

MIZORAM PUBLIC SERVICE COMMISSION
DEPARTMENTAL EXAMINATION FOR JUNIOR GRADE OF M.E.S. (AE/SDO)
UNDER POWER & ELECTRICITY DEPARTMENT,
GOVERNMENT OF MIZORAM, DECEMBER-2024.

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 (Questions No 1 - 20): Multiple Choice Questions:

(20×1=20)

1. A set of one or more attributes taken collectively to uniquely identify a record.
(a) Primary Key (b) Foreign key
(c) Super key (d) Candidate key
2. For designing a normal RDBMS which of the following normal form is considered adequate?
(a) 4NF (b) 3NF
(c) 2NF (d) 5NF
3. The FCFS algorithm is particularly troublesome for _____.
(a) operating systems (b) multiprocessor systems
(c) multiprogramming systems (d) time sharing systems
4. The _____ program initializes all aspects of the system, from CPU registers to device controllers and the contents of main memory, and then starts the operating system.
(a) bootstrap (b) main
(c) bootloader (d) rom
5. Set of rules that governs data communication.
(a) Protocols (b) Standards
(c) RFCs (d) Servers
6. Which transmission media provides the highest transmission speed in a network?
(a) coaxial cable (b) twisted pair cable
(c) optical fiber (d) electrical cable
7. Which of the following is used to store movie and image files?
(a) Blob (b) Clob
(c) Binary (d) Image

8. Which of the following statements are TRUE about an SQL query?

P: An SQL query can contain a HAVING clause even if it does not have a GROUP BY clause.

Q: An SQL query can contain a HAVING clause only if it has a GROUP BY clause.

R: All attributes used in the GROUP BY clause must appear in the SELECT clause.

S: Not all attributes used in the GROUP BY clause need to appear in the SELECT clause.

- (a) Q and R
- (b) Q and S
- (c) P and R
- (d) P and S

9. In Unix, which system call creates the new process?

- (a) create
- (b) fork
- (c) new
- (d) process

10. Which one of the following is the deadlock avoidance algorithm?

- (a) banker's algorithm
- (b) round-robin algorithm
- (c) elevator algorithm
- (d) karn's algorithm

11. In TCP, sending and receiving data is done as _____.

- (a) Stream of bytes
- (b) Sequence of characters
- (c) Lines of data
- (d) Packets

12. Dynamic web page _____.

- (a) is same every time whenever it displays
- (b) generates on demand by a program or a request from browser
- (c) both is same every time whenever it displays and generates on demand by a program or a request from browser
- (d) is different always in a predefined order

13. Which of the following is not characteristic of a relational database model?

- (a) Treelike structure
- (b) Table
- (c) Complex logical relationships
- (d) Records

14. A Relation is a-

- (a) Subset of a Cartesian product of a list of attributes
- (b) Subset of a Cartesian product of a list of domains
- (c) Subset of a Cartesian product of a list of tuple
- (d) Subset of a Cartesian product of a list of relations

15. If the resources are always preempted from the same process , this can occur.

- (a) deadlock
- (b) system crash
- (c) aging
- (d) starvation

16. When the event for which a thread is blocked occurs?

- (a) thread moves to the ready queue
- (b) thread remains blocked
- (c) thread completes
- (d) a new thread is provided

17. URL stands for _____.

- (a) unique reference label
- (b) uniform reference label
- (c) uniform resource locator
- (d) unique resource locator

18. What is start frame delimiter (SFD) in ethernet frame?
(a) 00000000 (b) 11111111
(c) 10101010 (d) 10101011
19. What is the language used by most of the DBMSs for helping their users to access data?
(a) High level language (b) Low level language
(c) Query Language (d) 4GL
20. Semaphore is a/an _____ to solve the critical section problem.
(a) hardware for a system (b) special program for a system
(c) locking mechanism (d) integer variable

Direction (Questions No 21 - 29): Answer any 6 (six) questions:

(6×5=30)

21. Explain the concept of ACID properties in DBMS.
22. With a neat diagram, explain the states of a process.
23. Differentiate between IPV4 and IPV6 address.
24. Explain the three level schema architecture in DBMS.
25. Differentiate between First Come First Serve (FCFS) and Priority Scheduling Algorithm
26. What are the different types of Network? Explain them briefly.
27. Explain the different types of relationships amongst tables in a DBMS.
28. Differentiate between Deadlock Prevention and Deadlock Avoidance.
29. Differentiate between Hub, Switch and Router?

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. Table 1 shows the measured voltage for magnetic core balance test where LT 440V AC is injected in across HT terminals RY, YB and BR as shown. Considering HV side only, what are the condition required for the transformer core to be magnetically balance? From the measured voltages are the required conditioned fulfilled? (5)

Apply Single phase voltage 440V Across	Measured Voltage						Condition required
	HV Volts (Ph-Ph)			LV Volts (Ph-n)			
	RY	YB	BR	rn	yn	bn	
RY	424	469	190	79	90	37	
YB	155	420	259	29	79	49	
BR	168	356	423	32	68	79	

31. Insulation resistance of 10MVA, 33/11kV transformer is measured between HV and LV side and the result obtained is shown below: (5)
1. $0.57 \text{ G}'\Omega$ after 10 minutes
 2. $0.41 \text{ G}'\Omega$ after 1 minutes
 3. $0.32 \text{ G}'\Omega$ after 30 seconds

Calculate the Polarization Index (PI) value and the Dielectric Absorption Ratio (DAR) value?

32. Draw schematic diagram of Wenner Array 4-point method for Earth Resistance measurement. What is the formula for calculating earth resistivity, ρ . What is the prescribed uniform distance between each probe compared to the depth of probe under ground? (5)
33. What are the criteria for selection site for Power Sub-Station? (5)
34. FIG. E shows a 100-50/1-1 Current Transformer (CT) circuit drawing where P1 & P2 denotes the primary winding terminals and S1, S2 & S3 denotes the secondary winding terminals. If the CT ratio is to be set at 100/1 ratio, which secondary terminals must be connected? For 33kV CT, what is the accuracy class acceptable for metering core? (5)

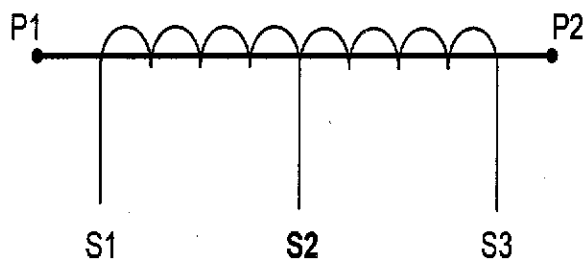
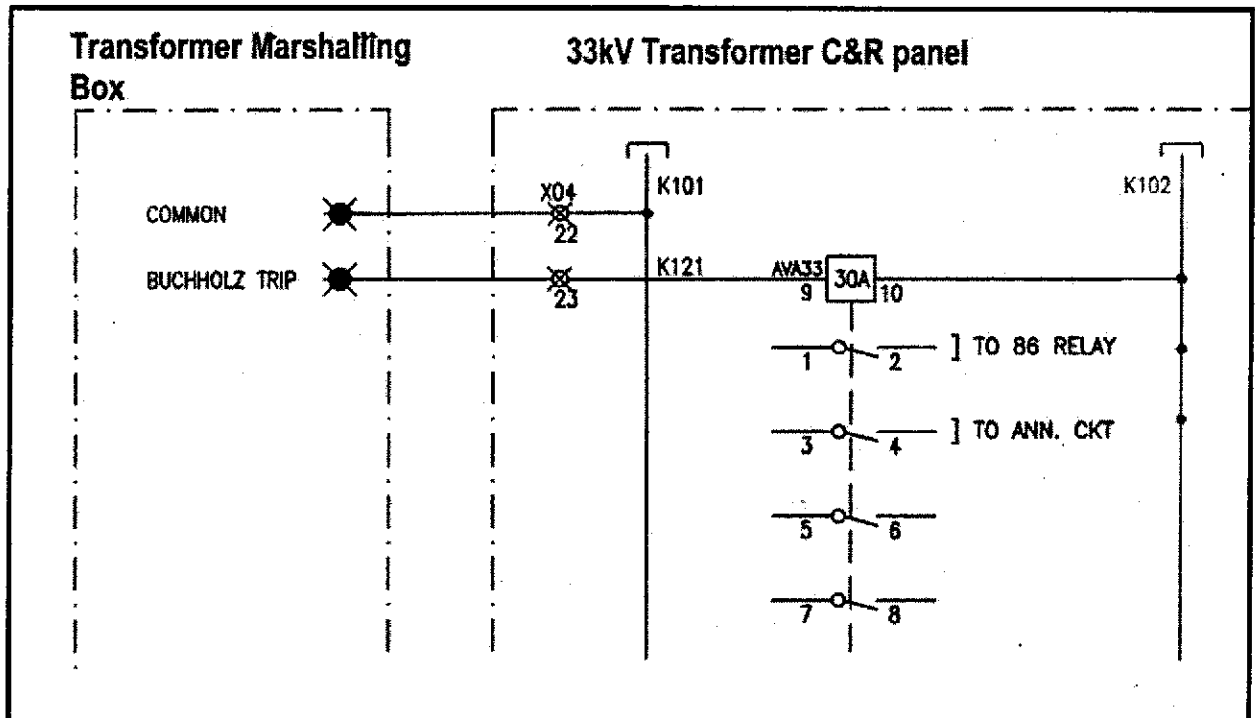


FIG. E

35. Figure below shows the nameplate of 100kVA, 11/0.415kV Distribution transformer. What is the normal tap position? What is the full form of ONAN? From the vector group how is the primary and secondary winding connected and what is the phase shift between the two? (5)

Rated power 100 kV-A		No. of phases 3	
TRANSFORMER to specification EN (IEC) 60076-1			
Rated voltage [V]		Current [A]	Insulation level
HV	11000 ± 2x2.5%	5.25	LI75 AC28
LV	415	139.10	AC3
Tap no.	HV voltage [V]	Connection symbol	Dyn11
1	11550	Cooling	ONAN
2	11275	Rated frequency	50 Hz
3	11000	Short-circuit imp.	3.88 %
4	10725	Load losses	1750 W
5	10450	No-load losses	145 W

36. Figure shows interconnection between Power Transformer Marshalling Box and 33kV Transformer Control & Relay for Buchholz protection. What is 86 relay stands for and what is its function? In the figure shown, what can cause 86 relay to operate? (5)



37. The external PT ratio is 33000/110V and external CT ratio is 400/1A. 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)
38. Draw single line diagram 33kV Incoming line connecting 33kV Bus at Substation showing the following elements: (10)
- (a) Surge Arrestor
 - (b) Isolator with Earth Switch
 - (c) Current Transformer
 - (d) Circuit Breaker
