

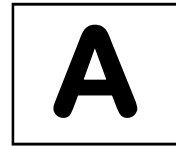
# MIZORAM SUBORDINATE SERVICES SELECTION BOARD



## COMPETITIVE EXAMINATION FOR RECRUITMENT TO THE POST OF JUNIOR SCIENTIFIC OFFICER UNDER MIZORAM FORENSIC SCIENCE LABORATORY, GOVERNMENT OF MIZORAM NOVEMBER - 2021

Question Booklet Series

PAPER – III



**Time Allowed : 3 Hours**

**Maximum Marks : 200**

### INSTRUCTIONS

1. This paper consists of one hundred (100) multiple-choice type of questions.
2. Immediately after the commencement of the examination, you should check that this question booklet does not have any unprinted or missing pages or items, etc. If so, get it replaced by a complete booklet from the invigilator.
3. Please note that it is the candidate's responsibility to fill in all necessary details such as Roll Number, etc. and the Question Booklet Series A, B, C or D carefully and without any omission or discrepancy at the appropriate places in the OMR Answer Sheet. Any omission/discrepancy will render the Answer Sheet liable for rejection.
4. Each question comprises four responses (answers). You will select the response which you want to mark on the Answer Sheet.
5. You have to mark your responses **ONLY** on the separate OMR Answer Sheet provided.  
***Read instructions given in the OMR sheet carefully.***
6. All questions carry equal marks.
7. Rough work is to be done in the spaces available in the question booklet.
8. You have to submit your Answer Sheet to the invigilators at the end of the examination compulsorily and must not carry it with you outside the Examination Hall. You are permitted to take away with you the question booklet on conclusion of examination.
9. There are no negative marks for incorrect answer.



1. A three-digit decimal number requires \_\_\_\_\_ for representation in the conventional BCD format.  
(A) 3 bits (B) 6 bits  
(C) 12 bits (D) 24 bits
2. What is the hit ratio of a cache if a system performs memory access at 30 nanoseconds with the cache and 150 nanoseconds without it? Assume that each uses 20 nanoseconds of memory, choose the closest approximate.  
(A) 81% (B) 75%  
(C) 92% (D) 87%
3. In which of the following storage replacement strategies is a program placed in the largest available hole in the memory?  
(A) Best Fit (B) Average Fit  
(C) Worse Fit (D) None of these
4. Resources are allocated to the processes on non-sharable basis in  
(A) Mutual exclusion (B) Hold and wait  
(C) No preemption (D) Circular wait
5. In Operating System, thrashing can be eliminated by reducing the level of  
(A) Page Fault (B) Multiprogramming  
(C) Swapping (D) Virtual Memory
6. Which algorithm is defined in Time quantum?  
(A) Shortest Job Scheduling Algorithm  
(B) Priority Scheduling Algorithm  
(C) Round Robin Scheduling Algorithm  
(D) Multilevel Queue Scheduling Algorithm
7. The Entity-Relationship Diagram is a tool to represent  
(A) Process model (B) Event model  
(C) Data model (D) Customer model
8. The SQL statements that are automatically executed when there is any change in the database like insertion, deletion or updating of data is called  
(A) Procedures (B) Triggers  
(C) Functions (D) None of these
9. If and only if the domain of each attribute contains only atomic values and the value of each attribute contains only a single value from that domain, then which normal form is the relation in ?  
(A) First Normal Form (B) Second Normal Form  
(C) Third Normal Form (D) Fourth Normal Form
10. The goal of hashing is to produce a search that takes  
(A)  $O(\log n)$  time (B)  $O(n \log n)$  time  
(C)  $O(1)$  time (D)  $O(n^2)$  time

11. In virtual circuit network, the number of delay times for setup and teardown are  
(A) 1 and 1 respectively (B) 1 and 2 respectively  
(C) 2 and 1 respectively (D) 2 and 2 respectively
12. Two IPv6 nodes want to interoperate using IPv6 datagrams, but they are connected to each other by intervening IPv4 routers. The best solution here is  
(A) to use dual-stack approach (B) to replace the system  
(C) tunneling (D) hyper-texting
13. Mutual Exclusion problem occurs between  
(A) two disjoint processes that do not interact  
(B) processes that share resources  
(C) processes that do not use the same resource  
(D) all of the above
14. A parity check usually can detect  
(A) one bit error (B) two bit error  
(C) three bit error (D) any bit error
15. A program that converts assembly language into machine code is  
(A) Machine Compiler (B) Interpreter  
(C) Converter (D) Assembler
16. The \_\_\_\_\_ clause allows us to select only those rows in the result relation of the \_\_\_\_\_ clause that satisfy a specified predicate.  
(A) where, from (B) from, select  
(C) select, from (D) from, where
17. A functional dependency between two or more non-key attributes is called  
(A) Transitive dependency (B) Partial transitive dependency  
(C) Functional dependency (D) Partial functional dependency
18. Consider a computer with 8 Mbytes of main memory and a 128 K cache. The cache block size is 4K. It uses a direct mapping scheme for cache management. How many different main memory blocks can map onto a given physical cache block?  
(A) 1024 (B) 512  
(C) 256 (D) 64
19. Which of the following is false?  
(A) Segmentation suffers from external fragmentation  
(B) Paging suffers from internal fragmentation  
(C) Segmented memory can be paged  
(D) Virtual memory is used only in multi-user systems
20. A hash table can store a maximum of 10 records. Currently there are records in locations 1, 3, 4, 7, 8, 9, 10. The probability of a new record going into location 2, with a hash function resolving collisions by linear probing is?  
(A) 0.1 (B) 0.2  
(C) 0.5 (D) 0.6

21. A state is safe, if
  - (A) the system does not crash due to deadlock occurrence
  - (B) the system can allocate resources to each process in some order and still avoid a deadlock
  - (C) the state keeps the system protected and safe
  - (D) all of the above
  
22. A deadlock in OS can be broken by
  - (A) aborting all the processes in the system
  - (B) aborting one or more processes to break the circular wait
  - (C) preempting all resources from all processes
  - (D) none of the above
  
23. The child process completes execution, but the parent keeps executing, then the child process is known as
  - (A) Orphan
  - (B) Body
  - (C) Zombie
  - (D) Ex-process
  
24. Which of the following architecture uses the CSMA/CD access method?
  - (A) ARC net
  - (B) Ethernet
  - (C) Router
  - (D) STP Server
  
25. Hamming distance between 100101000110 and 110111101101 is
  - (A) 3
  - (B) 4
  - (C) 5
  - (D) 6
  
26. In which of the following, a separate scheme is created consisting of that attribute and the primary key of the entity set?
  - (A) A many-to-many relationship
  - (B) A multi-valued attribute of an entity set
  - (C) A one-to-many relationship set
  - (D) All of the above
  
27. In B+ tree the node which points to another node is called
  - (A) Leaf node
  - (B) External node
  - (C) Final node
  - (D) Internal node
  
28. A temporary storage area, attached to the CPU for I/O operation is a
  - (A) channel
  - (B) buffer
  - (C) register
  - (D) cache
  
29. A file is
  - (A) an abstract datatype
  - (B) logical storage unit
  - (C) usually non volatile
  - (D) all of these
  
30. A CPU generally handles an interrupt by executing an interrupt service routine
  - (A) by checking interrupt register after execution of current instruction
  - (B) by checking interrupt register at the end of fetch cycle
  - (C) whenever an interrupt is registered
  - (D) by checking interrupt register at regular time interval

31. The BCD adder to add two decimal digits needs minimum of  
(A) 6 full adders and 2 half adders (B) 5 full adders and 3 half adders  
(C) 4 full adders and 3 half adders (D) 5 full adders and 2 half adders
32. A relational database consists of a collection of  
(A) tables (B) fields  
(C) records (D) keys
33. In the architecture of a database system, external level is  
(A) Physical level (B) Logical level  
(C) Conceptual level (D) View level
34. A small program having a single function that loads the operating system into memory and allows it to begin operation is  
(A) Main (B) Bootloader  
(C) Bootstrap loader (D) ROM
35. Which of the following is the deadlock avoidance algorithm?  
(A) Round Robin Algorithm (B) Elevator Algorithm  
(C) Banker's Algorithm (D) Karn's Algorithm
36. In networking terminology, UTP means  
(A) Unshielded Twisted Pair (B) Ubiquitous Teflon Port  
(C) Uniformly Terminating Port (D) Unshielded T-Connector Port
37. Making sure that all the data packets of a message are delivered to the destination is  
(A) Loss (B) Error Control  
(C) Time Delay (D) Duplication of Data
38. In TCP/IP model, which of the following layer is not present, while OSI model has this layer?  
(A) Application layer (B) Session layer  
(C) Transport layer (D) Network layer
39. The memory which is used to store the copy of data or instructions stored in larger memories, inside the CPU is called  
(A) Level 1 Cache (B) Level 2 Cache  
(C) Registers (D) TLB
40. CISC and RISC architectures have been developed to reduce the  
(A) cost (B) semantic gap  
(C) time delay (D) all of the above
41. The principle used by most packet switches is  
(A) Stop and wait (B) Store and wait  
(C) Store and forward (D) Stop and forward
42. What is the IEEE specification for a wireless LAN which covers the physical and datalink layers?  
(A) IEEE 802.3 (B) IEEE 802.5  
(C) IEEE 802.11 (D) IEEE 802.2

43. Pre-emptive scheduling is the strategy of temporarily suspending a running process  
(A) before the CPU time slice expires (B) to allow starving processes to run  
(C) when it requests I/O (D) all of these
44. The critical section problem needs a solution to synchronise the different processes.  
The solution to the critical section problem must satisfy the following three conditions  
(A) Mutual exclusion, Progress, Bounded Waiting  
(B) Critical Section, Non-Critical Section, Synchronising  
(C) System Calls, IPC Mechanisms, System Protection  
(D) Data Consistency, Starvation, Aging
45. CPU does not perform the operation  
(A) Data Transfer (B) Logic Operation  
(C) Arithmetic Operation (D) All of these
46. Add the two BCD numbers:  $1001 + 0100 = ?$   
(A) 10101111 (B) 01010000  
(C) 00001101 (D) 00010011
47. Functional dependencies are a generalisation of  
(A) key dependencies (B) relation dependencies  
(C) database dependencies (D) all of these
48. The entity type on which the \_\_\_\_\_ type depends is called the identifying owner.  
(A) strong entity (B) weak entity  
(C) relationship (D) E-R
49. Which of the following will happen after the following sequence of events is completed  
as per Two Phase Commit (2PC) Protocol?  
 *$T_C$  sends  $\langle \text{Prepare } T_1 \rangle$  to  $P_1$  and  $P_2$*   
 *$P_1$  sends  $\langle \text{Ready } T_1 \rangle$  to  $T_C$*   
 *$P_2$  sends  $\langle \text{Ready } T_1 \rangle$  to  $T_C$*   
 *$P_2$  crashed after sending  $\langle \text{Ready } T_1 \rangle$  to  $T_C$*   
 *$P_2$  recovered immediately after crash*  
(A)  $T_C$  sends  $\langle \text{Commit } T_1 \rangle$  to  $P_1$  and  $P_2$   
(B)  $T_C$  sends  $\langle \text{Abort } T_1 \rangle$  to  $P_1$  and  $P_2$   
(C)  $T_C$  sends  $\langle \text{Commit } T_1 \rangle$  only to participant  $P_1$   
(D)  $T_C$  sends  $\langle \text{Abort } T_1 \rangle$  only to participant  $P_2$
50. What is the full form of RAID?  
(A) Redundant Array of Independent Disks  
(B) Redundant Array of Important Disks  
(C) Random Access of Independent Disks  
(D) Random Access of Important Disks
51. How many layers are there in the OSI reference model?  
(A) 5 (B) 6  
(C) 7 (D) 10

52. The combination of an IP Address and a port number is known as  
(A) Network number (B) Socket address  
(C) Subnet mask number (D) MAC address
53. Which of the following is the broadcast address for a class B network ID using default subnet mask?  
(A) 172.16.10.255 (B) 255.255.255.255  
(C) 172.255.255.255 (D) 172.16.255.255
54. A \_\_\_\_\_ in a table represents a relationship among a set of values.  
(A) column (B) key  
(C) row (D) entry
55. Which of the following is true?  
(A) A relation in BCNF is always in 3NF  
(B) A relation in 3NF is always in BCNF  
(C) BCNF and 3NF are same  
(D) A relation in BCNF is not in 3NF
56. In which addressing mode are the operands stored in the memory and the address of the corresponding memory location given in register which is specified in the instruction?  
(A) Register Direct (B) Register Indirect  
(C) Base Indexed (D) Displacement
57. If the postfix form of a string is  $A B C + - D *$ , the infix string is  
(A)  $(A - (B + C)) * D$  (B)  $((A - B) + C) * D$   
(C)  $((A + B) - C) * D$  (D)  $(A + (B - C)) * D$
58. What are two kinds of semaphores?  
(A) Mutex & counting (B) Binary & counting  
(C) Counting & decimal (D) Decimal & binary
59. DHCP server provides \_\_\_\_\_ to the client.  
(A) Protocol (B) IP address  
(C) MAC address (D) Network address
60. Which of the following methods provide dedicated communication channel between two stations?  
(A) Circuit Switching (B) Switch Network  
(C) Packet Switching (D) All of these
61. *Employee(empcode, name, street, city, state, pincode)*;  
For any pincode, there is only one city and state. Also, for any given street, city and state, there is just one pincode. In normalization terms, *Employee* is a relation in  
(A) 1NF only  
(B) 2NF and hence also in 1NF  
(C) 3NF and hence also in 2NF and 1NF  
(D) BCNF and hence also in 3NF, 2NF and 1NF



62. Which of the following statements contains an error?  
(A) `select * from employee where emp_id = 10003;`  
(B) `select emp_id from employee where emp_id = 10006;`  
(C) `select emp_id from employee;`  
(D) `select emp_id where emp_id = 1009 and lastname = 'Miller';`
63. How many times will the following C Program print 'yes'?  
`main()  
{  
 fork(); fork(); printf("yes");  
}`  
(A) Only once  
(B) Twice  
(C) Four times  
(D) Eight times
64. The program a computer's microprocessor uses to start the computer system after it is powered on is  
(A) CD-ROM  
(B) BIOS  
(C) MS DOS  
(D) GUI
65. The method which offers higher speeds of I/O transfers is  
(A) Interrupts  
(B) DMA  
(C) Memory mapping  
(D) Program-controlled I/O
66. How many RAM chips of size 256K x 1bit are required to build 1Mbyte memory?  
(A) 4  
(B) 8  
(C) 10  
(D) 32
67. What is the preferred method for enforcing data integrity during an update/delete/insert into a table?  
(A) Constraints  
(B) Stored Procedure  
(C) Triggers  
(D) Cursors
68. A relation is  
(A) subset of a cartesian product of a list of relations  
(B) subset of a cartesian product of a list of attributes  
(C) subset of a cartesian product of a list of domains  
(D) subset of a cartesian product of a list of tuples
69. The topology with highest reliability is  
(A) Bus topology  
(B) Ring topology  
(C) Star topology  
(D) Mesh topology
70. Semaphores are used  
(A) to synchronise critical resources to prevent deadlock  
(B) to synchronise critical resources to prevent contention  
(C) to facilitating memory management  
(D) for efficiency of performing I/O devices

71. The first network created was called  
(A) BCNET (B) ARPANET  
(C) NSANET (D) ASAPNET
72. Which is the correct expression for the length of UDP datagram?  
(A) UDP length = IP length – IP header's length  
(B) UDP length = UDP length – IP header's length  
(C) UDP length = IP length + IP header's length  
(D) UDP length = UDP length + IP header's length
73. The instruction, Add #45,R1  
(A) adds the value of 45 to the address of R1 and stores 45 in that address  
(B) finds the memory location 45 and adds that content to that of R1  
(C) adds 45 to the value of R1 and stores it in R1  
(D) none of the above
74. Let E1 and E2 be two entities in an E/R 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 have any attributes of their own. What is the minimum number of tables required to represent this situation in the relational model?  
(A) 2 (B) 3  
(C) 4 (D) 5
75. In Three-Way Handshaking process, the situation where both the TCP's issue an active open is  
(A) Mutual open (B) Mutual close  
(C) Simultaneously open (D) Simultaneously closed
76. Which of the following protocols allows an application program on one machine to send a datagram to an application program on another machine?  
(A) SMTP (B) TCP  
(C) X.25 (D) UDP
77. Consider the join of a relation A with a relation B. If A has k tuples and B has r tuples, then the maximum and minimum sizes of the join are  
(A)  $k + r$  and 0 respectively (B) r, k and 0 respectively  
(C)  $r + k$  and  $|k - r|$  (D) r, k and  $r + k$  respectively
78. The hexadecimal equivalent of an octal number 2357 is  
(A) 2EE (B) 2FF  
(C) 4EF (D) 4FE
79. A class of parallel computers in Flynn's taxonomy that describes computers with multiple processing elements that perform the same operation on multiple data points simultaneously.  
(A) SIMD (B) MIMD  
(C) SIMT (D) MDMX

80. The sharing of a medium and its link by two or more devices is called  
(A) Duplexing (B) Fully Duplexing  
(C) Multiplexing (D) Microplexing
81. An application protocol which allows you to connect and login to a remote computer is  
(A) Telnet (B) FTP  
(C) HTTP (D) SMTP
82. What is the maximum number of IP addresses that can be assigned to hosts on a local subnet that uses the 255.255.255.224 subnet mask?  
(A) 10 (B) 16  
(C) 30 (D) 62
83. If the size of logical address space is 2 to the power of m, and a page size is 2 to the power of n addressing units, then the high order \_\_\_\_\_ bits of a logical address designate the page number, and the \_\_\_\_\_ low order bits designate the page offset.  
(A) m, n (B) n, m  
(C) m - n, m (D) m - n, n
84. Assume that there are 3 page frames which are initially empty. If the page reference string is 1, 2, 3, 4, 2, 1, 5, 3, 2, 4, 6, the number of page faults using the optimal replacement policy is  
(A) 5 (B) 6  
(C) 7 (D) 8
85. In classful addressing, an IP address 123.23.156.4 belongs to \_\_\_\_\_ class format.  
(A) A (B) B  
(C) C (D) D
86. Ethernet frame consists of  
(A) MAC address (B) IP address  
(C) Default mask (D) Network address
87. The File Transfer Protocol is built on  
(A) data centric architecture (B) client server architecture  
(C) service oriented architecture (D) object oriented architecture
88. Which statement is used to combine data or rows from two or more tables based on a common field between them?  
(A) Union (B) All  
(C) Join (D) All of these
89. The use of Hardware in Memory management through segment relocation and protection is  
(A) to perform address translation to reduce size of the memory  
(B) to perform address translation to reduce execution time overhead  
(C) Both (A) and (B)  
(D) Neither (A) nor (B)

90. The size of an IPv6 address is  
(A) 4 bytes (B) 8 bytes  
(C) 128 bytes (D) 256 bytes
91. Consider a disk queue with requests for I/O to blocks on cylinders 98 183 37 122 14 124 65 67. Considering FCFS (first come first served) scheduling, the total number of head movements, if the disk head is initially at 53, is  
(A) 600 (B) 640  
(C) 680 (D) 700
92. Which of the following is not in Process State Diagram?  
(A) Ready (B) Running  
(C) Executing (D) Waiting
93. Which of the following is not guided transmission media?  
(A) UTP (B) Coaxial  
(C) OFC (D) Infrared
94. In the process of fetching a web page from a server, the HTTP request/response take \_\_\_\_\_ RTTs.  
(A) 4 (B) 1  
(C) 2 (D) 3
95. In the \_\_\_\_\_ scheme, a transaction that wants to update the database first creates a complete copy of the database.  
(A) Shadow Copy (B) Shadow Paging  
(C) Shadow Mapping (D) Update log records
96. Which of the following statement is used to remove the privilege from the user John ?  
(A) Remove update on department from John  
(B) Revoke update on employee from John  
(C) Delete select on department from John  
(D) Grant update on employee from John
97. 8085 microprocess has \_\_\_\_\_ hardware interrupts.  
(A) 2 (B) 3  
(C) 4 (D) 5
98. The size of the physical address space of a processor is  $2^P$  bytes. The word length is  $2^W$  bytes. The capacity of cache memory is  $2^N$  bytes. The size of each cache block is  $2^M$  words. For a K-way set-associative cache memory, the length (in number of bits) of the tag field is  
(A)  $P - N - \log_2 K$  (B)  $P - N + \log_2 K$   
(C)  $P - N - M - W - \log_2 K$  (D)  $P - N - M - W + \log_2 K$

99. A network designer wants to connect 5 routers as point-to-point simplex line. Then the total number of lines required would be
- (A) 5 (B) 10  
(C) 20 (D) 32
100. In a paged memory, the page hit ratio is 0.35. The time required to access a page in secondary memory is equal to 100 ns. The time required to access a page in primary memory is 10 ns. The average time required to access a page is
- (A) 3.0 ns (B) 68.0 ns  
(C) 68.5 ns (D) 78.5 ns