F) be a relation schema with the following dependencies: C → F, E → A, EC → D, A-→ B. What is the key of R? A) EC B) ED C) CD D) AB

47.	In a B^+ tree, the maximum number of keys in a root node is 9. What is the minimum number of keys are possible in any non-root nodes? A) 2 B) 4 C) 5 D) 9
48.	Among the following statements which is useful for reading a password in a shell script? A) read password B) read -e password C) stty -echo; read password; stty echo D) tty echo off; read password; tty echo on
49.	Which of the following statement is useful for creating a patch file? A) patch oldfile newfile B) patch newfile oldfile C) diff oldfile newfile > patch.txt D) diff oldfile newfile | patch
50.	Which of the following require a device driver A) Cache Memory B) Main Memory C) Disk D) Operating System
51.	The functionality of Data Link Layer is A) The lowest layer whose function is to activate, deactivate and maintain the circuit between DTE and DCE. B) Performs routing and communication. C) Detection and recovery from errors in the transmitted data. D) Concerned with for the syntax of the data.
52.	The network topology with highest reliability is A) Bus B) Star C) Ring D) Mesh
53.	Which of the following is a class B host address? A) 230.0.0.0 B) 30.4.5.6 C) 230.0.0.0 D) 130.4.5.6
54.	The Hamming distance between 001111 and 010011 is A) 1 B) 2 C) 3 D) 4
55.	Error detection at the data link layer is achieved by A) Cyclic Redundancy codes C) Hamming Codes B) Bit Stuffing D) Equalization
56.	Satellite Switched Time-Division Multiple Access is A) The method of determining which device has access to the transmission medium at any time. B) A form of TDMA in which act switching is used to dynamically change the channel assignments. C) A medium access control technique for multiple access transmission media. D) None of the above

57.	Start and stop bits are used in serial communication for A) Error Detection B) Error Correction C) Slowing down the communication D) Synchronization
58.	Bit stuffing refers to A) Inserting a 'O' in flag stream to avoid ambiguity B) Appending a nibble to the flag sequence C) Appending a nibble to the use data stream D) Inserting a 'O' in user stream to differentiate it with a flag
59.	Which one of the following IP addresses belongs to the same subnet as 10.0.64.0/18 A) 10.0.63.4 B) 10.0.32.4 C) 10.0.126.3 D) 10.0.128.4
60.	Suppose the host has just been started. Identify the correct sequence in which the following packets are transmitted on the network by a host when a browser requests a webpage from a remote server. A) HTTP GET request, DNS query, TCP SYN B) DNS query, HTTP GET request, TCP SYN C) DNS query, TCP SYN, HTTP GET request D) TCP SYN, DNS query, HTTP GET request
61.	For a large-size network, which of the following is valid with reference to link state and distance vector routing protocols. A) The computational overhead in link state protocols is higher than in distance vector protocols. B) A distance vector protocol (with split horizon) avoids persistent routing loops, but not a link state protocol. C) After a topology change, a distance vector protocol will converge faster than a link state protocol. D) None of the above
62.	Which application level protocol is used to download an email from mailbox server to a mail client. A) HTTP B) SMTP C) POP D) FTP

63.	_____ means that the sender cannot deny sending a message to the receiver. A) Confidentiality B) Integrity C) Authentication D) Non-Repudiation
64.	A(n) _____ can be used to preserve the integrity of a document or a message. A) message summary B) message digest C) encrypted message D) copying message
65.	_____ is a popular session key creator protocol that requires an authentication server and a ticket-granting server. A) Key Distribution Centre B) Kerberos C) Certification Authority D) SSL
66.	_____ is used to carry traffic of one protocol over the network that does not support that protocol directly. A) Transferring B) Trafficking C) Switching D) Tunneling
67.	Two random large values 'p' and 'q' are selected in the RSA algorithm. Which of the following is the property of 'p' and 'q'? A) p and q should be divisible by Φ(n) B) p and q should be co-prime C) p and q should be prime D) p/q should give no remainder
68.	A digital signature is required for A) ensuring non-repudiation of communication by a sender B) sending emails C) FTP Transaction D) reading emails

69.	When the whole message is signed using an asymmetric key, the receiver of the message uses _____ to verify the digital signature. A) the receiver's public key B) the receiver's private key C) the sender's public key D) the Sender's private key
70.	Which entity certifies the binding between a public key and its owner? A) Key Distribution Centre B) Certification Authority C) Transport Layer Security D) Internet Engineering Task Force
71.	_____ monitors and controls incoming and outgoing network traffic using predetermined security rules. A) Cookies B) Router C) Firewall D) DBMS
72.	Which of the following characteristic is needed to design a mobile friendly website? A) Light B) Fast Loading C) Reactive D) Responsive
73.	In the MYSQL database, the metadata is stored at _____ A) metadata B) metasql C) mysql D) mydata
74.	_____ is used to connect a database in a web application. A) Oracle SQL developer B) JDBC Template C) mysql D) function call

75.	Which of these is not a major type of cloud computing usage? A) Software as a Service B) Infrastructure as a Service C) Hardware as a Service D) Platform as a Service
76.	Cloud computing architecture is a combination of A) SOA and Grid computing B) Virtualization and event driven architecture C) Utility computing and event driven architecture D) SOA and event driven architecture
77.	In Model-View-Controller (MVC) architecture, model defines the _____ A) Data-Access layer B) Business-Logic layer C) Presentation layer D) Interface layer
78.	The capability of a system to adapt the increased service load is called A) Elasticity B) Tolerance C) Scalability D) Capacity
79.	Which of the following annotation of JAX RS API is used to get status of method availability? A) @DELETE B) @HEAD C) @Produces D) @Consumes
80.	_____ technology allows creating useful IT services using resources that are traditionally bound to hardware A) Virtualization B) Docker hub C) Docker Swarm D) Interface

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