

**MIZORAM PUBLIC SERVICE COMMISSION**  
**DEPARTMENTAL EXAMINATION FOR JUNIOR GRADE OF M.E.S. (AE/SDO)**  
**UNDER POWER & ELECTRICITY DEPARTMENT, GOVERNMENT OF MIZORAM.**  
**(JULY-2025)**

**ENGINEERING PAPER – II**  
*(Computer Science Engineer under Electrical Wing)*

Time Allowed : 3 hours

FM : 100 PM : 40

**PART - A (50-MARKS)**

*Attempt all questions*

*This Section should be answered only on the Separate Answer Sheet provided.*

**Direction ( Question Nos 1 - 20): Multiple Choice Questions:** **(20×1=20)**

1. Which of the following SQL data types is used for variable-length character strings?  
(a) INT (b) **VARCHAR**  
(c) CHAR (d) TEXT
2. Which of the following is used to provide the interface between the OS and the user application?  
(a) **System Calls** (b) Shell  
(c) Scheduler (d) Kernel
3. Which of the following transmission media is most immune to electromagnetic interference (EMI)?  
(a) Twisted Pair (b) Coaxial Cable  
(c) **Optical Fiber** (d) Infrared
4. Which of the following best describes the difference between a schema and an instance?  
(a) Schema changes frequently, instance rarely changes  
(b) Schema is a snapshot of data, instance is the metadata  
(c) **Schema is the logical structure, instance is the actual content at a given time**  
(d) Instance is permanent, schema is temporary
5. In a multithreaded environment, each thread has its own:  
(a) **Register set and stack** (b) Code section  
(c) Data section (d) Open file table
6. HTTP is a:  
(a) **Stateless protocol** (b) Stateful protocol  
(c) Connection-oriented protocol (d) Real-time protocol
7. Which of the following commands would permanently delete all data and structure of a table?  
(a) DELETE FROM table\_name (b) TRUNCATE TABLE table\_name  
(c) REMOVE TABLE table\_name (d) **DROP TABLE table\_name**

8. Which scheduling algorithm gives the minimum average waiting time for a given set of processes?
- (a) FCFS (b) **SJF**  
(c) Round Robin (d) Priority Scheduling
9. In TCP, which field ensures reliable delivery by confirming receipt of data?
- (a) Sequence Number (b) **Acknowledgment Number**  
(c) Window Size (d) Checksum
10. Which cryptographic algorithm is commonly used in digital signatures?
- (a) Blowfish (b) AES  
(c) DES (d) **RSA**
11. Logical data independence means:
- (a) **Protection from changes in the logical structure**  
(b) Protection from changes in the physical structure  
(c) Ability to modify physical schema  
(d) Ability to modify application programs
12. Which of the following is a key characteristic of a relational database model?
- (a) Pointers to navigate between tuples (b) Object inheritance  
(c) **Tables with rows and columns** (d) Trees representing relationships
13. The Critical Section Problem arises in a system with:
- (a) Insufficient RAM  
(b) Processes that do not interact  
(c) Single-threaded programs  
(d) **Multiple processes requiring exclusive access to shared data**
14. A condition for deadlock to occur that involves resource holding without release is:
- (a) Circular wait (b) Mutual exclusion  
(c) **Hold and wait** (d) No preemption
15. Which layer of the OSI model is responsible for reliable message delivery?
- (a) Network Layer (b) **Transport Layer**  
(c) Session Layer (d) Application Layer
16. Which type of join returns only the matching rows from two tables?
- (a) LEFT JOIN (b) OUTER JOIN  
(c) FULL JOIN (d) **INNER JOIN**
17. Which of the following best describes the role of a DML compiler in a DBMS?
- (a) Parses schema definitions  
(b) **Converts queries into low-level instructions**  
(c) Compiles authorization policies  
(d) Optimizes memory usage

18. Which of the following statements about threads is false?
- (a) Threads share the same address space
  - (b) Threads are more lightweight than processes
  - (c) Threads always run independently of one another**
  - (d) Threads share open files
19. When a higher-priority process prevents a lower-priority process from running indefinitely, it is called:
- (a) Starvation**
  - (b) Deadlock
  - (c) Preemption
  - (d) Blocking
20. Which wireless technology operates in the 2.4 GHz and 5 GHz bands and supports speeds up to several Gbps?
- (a) Bluetooth
  - (b) Zigbee
  - (c) Infrared
  - (d) Wi-Fi**

*Direction ( Questions No 21 - 29): Answer any six :*

**(6×5=30)**

21. Explain with examples how primary key, foreign key, unique constraints are defined and used in relational databases.
22. Apply Shortest Remaining Time First (SRTF) algorithm to schedule the following process, what will be the average waiting time?

| Process | Arrival time (AT) | Burst Time (BT) |
|---------|-------------------|-----------------|
| P1      | 0                 | 8               |
| P2      | 1                 | 4               |
| P3      | 2                 | 9               |
| P4      | 3                 | 5               |
| P5      | 4                 | 2               |

23. What are the key differences between guided and unguided transmission media? Give examples of each and discuss their advantages.
24. What is normalization? Convert the bellowed unnormalized table into 3NF form.

| StudentID | StudentName | Course   | Instructor  |
|-----------|-------------|----------|-------------|
| 101       | Alice       | DBMS     | Prof Rao    |
| 101       | Alice       | Networks | Prof Sharma |

25. Explain the major components of an operating system and discuss how each contributes to system functionality.
26. Discuss the concept and working of VoIP. How is voice transmitted over IP networks, and what are its challenges?
27. What are the differences between hierarchical, network, and relational data models? Provide a use-

case example where each model would be best suited.

28. Define a semaphore. Distinguish between counting and binary semaphores
29. What are firewalls and VPNs? How do they enhance network security, and what are their key functions?

**PART - B (50-MARKS)**

*This Section should be answered only on the Separate Answer Sheet provided.*

*Marks for each question is indicated against it.*

*Attempt all questions.*

30. What are the differences between power transformers and distribution transformers? (5)
31. Explain direct and indirect lightning strike? Mention how transformer must be protected from lightning. (5)
32. Insulation resistance of 6.3MVA, 33/11kV transformer is measured between HV and LV and the result obtained is shown below:  
(a) 41.40  $G\Omega$  after 10 minutes  
(b) 20.70  $G\Omega$  after 1 minutes  
(c) 11.60  $G\Omega$  after 15 seconds  
Calculate the Polarization Index (PI) value and the Dielectric Absorption Ratio (DAR) value? (5)
33. Briefly mention different methods of improving Earth Resistance. (5)
34. How are hydroelectric power stations divided on the basis of head of water? Mention the heads and type of turbines recommended. (5)
35. What are the main functions of Capacitive Voltage Transformer (CVT)? At what system voltage CVT is used? How is the HV terminals of CVT connected? (5)
36. The external PT ratio is 33000/110V and external CT ratio is 50/1A. If the energy meter is calibrated for PT ratio 33000/110V, CT ratio -/1A then what will be the multiplying factor for the meter? (5)
37. What are the difference between Control & Relay (C&R) panels and switchgears? At what voltage level switchgear is commonly used in Mizoram? Mention in which sub-station 33kV Switchgear is used owned by Mizoram? (5)
38. How can we classify overhead transmission lines? Briefly describe how line constants are considered in each case? (5)
39. What are the standard span to be adopted for preparation of estimates/DPR for the following lines in case actual survey could not be done on time as per SOR 2023 prepared by P&E Department, Govt. of Mizoram? (5)  
(a) LT Line (b) LT ABC  
(c) 11kV Line (d) 33kV Line  
(e) 33kV Lattice Tower Line

