# SYLLABUS

✓ **Thinking and Decision Making:** Creative thinking, unfamiliar relationships, verbal reasoning, finding patterns trends and Assessment of figures & diagrams.

- Geometrical designs &Identification
- Selection of related letters / words / numbers /figures
- Identification of odd thing / item out from a group
- Completion of numerical series based on the pattern /logic
- Fill in the blanks of the series based on the numerical pattern and logic of the series
- Syllogisms (logic-based questions), Identification of logic & selection of correct answers based on the logic

✓ **Mathematics:**

- Set Theory: Concept of sets – Union, Intersection, Cardinality, Elementary counting; permutations and combinations.
- Probability and Statistics: Basic concepts of probability theory, Averages, Dependent and independent events, frequency distributions, measures of central tendencies and dispersions.
- Algebra: Fundamental operations in algebra, expansions, factorization, simultaneous linear /quadratic equations, indices, logarithms, arithmetic, geometric and harmonic progressions, determinants and matrices.
- Coordinate Geometry: Rectangular Cartesian coordinates, distance formulae, equation of a line, and intersection of lines, pair of straight lines, equations of a circle, parabola, ellipse and hyperbola.
- Calculus: Limit of functions, continuous function, differentiation of function, tangents and normal, simple examples of maxima and minima. Integration of functions by parts, by substitution and by partial fraction, definite integrals, applications of definite integrals to areas.

✓ **Computer:**

- Operating System: Main functions of operating systems, Processes, Threads, Interprocess communication, concurrency, Synchronization, Deadlock, CPU scheduling, I/O scheduling, Resource scheduling. Deadlock and scheduling algorithms, banker's algorithm for deadlock handling. Memory management and virtual memory. File Systems, I/O systems, DOS, UNIX and Windows.
- Data Structure: Arrays and their Applications; Sparse Matrix, Stacks, Queues, Priority Queues, Linked Lists, Trees, Forest, Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree, B Tree, B+ Tree, B* Tree, Data Structure for Sets, Graphs, Sorting and Searching Algorithms; Hashing. Functions, Recursion, Parameter passing.
- Digital Fundamentals: Data Types, Number Systems and Conversion, Complements, Fixed Point Representation, Floating Point Representation, Error Detection Codes, Computer Arithmetic - Addition, Subtraction, Multiplication and Division Algorithms, Digital Computers, Logic Gates, Boolean Algebra, Map Simplifications, Combinational Circuits, Flip-Flops, Sequential Circuits, Integrated Circuits, Decoders, Multiplexers, Registers and Counters, Memory Unit.

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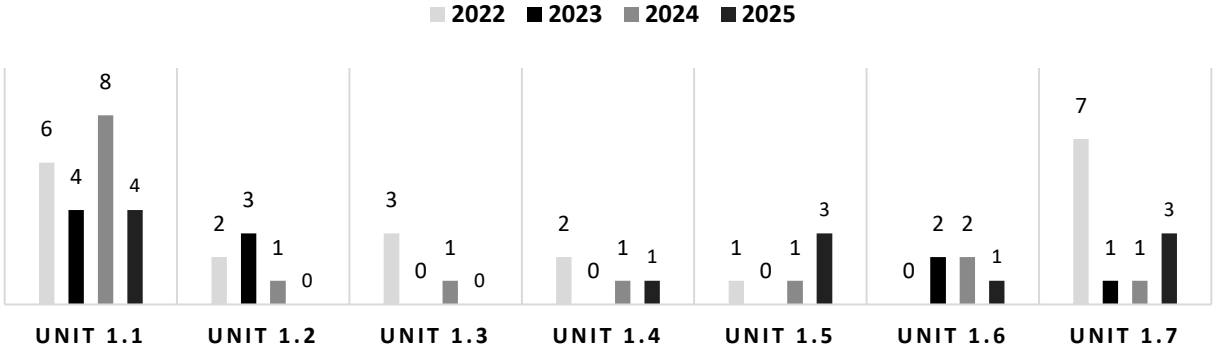
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CHAPTER

# 1 Thinking and Decision Making

## NUMBER OF QUESTIONS ASKED IN CUET (UG) ECONOMICS




## Unit 1.1: Logical Reasoning

### PREVIOUS YEAR EXAM QUESTIONS

**[2022]**

**1. If 'ORANGE' is coded as 'MTYPEG' in a certain language, then how will 'CHILLY' be coded in that language?**

(1) AJGNWW (2) AJGNIA
(3) AJKNWW (4) AJGOOW

**[2022]**

**2. If 'MANGO' is coded as 'KCLIM' in a certain language, then how will 'SWEETY' be coded in that language?**

(1) QYCGRA (2) QYCCRA
(3) QYGCRA (4) YQCGRA

**[2022]**

**3. India has been continuously experiencing military threats from its neighboring countries.**

**Statement I**: India should engage in an all-out war to stop the nagging threats.

**Statement II**: India should get the neighbors into a serious dialogue to reduce the tension at its border.

**In the light of the above statements, choose the correct answer from the options given below:**

(1) Both Statement I and Statement II are correct.
(2) Both Statement I and Statement II are incorrect.
(3) Statement I is correct but Statement II is incorrect.
(4) Statement I is incorrect but Statement II is correct.

**[2022]**

**4. The symbols are defined as follows:**

**$A + B$ means A is the daughter of B.**
**$A \times B$ means A is the son of B.**
**$A - B$ means A is the wife of B.**
**$P \times Q - S$ means S is the father of Q.**

**Statement I**: $S$ is the father of $P$.

**Statement II**: $P$ is the daughter of $Q$.

**In the light of the above statements, choose the correct answer from the options given below:**

(1) Both Statement I and Statement II are true.
(2) Both Statement I and Statement II are false.
(3) Statement I is true but Statement II is false.
(4) Statement I is false but Statement II is true.

**[2022]**

**5. Match List I with List II:**

| LIST I (Books) | LIST II (Authors) |
|---|---|
| A. The Story of My Experiments with Truth | I. Maulana Abul Kalam Azad |
| B. Glimpses of World History | II. Narendra Modi |
| C. India Wins Freedom | III. Pandit Jawaharlal Nehru |
| D. Exam Warriors | IV. M.K. Gandhi |

**Choose the correct answer from the options given below:**

(1) A-IV, B-III, C-I, D-II (2) A-III, B-IV, C-II, D-I
(3) A-IV, B-II, C-III, D-I (4) A-III, B-IV, C-II, D-I

**[2022]**

**6. Match List I with List II:**

| LIST I | LIST II |
|---|---|
| A. Austria | I. Oslo |
| B. Iran | II. Stockholm |
| C. Norway | III. Vienna |
| D. Sweden | IV. Tehran |

**Choose the correct answer from the options given below:**

(1) A-III, B-I, C-IV, D-II (2) A-III, B-IV, C-II, D-I
(3) A-III, B-IV, C-I, D-II (4) A-I, B-II, C-III, D-IV

**[2023]**

**7. Match List I with List II.**

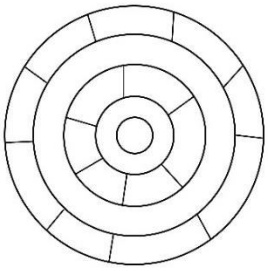
| LIST I | LIST II |
|---|---|
| A. Dog : Rabies :: Mosquito : | I. Bacteria |
| B. Amnesia : Memory :: Paralysis : | II. Liver |
| C. Meningitis : Brain :: Curdrosis : | III. Movement |
| D. Influenza : Virus :: Typhoid : | IV. Malaria |

**Options:**

(1) A-II, B-III, C-I, D-IV (2) A-III, B-IV, C-II, D-I
(3) A-IV, B-III, C-II, D-I (4) A-IV, B-III, C-II, D-I

**[2023]**

**8. Consider the adjoining diagram. What is the minimum number of different colors required to paint the figure such that no two adjacent regions have the same color?**



(1) 3 (2) 4
(3) 5 (4) 6

**[2023]**

**9. These are eight members in the family. Bravo and Priya are siblings. Angel is Kajal's granddaughter, Kajal who is Priya's mother-in-law. Ziva is a married woman and is older than Tim. Tim is the son of Sam who is the brother-in-law of Bravo. Smith is the eldest male in the family. Angel is not Ziva's daughter. So how is Bravo related to Ziva?**

(1) Son (2) Husband
(3) Brother-in-law (4) Son-in-law

**[2023]**

**10. Find out the trend and choose the missing character from the given alternative.**

| | | |
|---|---|---|
| 2 | 5 | 10 |
| 17 | ? | 37 |
| 50 | 65 | 82 |

(1) 20 (2) 26
(3) 27 (4) 32

**[2024]**

**11. Amit was counting down from 34, Punit was counting upwards the numbers starting from 2 and he was calling out only the even numbers. What common number will they call out at the same time if they were calling out at the same speed?**

(1) 22
(2) 23
(3) 24
(4) They will not call out the same number.

**[2024]**

**12. In a class.4/5 of the students are boys and rest are girls. If 2/5 of the boys and 1/4 of the girls are absent, what part of the total number of students is present?**

(1) 37/100 (2) 63/100
(3) 53/100 (4) 47/100

**[2024]**

**13. There is a certain relation between two given words on left side of :: and one word is given on the right side of :: while another word is missing. Select the missing word which have same relation as the word pairs on the left side of :: symbol.**

**Current: Circuit:: Earth: ?**

(1) Solar System (2) Orbit
(3) Planet (4) Moon

**[2024]**

**14. Four students are sitting on a bench to be photographed. Kamal is to the left of Amrita. Dipak is to the right of Amrita. Ankit is between Amrita and Dipak. Identify students sitting in corner's of the bench?**

(1) Kamal, Ankit (2) Kamal, Dipak
(3) Dipak, Amrita (4) Amrita, Ankit

**[2024]**

**15. K is the son of A's mother's sister. Q is daughter of D, who is the father of G and grandfather of A. P is the daughter of H who is grandmother of K. D is husband of H and G is husband of L. How is P related to Q?**

(1) Sister (2) Mother
(3) Daughter (4) Cousin

**[2024]**

**16. One day, Amit left home and cycled 15 km southwards, turned right and cycled 7 km and turned right and cycled 10 km and turned left and cycled 5 km. How many kilometres will he have to cycle to reach his home?**

(1) 17 km (2) 12 km
(3) 13 km (4) 37 km

**[2024]**

**17. In a certain code if SCOTLAND is written as 12345678, LOAN is written as 1435, LOTS is written as 8124.DAN is written as 537 and SON is written as 458, then what will be the code for 'C'?**

(1) 4 (2) 5
(3) 6 (4) 8

**[2024]**

**18. If P means '%', A means 'x' B means '-' and J means '+', then 14J2P3A6B7=?**

(1) 28 (2) 18
(3) 4 (4) 35

**[2025]**

**19. Consider the following alphabets series:**

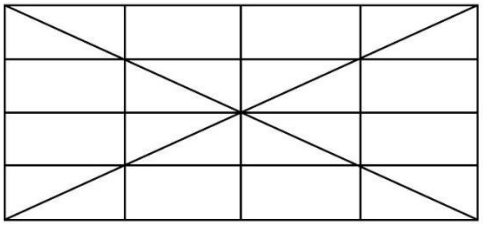
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

**If the second half of the given alphabets is written in reverse order, which letter will be seventh to the right of the twelth letter from the left end?**

(1) R (2) S
(3) U (4) T

**[2025]**

**20. Find the number of triangles in the given figure.**



(1) 36 (2) 44
(3) 48 (4) 46

**[2025]**

**21. Introducing a man to her husband, a women said "His brother's father is the only sun of my grandfather." How is the women related to this man?**

(1) Mother (2) Aunt
(3) Sister (4) daughter

**[2025]**

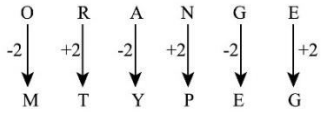
**22. In a certain code, VISHWANATHAN is written as NAAWTHHSANIV, how is the KARUNAKARANA written as**

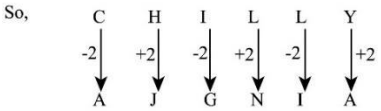
(1) KAANRAURNAAK (2) AKNUARRANKA
(3) NKKRANKRAUK (4) RURNKAAUNAK

| Answer Key | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| (2) | (1) | (4) | (3) | (1) | (3) | (3) | (2) | (2) | (2) |
| **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** |
| (4) | (2) | (2) | (2) | (1) | (3) | (3) | (2) | (3) | (3) |
| **21** | **22** | | | | | | | | |
| (3) | (1) | | | | | | | | |

## EXPLANATIONS

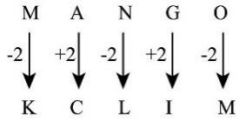
**1. Correct Answer is (2):**

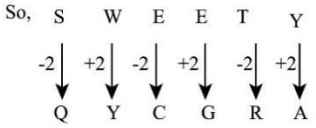



So, Correct option is 2.

**2. Correct Answer is (1):**




So, Correct option is 1.

**3. Correct Answer is (4):**

**4. Correct Answer is (3):**

- △→represent male
- ○→represent female
- at same lavel, brother, sister, cousin represents.
- at same lavel, (+) represent couple.

Now P × Q -S

Q+S

P

So, S is the father of P.
P is the Son of Q.

So, Statement I is True
Statement II is False.

So, Correct option is 3.

**5. Correct Answer is (1)**

**A. The Story of My Experiments with Truth → IV. M.K. Gandhi**

This book is an autobiography written by **M.K. Gandhi**, detailing his early life and experiments with truth.

**B. Glimpses of World History → III. Pandit Jawaharlal Nehru**

This book is written by **Pandit Jawaharlal Nehru**, which gives a historical account of the world from an Indian perspective.

**C. India Wins Freedom → I. Maulana Abul Kalam Azad**

This is the book written by **Maulana Abul Kalam Azad**, where he discusses India's struggle for independence and his personal experiences.

**D. Exam Warriors → II. Narendra Modi**

This book is written by **Narendra Modi**, aimed at guiding students on how to deal with exams and stress.

**So, Correct option is 1.**

**6. Correct Answer is (3):**

- **A. Austria → III. Vienna**
  **Vienna** is the capital city of **Austria**.
- **B. Iran → IV. Tehran**
  **Tehran** is the capital city of **Iran**.
- **C. Norway → I. Oslo**
  **Oslo** is the capital city of **Norway**.
- **D. Sweden → II. Stockholm**
  **Stockholm** is the capital city of **Sweden**.

**So, Correct option is 3.**

**7. Correct Answer is (3):**

**A. Dog: Rabies:: Mosquito:** Rabies is caused by a virus, and mosquitoes are known for transmitting **Malaria**, which is caused by a parasite.

**B. Amnesia: Memory:: Paralysis:** Amnesia affects memory, while paralysis affects **movement**.

**C. Meningitis: Brain:: Curdrosis:** Meningitis is an infection of the brain, and **curdrosis** (likely referring to cirrhosis) affects the **liver**.

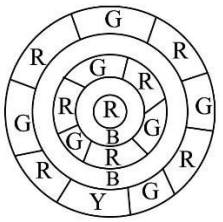
**D. Influenza: Virus:: Typhoid :** Influenza is caused by a virus, and **Typhoid** is caused by **bacteria**.

So, the correct match is:

- A-IV (Mosquito : Malaria)
- B-III (Paralysis : Movement)
- C-II (Meningitis : Brain, Curdrosis : Liver)
- D-I (Influenza : Virus, Typhoid : Bacteria)

**So, Correct option is 3.**

**8. Correct Answer is (2):**




Let G⇒Green
B⇒Blue
Y⇒Yellow
R⇒Red

So, minimum no. of colours required = 4

**9. Correct Answer is (2):**

We are given the following family relationships:

1. **Bravo and Priya are siblings.**
2. **Angel is Kajal's granddaughter, and Kajal is Priya's mother-in-law.**

- From this, we deduce that **Priya's husband (who is not directly mentioned) is Kajal's son**. **Angel is the daughter of Priya's husband (Angel's father)**.

3. **Ziva is a married woman and is older than Tim.**
4. **Tim is the son of Sam, who is the brother-in-law of Bravo.**

- Since **Sam** is the brother-in-law of Bravo, **Sam is married to Bravo's sister** (Priya). Therefore, **Tim is the son of Priya**.

5. **Smith is the eldest male in the family.**

- **Smith** is the eldest male member in the family, likely related to either Kajal or the other side of Priya's family.

6. **Angel is not Ziva's daughter.**

- **Angel** is not Ziva's daughter, so Ziva must be related to Angel's family in some other way.

**Family Tree Analysis:**

- **Bravo** and **Priya** are siblings, so Bravo is married to someone other than Priya's husband.
- **Ziva is a married woman**. Since **Bravo** is Priya's sibling, Bravo could be Ziva's **husband**.

**Conclusion:**

**Bravo** is **Ziva's husband**.

**So, Correct option is 2.**

**10. Correct Answer is (2):**

**11. Correct Answer is (4):**

- Amit is counting down from 34, so his numbers will be: 34, 33, 32, 31, 30, 29, 28, 27, 26, 25, 24, 23, 22, 21, 20 ..., etc.

- Punit is counting upwards starting from 2 and calling only even numbers: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26 ..., etc.
  Now, we need common number at same index
- 34, 33, 32, 31, 30, 29, 28, 27, 26, 25, 24, 23, 22, 21, 20 ..., etc.
- 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26…… ..., etc.
  Here not common number at same index.
  **So, Correct option is 4.**

**12. Correct Answer is (2):**
Fraction of boys = 4/5
Fraction of girls = 1 - 4/5 = 1/5
Fraction of absent boys = 2/5
Fraction of absent girls = ¼
Fraction of present boys = 4/5× (1-2/5) = 4/5 × 3/5 = 12/25
Fraction of present girls = 1/5 × (1-1/4) = 1/5 × 3/4 = 3/20
Total fraction present = 12/25 + 3/20
→ Total fraction present = (48 +15)/100 = 63/100
63/100 part of the total number of students is present.
**So, Correct option is 2.**

**13. Correct Answer is (2):**
**Current: Circuit :: Earth: ?**
- The relation between "Current" and "Circuit" is that electric current flows through a circuit.
- Similarly, the relation between "Earth" and the missing word should be something that is closely related to Earth in a similar way that a circuit is related to current.
  To analyze the options:

1. **Solar System** - Earth is part of the solar system, but it does not form a direct flowing relationship like current and circuit.
2. **Orbit** - Earth moves in an orbit, but it doesn't perfectly match the relationship of current flowing through a circuit.
3. **Planet** - Earth is a planet, but this is a category, not a dynamic relationship.
4. **Moon** - The Moon orbits Earth, but again, this doesn't fit the same kind of dynamic as current and circuit.

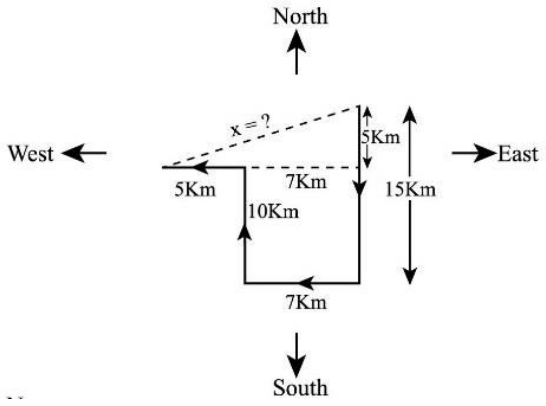
The best analogy would be **Orbit**, as the Earth follows a path (orbit), just like current flows through a circuit.
**So, Correct option is 2.**

**14. Correct Answer is (2):**
**Given:**
- **Kamal is to the left of Amrita.**
- **Dipak is to the right of Amrita.**
- **Ankit is between Amrita and Dipak.**
  So, the seating arrangement will look like this:
  **Kamal | Amrita | Ankit | Dipak**
- Kamal is sitting on the leftmost side (corner) of the bench.
- Dipak is sitting on the rightmost side (corner) of the bench.
  **So, Correct option is 2.**

**15. Correct Answer is (1):**
**Given:**
1. **K is the son of A's mother's sister.**
- This means K is A's cousin.
2. **Q is the daughter of D, who is the father of G and grandfather of A.**
- This means Q is A's aunt (since D is A's grandfather, and Q is D's daughter).
3. **P is the daughter of H, who is the grandmother of K.**
- This means H is K's grandmother, and P is H's daughter, so P is K's mother.
4. **D is the husband of H and G is the husband of L.**
- This information is not immediately relevant to P and Q's relationship.

**Now, looking at P and Q:**
- **P** is K's mother (from point 3).
- **Q** is A's aunt (from point 2).
  Now, considering the relationships more carefully:
- **P** is the **sister** of **Q** because both are daughters of H and D, respectively.
  Therefore, **P** and **Q** are **sisters**.
  **So, Correct option 1.**

**16. Correct Answer is (3):**




Now $x^2 = (7+5)^2 + (5)^2$
$x^2 = 144 + 25$
$x^2 = 169$
$x^2 = 13\ km$

**17. Correct Answer is (3):**

S C O T L A N D is written as 1 2 3 4 5 6 7 8

L O A N is written as 1 4 3 5

L O T S is written as 8 1 2 4

D A N is written as 5 3 7

S O N is written as 4 5 8

is uncomments all So, $\boxed{C = 6}$

**18. Correct Answer is (2):**

Given:

- **P means '%'**
- **A means '*'**
- **B means '-'**
- **J means '+'**

Now, 14J2P3A6B7=>14%2+3*6-7

= 7 + 18 – 7 = 18

So, Correct option is 2.

**19. Correct Answer is (3):**

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

←----------→ ←----------→

First half Second half

Now, Reverse second half

A B C D E F G H I J K L M Z Y X W V U T S R Q P O N

12 7(from 12th)

←----------→ ←----------→

First half Second half

12th from left=L

7th from 12th =U

So, Correct option is 3.

**20. Correct Answer is (3):**

**21. Correct Answer is (3):**

The woman says: **"His brother's father is the only son of my grandfather."**

- **"My grandfather's only son"** refers to her father (because her grandfather's son would be her father).
- **"His brother's father"** is the father of the man being introduced. So, the woman's father's role is the father of this man's brother, meaning the woman's father is the **father** of the man being introduced.

This means that the woman is **the sister of the man** being introduced.

**So, Correct option is 3.**

**22. Correct Answer is (1):**

Sol$^{n}$ ⇒

V I S H W A | N A T H A N

⑥ ④ ② ① ③ ⑤

N A A W T H H S A N I V

Now

K A R U N A | K A R A N A

⑥ ④ ② ① ③ ⑤

K A A N R A U R N A A N

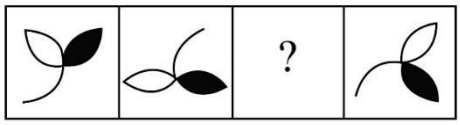
So, Correct option is 1.

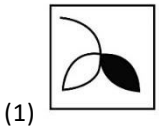
## Unit 1.2: Spatial and Diagrammatic Reasoning

### PREVIOUS YEAR EXAM QUESTIONS

**[2022]**

**1. Which will be the missing pattern in the series? Redraw figure.**





(1)



(2)



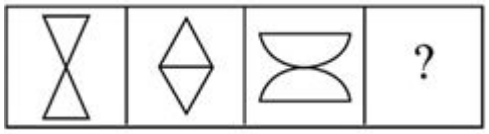
(3)



(4)

**[2022]**

**2. What will be the next pattern in the series?**





(1)



(2)



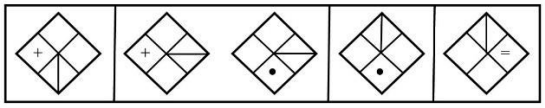
(3)



(4)

**[2023]**

**3. Which of the following will be the next figure in the sequence?**

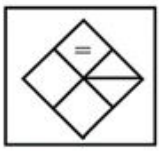




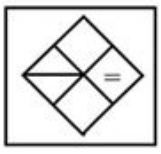
(1)



(2)



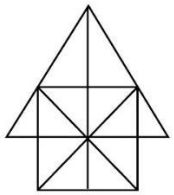
(3)



(4)

**[2023]**

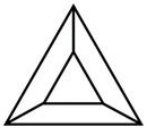
**4. Count the number of triangles and squares in the given figure.**



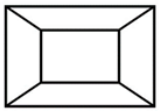
(1) 26 triangles, 5 squares
(2) 28 triangles, 5 squares
(3) 26 triangles, 6 squares
(4) 28 triangles, 6 squares

**[2023]**

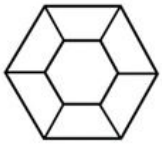
**5. Choose the figure that is different from the rest.**



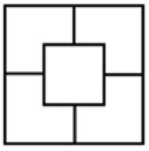
(1)



(2)



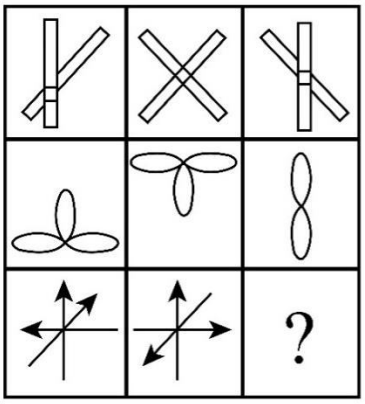
(3)

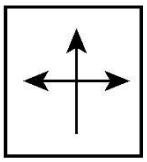


(4)

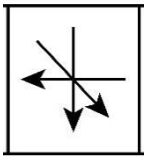
**[2024]**

**6. Select a suitable figure from the given options that would complete the figure matrix?**

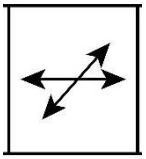




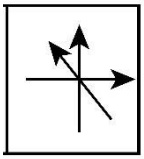
1.



2.



3.



4.

| Answer Key | | | | | |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |
| (3) | (1) | (4) | (2) | (4) | (3) |

## EXPLANATIONS

**1. Correct Answer is (3):**



Rotate $180^0$ and exchange leave

So, Correct option is 3.

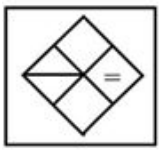
**2. Correct Answer is (1):**



Half-half part rotate $180^0$

So, Correct option is 1.

**3. Correct Answer is (4):**



The box which has line shifted anti-clockwise by 1.

So, Correct option is 4.

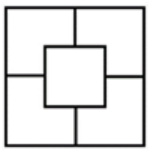
**4. Correct Answer is (2):**

No. of triangle=28

No. of squares=5

**So, Correct option is 2.**

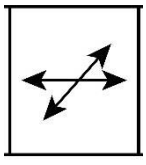
**5. Correct Answer is (4):**



Except (4) all are connected by corner.

**So, Correct option is 4.**

**6. Correct Answer is (3):**

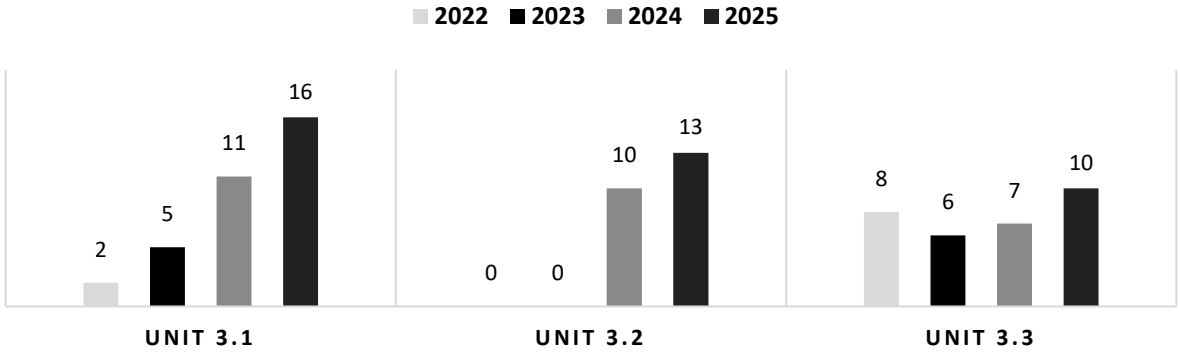


CHAPTER

# 3

# Computer

**NUMBER OF QUESTIONS ASKED IN CUET (UG) ECONOMICS**




## Unit 3.1: Operating System

### PREVIOUS YEAR EXAM QUESTIONS

**[2022]**

**1. Which of the following storage hardware(s) can be used as a backup device?**

(A) HDD
(B) ROM
(C) RAM
(D) Cache
(E) Magnetic Tape

**Choose the correct answer from the options given below:**

(1) Only A, B, and C (2) Only B, C, and D
(3) Only A and E (4) Only A, C, and E

**[2022]**

**2. In a processor, while executing an instruction _____**

(A) The Program Counter is used to hold the address of the next instruction.
(B) The Instruction Register holds the instruction for execution.
(C) The Memory Address Register is used to perform address translation.
(D) The Memory Data Register is used to perform data operations.
(E) The Clock generates control signals.

**Choose the correct answer from the options given below:**

(1) Only A and B are true.
(2) Only C and D are true.
(3) Only A, B, and E are true.
(4) Only B, C, and D are true.

**[2023]**

**3. A RAM chip has a capacity of 1024 words of 8 bits each (1k × 8). The number of 2 × 4 decoders with an enable line needed to construct a 16k × 16 RAM from 1k × 8 RAM is:**

(1) 5 (2) 4
(3) 7 (4) 6

**[2023]**

**4. A 32-bit wide main memory with a capacity of 1 GB is built using 256 M × 4-bit DRAM chips. The number of rows of memory cells in the DRAM chip is $2^{14}$. The time taken to perform one refresh operation is 50 nanoseconds. The refresh period is 2 milliseconds. The percentage (rounded to the closest integer) of the time available for performing memory read/write operations in the main memory unit is:**

(1) 56 (2) 59
(3) 54 (4) 61

**[2023]**

**5. Which of the following is a correct definition of volatile memory?**

(1) It does not retain its contents at high temperature.
(2) It is to be kept in an air-tight box.
(3) It loses its contents on failure of power supply.
(4) It does not lose its contents on failure of power supply.

**[2023]**

**6. Consider the expression $(a-1)\cdot\left(\frac{(b+c)}{3}+d\right)$. Let $x$ be the minimum number of registers required by an optimal code generation (without any register spill) algorithm for a load/store architecture, in which:**
**(i) Only load and store instructions can have memory operands.**
**(ii) Arithmetic instructions can have only register or immediate operands. The value of $x$ is:**
(1) 2 (2) 4
(3) 1 (4) 3

**[2023]**

**7. The amount of time required to read a block of data from a disk into memory is composed of seek time, rotational latency, and transfer time. Rotational latency refers to:**
(1) The time it takes for the platter to make a full rotation.
(2) The time it takes for the read/write head to move into position over the appropriate track.
(3) The time it takes for the platter to rotate the correct sector under the head.
(4) To reduce the number of bits in the field of instruction.

**[2024]**

**8. Consider a system with 1 K pages and 512 frames, and each page is of size 2 KB. How many bits are required to represent the virtual address space memory?**
(1) 20 bits (2) 21 bits
(3) 11 bits (4) 16 bits

**[2024]**

**9. An operating system contains 4 user processes, each requiring 5 units of resource $R$. The minimum number of required units of $R$ such that no deadlock will ever occur is:**
(1) 20 (2) 4
(3) 17 (4) 15

**[2024]**

**10. We can say that a schedule $T$ can be conflict serializable if:**
(1) If a schedule $T$ can be transformed into a serial schedule $U$ by a series of swaps of conflicting operations.
(2) If a schedule $T$ can be transformed into a serial schedule $U$ by a series of swaps of nonconflicting operations.
(3) If a schedule $T$ can be transformed into a nonserial schedule $U$ by a series of swaps of conflicting operations.
(4) If a schedule $T$ can be transformed into a nonserial schedule $U$ by a series of swaps of nonconflicting operations.

**[2024]**

**11. On a system using simple segmentation, the segment table is as follows:**

| Segment | Limit | Base |
|---|---|---|
| 0 | 500 | 1000 |
| 1 | 200 | 2000 |
| 2 | 300 | 2500 |
| 3 | 100 | 1700 |

**What is the physical address for the logical address $2,212$?**
(1) 2712 (2) 512
(3) 2212 (4) 2800

**[2024]**

**12. How many child processes will be created by the following fork () system calls?**
**Fork ();**
**fork ();**
**fork ();**
**fork ();**
(1) 4 (2) 16
(3) 15 (4) 3

**[2024]**

**13. Match List I with List II:**

| LIST I | LIST II |
|---|---|
| A. Critical Region | I. Circular wait |
| B. Working Set | II. Condition variable |
| C. Deadlock | III. Principle of locality |
| D. Wait/signal | IV. Mutual exclusion |

**Choose the correct answer from the options given below:**
(1) (A) - (IV), (B) - (III), (C) - (I), (D) - (II)
(2) (A) - (IV), (B) - (III), (C) - (II), (D) - (I)
(3) (A) - (III), (B) - (IV), (C) - (II), (D) - (I)
(4) (A) - (II), (B) - (III), (C) - (IV), (D) - (I)

**[2024]**

**14. How does the number of page frames affect the number of page faults for a given memory access pattern in the FIFO page replacement algorithm?**

(1) Increasing the number of page frames always decreases the number of page faults.

(2) Increasing the number of page frames may increase or decrease the number of page faults depending on the memory access pattern.

(3) Increasing the number of page frames always increases the number of page faults.

(4) Increasing the number of page frames has no effect on the number of page faults.

**[2024]**

**15. Decreasing the RAM of a computer typically leads to which of the following outcomes?**

(1) Virtual memory increases.

(2) Page faults increase.

(3) Page faults decrease.

(4) Segmentation faults occur.

**[2024]**

**16. Arrange the following in increasing order of their per unit cost:**

(A) DRAM

(B) Magnetic disk

(C) Optical disk

(D) SRAM

(E) Magnetic tape

**Choose the correct answer from the options given below:**

(1) (E), (C), (B), (A), (D). (2) (E), (C), (B), (D), (A).

(3) (C), (B), (E), (D), (A). (4) (C), (B), (D), (E), (A).

**[2024]**

**17. The idea of cache memory is based on which of the following?**

(1) Principle of locality of reference.

(2) Based on the fact that a large portion of a program is referenced relatively frequently.

(3) Principle of 10-90 rule

(4) Non-volatile storage

**[2024]**

**18. Match List I with List II:**

| LIST I | LIST II |
|---|---|
| A. Flash memory | I. Oldest and Slowest |
| B. PMOS | II. Used in large-scale integration (LSI) |
| C. NMOS | III. Least power consumption |
| D. CMOS | IV. Non-volatile RAM which is powered continuously |

**Choose the correct answer from the options given below:**

(1) (A) - (I), (B) - (IV), (C) - (III), (D) - (II)

(2) (A) - (I), (B) - (IV), (C) - (II), (D) - (III)

(3) (A) - (IV), (B) - (I), (C) - (III), (D) - (II)

(4) (A) - (IV), (B) - (I), (C) - (II), (D) - (III)

**[2025]**

**19. Which of the following scheduler/schedulers is/are also called CPU scheduler?**

(A) Short Term Scheduler

(B) Long Term Scheduler

(C) Medium Term Scheduler

(D) Asymmetric Scheduler

**Choose the correct answer from the options given below:**

(1) (A), (B) and (D) only

(2) (A), (B) and (C) only

(3) (A), (B), (C) and (D)

(4) (A) only

**[2025]**

**20. For the deadlock to occure, the four conditions namely mutual exclusion, Hold and wait, No exemption, circular wait_____.**

(1) May or may not Hold

(2) the circular wait does not implies hold and wait conditions.

(3) Are completely independent.

(4) Must hold simultaneously

**[2025]**

**21. Which disk scheduling algorithm looks for the track closest to the current head position?**

(1) LOOK (2) SSTF

(3) FCFS (4) SCAN

**[2025]**

**22. Which CPU scheduling algorithm prefers the process with the shortest burst time?**

(1) FCFS (2) SJF

(3) Round Robin (4) priority Scheduling

**[2025]**

**23. Arrange the following layers of MS DOS operating system starting from inner most to outer most:**

(A) ROM BIOS Device drivers

(B) Resident System Program

(C) MS DOS Device Drivers

(D) Application Program

**Choose the correct answer from the options given below:**

(1) (A), (C), (B), (D) (2) (D), (B), (C), (A)

(3) (B), (A), (D), (C) (4) (C), (B), (D), (A)

**[2025]**

**24. Match List-I with List-II**

| List-I | List-II |
|---|---|
| (A) Seek Time | (I) Total number of bytes transferred divided by the total time between the first request for service and the completion of the last transfer |
| (B) Access Time | (II) Time taken for the disk to rotate the desired sector to the disk head |
| (C) Rotational Latency | (III) Seek Time + Rotational Latency |
| (D) Disk Bandwidth | (IV) Time taken for the disk arm to move the heads ta the cylinder containing the desired sector |

**Choose the correct answer from the option given below:**

(1) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)
(2) (A)-(I), (B)-(III), (C)-(II), (D)-(IV)
(3) (A)-(I), (B)-(III), (C)-(IV), (D)-(II)
(4) (A)-(IV), (B)-(III), (C)-(III), (D)-(I)

**[2025]**

**25. External fragmentation occurs_____**

(1) When enough total memory space exists to satisfy a request, but it is not contiguous, storage is fragmented into a large number of small holes.
(2) When enough total memory space exists to satisfy a request, which is contiguous, storage is fragmented into a large number of small holes.
(3) When memory is empty.
(4) Always.

**[2025]**

**26. Details of paging system for memory management are as follows**

Logical address: 32 KB
Page Size: 4 KB
Physical Memory size: 64 KB

**The number of pages in the logical address space and number of pages frames in physical memory respectively are:**

(1) 4,76 (2) 4,12
(3) 8,16 (4) 3,16

**[2025]**

**27. A situation where two or more processes are blocked, waiting for resources held by each other is called:**

(1) Pooling (2) Deadlock
(3) Thrashing (4) Paging

**[2025]**

**28. Consider a page reference string as: 7,0,5,2,0,3,0,4,2,3,0,3,2.Assume that there are 3-page frames available calculate the total number of page faults for the above reference string it LRU policy is used for page replacement.**

(1) 10 (2) 8
(3) 9 (4) 11

**[2025]**

**29. Which of the following is a way to recover from the deadlock which has already occurred?**

(1) Process termination
(2) Non preemption of resources
(3) Banker's algorithm
(4) Circular wait

**[2025]**

**30. Consider a typical process P, in the critical section. Arrange the following statements of code to make a valid general structure**

(A) Critical section
(B) Remainder section
(C) entry section
(D) Exit section

**Choose the correct answer from the options given below:**

(1) (C), (B), (D), (A) (2) (C), (A), (D), (B)
(3) (C), (A), (D), (B) (4) (C), (B), (D), (A)

**[2025]**

**31. To provide a memory capacity of $32\,\mathrm{K} \times 16$ how many address lines and data lines are required?**

(1) address lines $= 14$, data lines $= 16$
(2) address lines $= 15$, data lines $= 16$
(3) address lines $= 14$, data lines -4
(4) address lines $= 15$, data lines $= 4$

**[2025]**

**32. Consider the following type of memories.**

(A) Hard Disk Drive (HDD)
(B) Cache Memory
(C) Random Access Memory (RAM)
(D) Registers

**Arrange the above memories according to their access speed (from fastest to slowest)**

(1) (D), (C), (B), (A) (2) (A), (C), (B), (D)
(3) (B), (D), (A) (A) (4) (D), (B), (C), (A)

**[2025]**

**33. The Dining Philosopher' problem can be solved by:**

(1) Use of semaphores
(2) Use of overlays
(3) Mutual exclusion
(4) Bounded waiting

**[2025]**

**34. March List-I with List-II**

| List-I (CPU Scheduling Algorithm) | List-II (Feature) |
|---|---|
| (A) FCFS | (I) FCFS+Preemption |
| (B) Round Robin | (II) Allows the processes to move between queues |
| (C) Multi level queue scheduling | (III) Often long average waiting time |
| (D) Multi-level Feedback Queue | (IV) Permanent assignment of processes to one specific queue |

**Choose the correct answer from the options given below:**

(1) (A)-(I), (B)-(II), (C)-(III), (D)- (IV)

(2) (A)-(III), (B)-(I), (C)-(IV), (D)-(II)

(3) (A)-(I), (B)-(II), (C)-(IV), (D)-(III)

(4) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)

| Answer key | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| (3) | (1) | (1) | (2) | (3) | (1) | (1) | (2) | (3) | (2) |
| **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** |
| (1) | (3) | (1) | (2) | (2) | (1) | (1) | (2) | (4) | (4) |
| **21** | **22** | **23** | **24** | **25** | **26** | **27** | **28** | **29** | **30** |
| (2) | (2) | (1) | (4) | (1) | (3) | (2) | (3) | (1) | (3) |
| **31** | **32** | **33** | **34** | | | | | | |
| (2) | (4) | (1) | (2) | | | | | | |

## EXPLANATIONS

**1. Correct Answer is (3):**

**A. HDD (Hard Disk Drive)**: **True.** HDDs are commonly used as backup devices because they offer high storage capacity and are used for long-term data storage.

**B. ROM (Read-Only Memory)**: **False.** ROM is non-volatile memory used for storing firmware, and it is not typically used for data backup.

**C. RAM (Random Access Memory)**: **False.** RAM is volatile memory used for temporary storage during operations. Data is lost when the power is turned off, making it unsuitable for backups.

**D. Cache**: **False.** Cache memory is a small, high-speed memory used to store frequently accessed data for faster processing. It is not suitable for long-term data backup.

**E. Magnetic Tape**: **True.** Magnetic tapes are widely used for backup purposes, especially for large-scale data backup in enterprises. They are reliable for long-term storage and offline backups.

**So, Correct option is 3.**

**2. Correct Answer is (1):**

**A. The Program Counter is used to hold the address of the next instruction**:

**True.** The Program Counter (PC) holds the address of the next instruction to be executed.

**B. The Instruction Register holds the instruction for execution**:

**True.** The Instruction Register (IR) holds the instruction that is currently being executed by the CPU.

**C. The Memory Address Register is used to perform address translation**:

**False.** The Memory Address Register (MAR) holds the address of the memory location to be accessed, but it does not perform address translation. That function is handled by the Memory Management Unit (MMU) if address translation is required.

**D. The Memory Data Register is used to perform data operations**:

**False.** The Memory Data Register (MDR) holds the data that is being transferred to or from memory. It doesn't perform data operations like calculations or transformations.

**E. The Clock generates control signals**:

**False in this context.** While the clock controls the timing of operations, it doesn't directly generate the control signals. Control signals are generated by control units (like the Control Unit or CU) in the processor, using the clock to sync operations.

So, Correct option is 1.

**3. Correct Answer is (1):**

Given:

RAM chip capacity = 1K × 8 bits

No. of 2 × 4 decodes with enable line = $\frac{16K \times 16}{1K \times 8} = 32 \Rightarrow 2^5$

**4. Correct Answer is (2):**

- Each DRAM chip has **$2^{14}$ rows**.
- Each row needs **50 ns** to refresh.
- Total refresh time per chip:
  $2^{14} \times 50 = 819200$ ns
- Refresh period = **2 ms = 2,000,000 ns**

So, time available for read/write:

$= \left(1 - \frac{819200}{2000000}\right) \times 100 = 59.04\%$

So, Correct option is 2.

**5. Correct Answer is (3):**

**Volatile memory** is a type of computer memory that **requires power to retain data**. When the **power is turned off or fails**, the data is **lost**. This includes memory like **RAM**, which is used for temporary data storage during active processing.

So, **Correct Answer (3)**: *It loses its contents on failure of power supply.*

**6. Correct Answer is (1):**

Expression: $(a - 1) \times \left(\frac{(b+c)}{3} + d\right)$

Now

$r_1 \leftarrow a$

$r_1 \leftarrow r_1 - 1$

$r_2 \leftarrow b$

$r_2 \leftarrow r_2 + c$

$r_2 \leftarrow r_2/3$

$r_2 \leftarrow r_2 + d$

$r_2 \leftarrow r_1 \times r_2$

So, there are only 2 registers used $x = 2$

**7. Correct Answer is (1):**

Reading from a disk involves:

- **Seek time**: time to move the read/write head to the correct track.
- **Rotational latency**: time for the disk to rotate so the desired sector is under the head.
- **Transfer time**: time to read/write the data once positioned.

So, Correct option is 1.

**8. Correct Answer is (2):**

Given:

$Page\ Size: 2\ KB = 2^{11}\ bytes$

$Number\ of\ Pages = 1K\ pages = 2^{10}\ pages.$

Total Addressable Memory:

Total addressable memory = Number of pages x Page size

$Total\ addressable\ memory = 2^{10}\ pages \times 2^{11}\ bytes/page$

$= 2^{21}\ bytes$

So, we need 21 bits to represent the virtual address space.

**So, Correct option is 2.**

**9. Correct Answer is (3):**

To avoid deadlock with 4 processes(n) each needing up to 5 units,

use the formula:

$(r - 1) \times n + 1.$

So, $(5 - 1) \times 7 + 1 = 17$ units needed.

**So, Correct option is 3.**

**10. Correct Answer is (2):**

- Conflict serializability means that the schedule can be transformed into a serial schedule by swapping **nonconflicting** operations (i.e., operations that do not conflict, such as operations on different data items or non-overlapping operations).
- Swapping conflicting operations changes the outcome and is not allowed in conflict serializability.
- The key is that only nonconflicting operations can be swapped to reorder the schedule without affecting the final outcome.

So, Correct option is 2.

**11. Correct Answer is (1):**

Given:

| Segment | Limit | Base |
|---|---|---|
| 0 | 500 | 1000 |
| 1 | 200 | 2000 |
| 2 | 300 | 2500 |
| 3 | 100 | 1700 |

**Step 1: Check if offset ≤ limit**

- For segment 2, limit = 300
- Given offset = 212
- Since 212 ≤ 300, address is valid.

**Step 2: Calculate physical address**

Physical Address = Base + Offset = 2500 + 212

= 2712

**So, Correct option is 1.**

**12. Correct Answer is (3):**

Fork system call is used to create a new process also called a child process or new process.

Formula:

With n fork system calls, number of new (child) processes created is 2" - 1.

Here n = 4

$new\ process\ created = 2^4 - 1 = 16 - 1 = 15$

So, Correct option is 3.

**13. Correct Answer is (1):**

**A. Critical Region:** This is associated with Mutual Exclusion. Critical regions are parts of the code where shared resources are accessed, and mutual exclusion ensures that only one process can enter the critical region at a time.

**B. Working Set:** This is associated with the Principle of Locality. The working set model is based on the principle of locality, which states that a program will tend to use a relatively small subset of its pages frequently.

**C. Deadlock:** This is associated with Circular Wait. Circular wait is one of the necessary conditions for a deadlock to occur.

**D. Wait/signal:** This is associated with Condition Variable. The wait/signal mechanism is used in condition variables to synchronize processes.

So, the correct option is 1.

**14. Correct Answer is (2):**

- Normally, increasing page frames reduces page faults.
- However, in FIFO, **Belady's anomaly** can occur, where increasing frames causes more page faults for some access patterns.
- Therefore, the number of page faults may increase or decrease depending on the memory access pattern.

So, Correct option is 2.

**15. Correct Answer is (2):**

- When RAM decreases, fewer pages can be held in memory.
- This leads to more frequent page replacements and thus more page faults.
- Virtual memory size may stay the same or be adjusted, but increased page faults are a direct consequence.
- Segmentation faults are unrelated to RAM size decrease.

So, correct option is 2.

**16. Correct Answer is (1):**

**Increasing order of per unit cost:**

(E) Magnetic tape < (C) Optical disk < (B) Magnetic disk < (A) DRAM < (D) SRAM

So, Correct option is 1.

**17. Correct Answer is (1):**

Cache memory works on the **principle of locality of reference**, which means programs tend to access the same set of memory locations repeatedly over a short period of time (temporal locality) or access memory locations close to those recently accessed (spatial locality).

So, Correct option is 1.

**18. Correct Answer is (2):**

- **Flash memory (A)** is oldest and slowest technology here → (I).
- **PMOS (B)** transistors need continuous power to retain state → (IV).
- **NMOS (C)** used in large-scale integration (LSI) → (II).
- **CMOS (D)** uses the least power → (III).

So, the correct matching is option **2**.

**19. Correct Answer is (4):**

- **Short Term Scheduler** (CPU scheduler): This scheduler directly selects processes from the ready queue to run on the CPU. It makes frequent decisions about which process to execute next and is thus called the **CPU scheduler**.
- **Long Term Scheduler**: It controls the degree of multiprogramming by deciding which processes are loaded into memory, but it does not directly manage CPU scheduling.
- **Medium Term Scheduler**: It handles the swapping of processes in and out of memory and does not directly schedule CPU processes.
- **Asymmetric Scheduler**: This term does not relate directly to CPU scheduling, but rather to a type of scheduling approach where one processor handles scheduling for others.

Therefore, the **CPU scheduler** is the **Short Term Scheduler**, not the others.

**So, Correct option is 4.**

**20. Correct Answer is (4):**

For a deadlock to occur in a system, all four necessary conditions must hold simultaneously. These conditions are:

1. **Mutual Exclusion**: At least one resource must be held in a non-shareable mode.
2. **Hold and Wait**: A process holding at least one resource is waiting to acquire additional resources held by other processes.
3. **No Preemption**: Resources cannot be forcibly taken away from a process holding them.
4. **Circular Wait**: A set of processes exist where each process is waiting for a resource held by the next process in the cycle.

# M O C K - T E S T

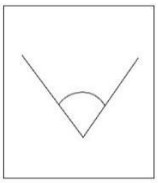
# MOCK TEST

1

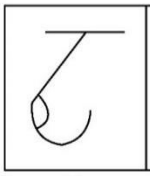
## MOCK TEST

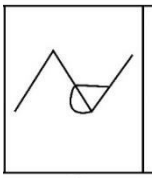
**1. From the given answer figures, select the one in which the question figure is hidden/embedded in the same direction.**

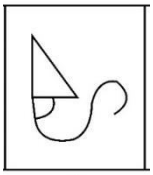
**Question Figure:**

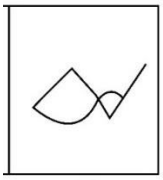


**Answer Figures:**

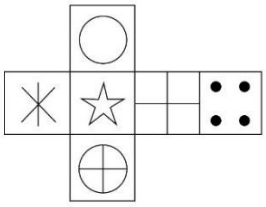
(1) 

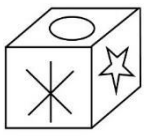
(2) 

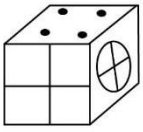
(3) 

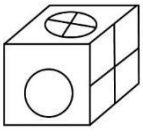
(4) 

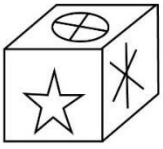
**2. Which of the following cube in the answer figure cannot be made based on the unfolded cube in the question figure?**



(1) 

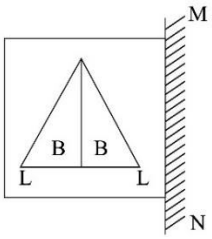
(2) 

(3) 

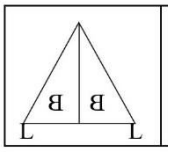
(4) 

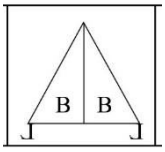
**3. Which of the answer figure is exactly the mirror image of the question figure if a mirror is placed on the line MN?**

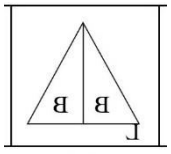
**Question figure:**

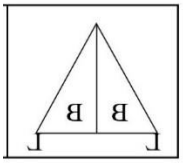



**Answer figures:**

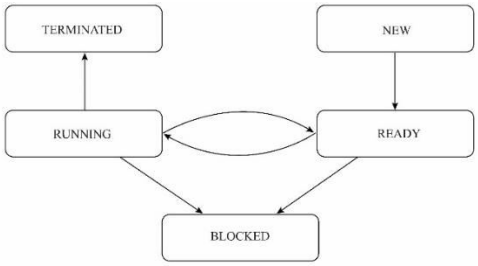
(1) 

(2) 

(3) 

(4) 

**4. The process state transition diagram in the below figure is representative of**




(1) a batch operating system
(2) an operating system with a preemptive scheduler
(3) an operating system with a non-preemptive scheduler
(4) a uni-programmed operating system

**5. Which of the following is an example of a spooled device?**

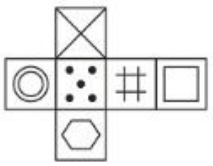
(1) a line printer used to print the output of a number of jobs
(2) a terminal used to enter input data to a running program
(3) a secondary storage device in a virtual memory system
(4) a graphic display device

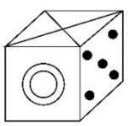
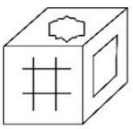
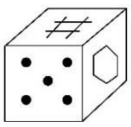
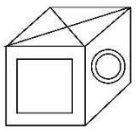
**6. System calls are usually invoked by using:**
(1) A software interrupt
(2) Polling
(3) An indirect jump
(4) A privileged instruction

**7. Consider the following statements:**
(i) First-in-first out types of computations are efficiently supported by STACKS.
(ii) Implementing LISTS on linked lists is more efficient than implementing LISTS on an array for almost all the basic LIST operations.
(iii) Implementing QUEUES on a circular array is more efficient than implementing QUEUES on a linear array with two indices.
(iv) Last-in-first-out type of computations are efficiently supported by QUEUES.
**Which of the following is correct?**
(1) (ii) and (iii) are true (2) (1) and (ii) are true
(3) (iii) and (iv) are true (4) (ii) and (iv) are true

**8. A queue is implemented using an array such that ENQUEUE and DEQUEUE operations are performed efficiently. Which one of the following statements is CORRECT (n refers to the number of items in the queue)?**
(1) Both operations can be performed in $O(1)$ time
(2) At most one operation can be performed in $O$ (1) time but the worst case time for the other operation will be $\Omega(n)$
(3) The worst case time complexity for both operations will be $\Omega(n)$
(4) Worst case time complexity for both operations will be $\Omega(\log\ n)$

**9. Which of the following cube in the answer figure cannot be made based on the unfolded cube in the question figure?**



(1) 
(2) 
(3) 
(4) 

**10. Let $U = \{1, 2, \ldots, 15\}$. Let $P \subseteq U$ consist of all prime numbers, $Q \subseteq U$ consist of all even numbers and $R \subseteq U$ consist of all multiples of 3. Let $T = P - Q$. Then which of the following is CORRECT?**
(1) $|T| = 6\ and\ |T \cup R| = 9$
(2) $|T| = 6\ and\ |T \cup R| = 9$
(3) $|T| = 5\ and\ |T \cap R| = 1$
(4) $|T| = 6\ and\ |T \cap R| = 1$

**11. In a three-party meet, parties A, B and C sent 5 representatives each. Everyone greeted everyone else, except none of party A greeted any of party C and vice versa. The number of greetings was**
(1) 50 (2) 60
(3) 210 (4) 225

**12. If $A$ and $B$ are $3 \times 3$ real matrices such that $rank(AB) = 1$, then $rank(BA)$ cannot be**
(1) 0 (2) 1
(3) 2 (4) 3

**13. The value of $\log_n 4^{-16}$ is −32. The value of $n$ is _____.**

**14. In the question two statements are given, followed by two conclusions, I and II. You have to consider the statements to be true even if it seems to be at variance from commonly known facts. You have to decide which of the given conclusions, if any, follows from the given statements.**
**Statement 1:** No squares are rectangles.
**Statement 2:** All rectangles are triangles.
**Conclusion I:** Some triangles are squares.
**Conclusion II:** Some triangles are rectangles.
(1) Only conclusion I follows
(2) Only conclusion II follows
(3) Both I and II follow
(4) None of these

**15. A Processor needs software interrupt to**
(1) Test the interrupt system of the processor
(2) Implement co-routines
(3) Obtain system services which need execution of privileged instructions
(4) Return from subroutine

**16. A CPU has two modes-privileged and non-privileged. In order to change the mode from privileged to non-privileged**
(1) a hardware interrupt is needed
(2) a software interrupt is needed

(3) a privileged instruction (which does not generate an interrupt) is needed
(4) a non-privileged instruction (which does not generate an interrupt) is needed

**17. Let P be a singly linked list. Let Q be the pointer to an intermediate node x in the list. What is the worst-case time complexity of the best-known algorithm to delete the node x from the list?**
(1) $O(n)$ (2) $O(log^2\ n)$
(3) $O(log\ n)$ (4) $O(1)$

**18. The following C function takes a simply-linked list as input argument. It modifies the list by moving the last element to the front of the list and returns the modified list. Some part of the code is left blank.**

```
typedef struct node {
   int value;
   struct node *next;
} Node;
Node *move_to_front(Node *head) {
    Node *p, *q;
    if ((head = = NULL: || (head->next = = NULL)) return
     head;
    q = NULL; p = head;
    while (p-> next !=NULL) {
                q=P;
                p=p->next;
}
_____________________________
return head;
}
```

**Choose the correct alternative to replace the blank line.**
(1) $q$ = NULL; $p$->next = head; head = $p$;
(2) q->next = NULL; head = $p$; p->next = head;
(3) head = p: p—> next = q: q->next = NULL:
(4) q → next = NULL; p ->next = head; head = p;

**19. The function $f(x) = |x + 1|$ on the interval $[-2, 0]$ is**
(1) continuous and differentiable
(2) continuous on the interval but not differentiable at all points
(3) neither continuous nor differentiable
(4) differentiable but not continuous

**20. $\lim_{x\to\infty} \frac{x^3-\cos\ x}{x^2+(\sin\ x)^2}$ equal**
(1) ∞ (2) 0
(3) 2 (4) does not exist

**21. The function $f(x) = x^3 - 6x^2 + 9x + 25$ has**
(1) a maxima at $x = 1$ and a minima at $x = 3$
(2) a maxima at $x = 3$ and a minima at $x = 1$
(3) no maxima, but a minima at $x = 3$
(4) a maxima at $x = 1$, but no minima

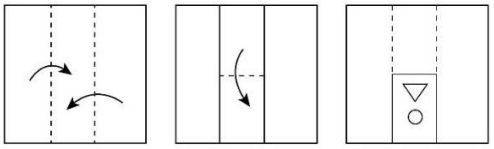
**22. If $y = |x|$ for $x < 0$ and $y = x$ for $x \geq 0$, then**
(1) $\frac{dy}{dx}$ is discontinuous at x = 0
(2) y is discontinuous at x = 0
(3) $y$ is not defined at $x = 0$
(4) both y and $\frac{dy}{dx}$ are discontinuous at x = 0

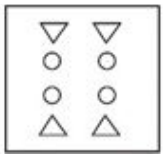
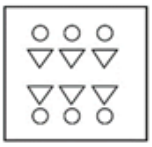
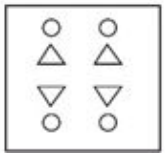
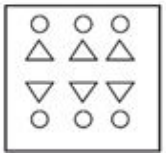
**23. Given$\sqrt{224}) = 13$),**
**The value of the radix r is:**
(1) 10 (2) 8
(3) 5 (4) 6

**24. The number 43 in 2's complement representation is**
(1) 01010101 (2) 11010101
(3) 00101011 (4) 10101011

**25. The range of integers that can be represented an n bit 2's complement number system is**
(1) $-2^{n-1}$ to $(2^{n-1} - 1)$
(2) $-(2^{n-1} - 1)$ to $(2^{n-1} - 1)$
(3) $-2^{n-1}$ to $2^{n-1}$
(4) $-(2^{n-1} + 1)t0(2^{n-1} - 1)$

**26. The sequence of folding a piece of paper and the manner in which the folded paper has been cut is shown in the following figures. How would this paper look when unfolded?**



(1)  (2) 
(3)  (4) 

**27. ACEG: SUWY :: BDFH:?**
(a) TVZX (b) RIZV
(c) TVXZ (d) RTVZ

**28. If HOSPITAL is written as 32574618 in a certain code, how would POSTAL be written in that code?**
(1) 752618 (2) 725618
(3) 725168 (4) 725681

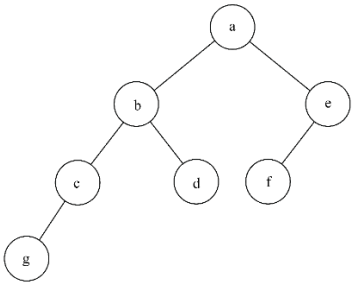
**29. Consider a set of n tasks with known runtimes $r_1$, $r_2$, .., $r_n$ to be run on a uniprocessor machine. Which of the following processor scheduling algorithms will result in the maximum throughput?**
(1) Round-Robin
(2) Shortest-Job-First
(3) Highest-Response-Ratio-Next
(4) First-Come-First-Served

**30. Which of the following scheduling algorithms is non-pre-emptive?**
(1) Round Robin
(2) First-in-First-out
(3) Multilevel Queue Scheduling
(4) Multilevel Queue Scheduling with Feedback

**31. Which of the following does not interrupt a running process?**
(1) A device (2) Timer
(3) Scheduler process (4) Power failure

**32. Let SLLdel be a function that deletes a node in a singly-linked list given a pointer Let SLLdel be a function that deletes a node in a singly-linked list given a pointer function that deletes a node in a doubly-linked list given a pointer to the node and a pointer to the head of the list. Let $n$ denote the number of nodes in each of the linked lists. Which one of the following choices is TRUE about the worst-case time complexity of SLLdel and DLLdel?**
(1) SLLdel is $O(1)$ and DLLdel is $O(n)$
(2) Both SLLdel and DLLdel are $O(\log(n))$
(3) Both SLLdel and DLLdel are $O(1)$
(4) SLLdel is $O(n)$ and DLLdel is $O(1)$

**33. Which of the following sequences denotes the post order traversal sequence of the below tree?**




(1) f e g c d b a (2) g c b d a f e
(3) g c d b f e a (4) f e d g c b a

**34. From the given alternative words, select the word which cannot be formed using the letters of the given word:**
**Given: IMPASSIONABLE**
(1) IMPASSABLE (2) IMPOSSIBLE
(3) IMPASSIVE (4) IMPASSION

**35. Let $P$ be a $4 \times 4$ matrix whose determinant is $10$. The determinant of the matrix $-3P$ is**
(1) $-810$ (2) $-30$
(3) 30 (4) 810

**36. Consider the equation $x^3 - 1 = 0$. If one of the solutions to this equation is 1, the other solution is**
(1) $\frac{1}{2} + \frac{\sqrt{3}}{2}i$ (2) $i$
(3) $-i$ (4) $-\frac{1}{2} - \frac{\sqrt{3}}{2}i$

**37. Which one number is wrong in the given series?**
**126, 98, 70, 41, 14**
(1) 98 (2) 70
(3) 126 (4) 41

**38. 975, 864, 753, 642, ?**
(1) 431 (2) 314
(3) 531 (4) 532

**39. A triangle $ABC$ consists of vertex points $A(0,0), B(1,0)$ and $C(0,1)$. The value of the integral $\iint 2x\,dxdy$ over the triangle is**
(1)1 (2) $\frac{1}{3}$
(3)$\frac{1}{8}$ (4) $\frac{1}{9}$

**40. If $\Phi(x) = \int_0^{x^2} \sqrt{t}\,dt$, then $\frac{d\Phi}{dx}$ is:**
(1) $2x^2$ (2) $\sqrt{x}$
(3) 0 (4) 1

**41. $\mathrm{Lt}_{x\to 1} \frac{(x^2-1)}{(x-1)}$ Is:**
(1) $\infty$ (2) 0
(3c) 2 (4) 1

**42. $\int_0^{\frac{\pi}{2}} \int_0^{\frac{\pi}{2}} \sin(x+y)dxdy$ is:**
(1) 0 (2) $\pi$
(3) $\frac{\pi}{2}$ (4) 2

(1) 20 (2) 22
(3) 21 (4) 18

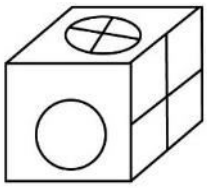
**75. The average weight of four kids is 29.6 kg. If three of the kids weigh 29.8 kg, 28.6 kg and 29.7kg respectively, the weight of the fourth kid (in kg) is**
(1) 29.3 (2) 29.6
(3) 30.3 (4) 30.6

| Answer key | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| (4) | (3) | (4) | (2) | (1) | (1) | (1) | (1) | (2) | (3) |
| **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** |
| (2) | (4) | (4) | (2) | (3) | (4) | (1) | (4) | (2) | (1) |
| **21** | **22** | **23** | **24** | **25** | **26** | **27** | **28** | **29** | **30** |
| (1) | (1) | (3) | (3) | (1) | (4) | (3) | (2) | (2) | (2) |
| **31** | **32** | **33** | **34** | **35** | **36** | **37** | **38** | **39** | **40** |
| (1) | (4) | (3) | (3) | (4) | (4) | (4) | (3) | (2) | (1) |
| **41** | **42** | **43** | **44** | **45** | **46** | **47** | **48** | **49** | **50** |
| (3) | (4) | (1) | (2) | (2) | (4) | (4) | (1) | (3) | (1) |
| **51** | **52** | **53** | **54** | **55** | **56** | **57** | **58** | **59** | **60** |
| (4) | (1) | (2) | (3) | (2) | (3) | (1) | (4) | (1) | (1) |
| **61** | **62** | **63** | **64** | **65** | **66** | **67** | **68** | **69** | **70** |
| (1) | (2) | (4) | (3) | (4) | (3) | (2) | (3) | (1) | (2) |
| **71** | **72** | **73** | **74** | **75** | | | | | |
| (1) | (2) | (4) | (3) | (3) | | | | | |

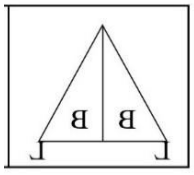
## EXPLANATION

**1. Correct Answer is: (4)**
The given figure is embedded in option (4) figure.

**2. Correct Answer is: (3):**
**Opposite faces:** not adjacent to any edge or corner.



**3. Correct Answer is: (4)**



**4. Correct Answer is: (2)**
The transition from running to ready indicates that the process in the running state can be preempted and brought back to ready state.
So, Correct option is 2.

**5. Correct Answer is: (1)**
A **spooled device** is one that uses **spooling (Simultaneous Peripheral Operation On-Line)**, which allows multiple processes to send data to the device asynchronously. Spooling is commonly used for printers, where multiple print jobs are queued in a buffer and processed sequentially.

- **Option (1) is correct** because a line printer typically processes multiple jobs by spooling them in a queue before printing.
- **Option (2) is incorrect** because a terminal provides direct input to a running program and does not use spooling.
- **Option (3) is incorrect** because secondary storage in a virtual memory system is used for paging/swapping, not spooling.
- **Option (4) is incorrect** because a graphic display device renders data in real-time rather than spooling it.

So, Correct option is 1.

**6. Correct Answer is: (1)**
System calls allow user programs to request services from the operating system (such as file operations, process management, and memory allocation). These are typically invoked using **software interrupts** because:

- When a system call is made, the CPU switches from **user mode** to **kernel mode** using a **software interrupt** (also called a **trap**).
- This allows the operating system to safely execute the requested service while maintaining security and stability.

**Why Not the Other Options?**

**(b)** **Polling** → Polling is used for checking hardware status, not for invoking system calls.
**(c)** **An indirect jump** → This is used for function calls and dynamic linking, not system calls.
**(d)** **A privileged instruction** → Privileged instructions are executed only in kernel mode but are not used to invoke system calls directly.
So, Correct option is 1.

**7. Correct Answer is: (1)**
(i) Wrong stack is used for implementation of LIFO order

(ii) true provided list is dynamic in nature, for static list both will have same performance

(iii) can be true if we implementation circular queue using 2 pointer, else no advantage

(iv) false, queue is used to support FIFO

**So, Correct option is 1.**

**8. Correct Answer is: (1)**

Implementing queue using array:

**ENQUEUE Operation:**

Check array full or not

if array is full

stop

else enter the element in the end of array;

which will take O(1) time.

**DEQUEUE Operation:**

Check array empty or not

if array is empty

stop

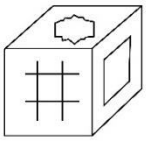
else delete the element from front of array and increment the head value (pointer to the starting element of array).

which will take O(1) time.

So for array implementation of queue, ENQUEUE and DEQUEUE operation takes O(1) time.

**So, Correct option is 1.**

**9. Correct Answer is: (2)**



**10. Correct Answer is: (3)**

We have

$P = \{2, 3, 5, 7, 11, 13\}$

$Q = \{2, 4, 6, 8, 10, 12, 14\}$

$R = \{3, 6, 9, 12, 15\}$

$T = \{3, 5, 7, 11, 13\}$

$T \cup R = \{3, 5, 6, 7, 9, 11, 12, 13, 15\}$

$T \cap R = \{3\}$

$\therefore |T| = 5, |T \cup R| = 9, |T \cap R| = 1$

**11. Correct Answer is: (2)**

Given three parties: A, B, and C.

Each party has 5 representatives.

Everyone greeted everyone else, except that party A did not greet party C and vice versa.

If there were no restrictions, the total number of greetings among all 15 people would be:

Total greetings $= \binom{15}{2} = \frac{15 \times 14}{2} = 105$

Party A has 5 members, and party C has 5 members.

Greetings among all 10 people $= \binom{10}{2} = \frac{10 \times 9}{2} = 45$

Total valid greetings $= 105 - 45 = 60$

**12. Correct Answer is: (4)**

$AB$ is a $3 \times 3$ matrix such that

$rank(AB) = 1 \neq 3.$

$\therefore \det(AB) = 0$

$\Rightarrow \det(BA) = 0$

$\Rightarrow rank(BA) \neq 3.$

**13. Correct Answer is: (4)**

$\log_n 4^{-16} = -32$

$\therefore -16 \log_n 4 = -32$

$\therefore \log_n 4 = 2$

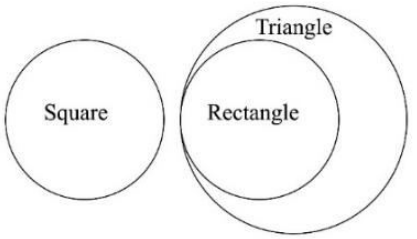
$\therefore 4 = n^2$

$\therefore n = 2$ or -2

But base of logarithm cannot be negative

$\therefore n = 2$

**14. Correct Answer is: (2)**




**Checking the Conclusions:**

1. **Conclusion I: Some triangles are squares.**

- We know that **no squares are rectangles**, and **rectangles are triangles**, but **nothing is mentioned about squares being triangles**.
- There is **no connection between squares and triangles**, so **Conclusion I does not follow**.

2. **Conclusion II: Some triangles are rectangles.**

- From **Statement 2**, all rectangles are part of the triangles.
- This directly supports **Conclusion II**.

**Final Answer:**

Since **only Conclusion II follows**, the correct answer is:

**(2) Only conclusion II follows.**

**15. Correct Answer is: (3)**

To execute privileged instructions, system services can be obtained using software interrupt.

**16. Correct Answer is: (4)**

Because we want to change the mode from privileged

to non-privileged, to the next instruction to be executed should be non- privileged instruction.

**17. Correct Answer is: (1)**

To delete node $x$, we should findout the previous node to the $x$. To find the previous nodes to the $x$ will take $O(n)$.

Therefore it takes $O(n)$.

**18. Correct Answer is: (4)**

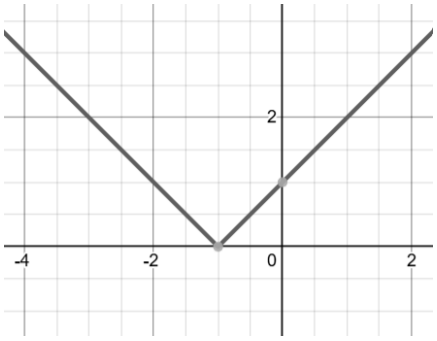
As per given code p points to last node which should be head in modified.

q is the previous node of tail which should be tail for modified

So, Correct option is 4.

**19. Correct Answer is: (2)**

The graph of function looks like this:




It is clear from the graph that function is continuous at all points.

The graph has corner point at $x = -1$, so function is not differentiable there. It is differentiable at all points except $x = -1$.

**20. Correct Answer is: (1)**

As $x \to \infty$, $x^3 - \cos x \approx x^3$ and $x^2 + (\sin x)^2 \approx x^2$

$\therefore \lim_{x\to\infty} \frac{x^3-\cos x}{x^2+(\sin x)^2} = \lim_{x\to\infty} \frac{x^3}{x^2} = \lim_{x\to\infty} x = \infty$

**21. Correct Answer is: (1)**

$f'(x) = 3x^2 - 12x + 9$

To find the critical points, set $f'(x) = 0$:

$3x^2 - 12x + 9 = 0$

$(x-1)(x-3) = 0$

Thus, the critical points are $x = 1$ and $x = 3$.

- At $x = 1$:

$$f''(1) = 6(1) - 12 = -6$$

Since $f''(1) < 0$, there is a **local maximum** at $x = 1$.

- At $x = 3$:

$$f''(3) = 6(3) - 12 = 6$$

Since $f''(3) > 0$, there is a **local minimum** at $x = 3$.

**22. Correct Answer is: (1)**

Note carefully that we actually have $y = |x|, x \in \mathbb{R}$.

So, y is continuous at $x = 0$ but $y$ is not differentiable at $x = 0$.

So, $\frac{dy}{dx}$ is not defined at $x = 0$ and hence discontinuous at $x = 0$.

**23. Correct Answer is: (3)**

$(\sqrt{224})_r = (13)_r$

Converting r base to decimal

$\sqrt{2 \times r^2 + 2 \times r^1 + 4 \times r^0} = 1 \times r + 3$

$Take\ square\ on\ both\ sides$

$2r^2 + 2r + 4 = r^2 + 6r + 9$

$\Rightarrow r^2 - 4r - 5 = 0$

$\Rightarrow r^2 - 5r + r - 5 = 0$

$\Rightarrow (r-5)(r+1) = 0$

So, r=5 and r=-1

Base cannot be negative so, Correct answer is 3.

**24. Correct Answer is: (3)**

2's complement representation is not same as 2's complement of a number. In 2's complement representation positive integers are represented in its normal binary form while negative numbers are represented in its 2's complement form.

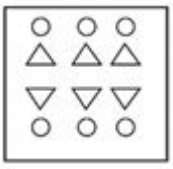
43 = 32 + 8 + 2 + 1 = (00101011)

**So, Correct option is 3.**

**25. Correct Answer is: (1)**

The range is $-2^{n-1}$ to $(2^{n-1} - 1)$ including 0.

**26. Correct Answer is: (4)**



**27. Correct Answer is: (3)**

Identifying the Pattern in "ACEG: SUWY"

- A → S (Shift forward by 18)
- C → U (Shift forward by 18)
- E → W (Shift forward by 18)
- G → Y (Shift forward by 18)

Thus, the pattern follows a shift of $+18$ positions in the alphabet.

Applying the Same Pattern to "BDFH"

- B → T (Shift forward by 18)
- D → V (Shift forward by 18)

- F → X (Shift forward by 18)
- H → Z (Shift forward by 18)

Thus, "BDFH" maps to TVXZ.

From the given options, TVXZ corresponds to option: (3)"TVXZ")

**28. Correct Answer is: (2)**

Let's analyze how the word HOSPITAL is coded as 32574618 by mapping each letter to its corresponding number.

From HOSPITAL → 32574618, we match the positions:

| Letter | H | O | S | P | I | T | A | L |
|---|---|---|---|---|---|---|---|---|
| Code | 3 | 2 | 5 | 7 | 4 | 6 | 1 | 8 |

Now, find the numbers for P, O, S, T, A, L using the mapping above:

So, POSTAL → 725618.

Final Answer: (2) 725618

**29. Correct Answer is: (2)**

SJF executes shortest job very early so throughput increases in the case of SJF.

**30. Correct Answer is: (2)**

FCFS is non pre-emptive algorithm.

**31. Correct Answer is: (1)**

Device can not interrupt a running process but timer, scheduler and power failure can interrupt a running process.

**32. Correct Answer is: (4)**

**1. Deleting a Node in a Singly-Linked List (SLLdel):**

- In a singly-linked list, there is no direct link to the previous node.
- To delete a given node, we need to find its predecessor (if not already provided), which requires traversing the list from the head.
- In the **worst case**, this takes **O(n)** time, where n is the number of nodes in the list.

**2. Deleting a Node in a Doubly-Linked List (DLLdel):**

- In a doubly-linked list, each node has pointers to both its previous and next nodes.
- With the given pointer to the node and the head of the list:
  - We do not need to traverse the list to find the predecessor.
  - The deletion can be performed in **O(1)** time by updating the pointers of the adjacent nodes.

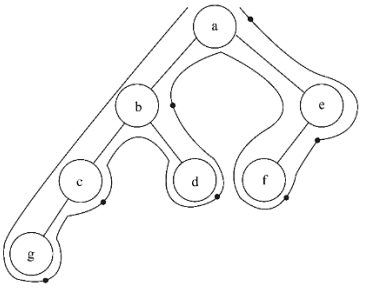
**Evaluating the Options:**

- **Option A:** SLLdel is **O(1)** and DLLdel is **O(n)** — **Incorrect**, as SLLdel is **O(n)**.
- **Option B:** Both are **O(log(n))** — **Incorrect**, as linked list operations are not logarithmic.
- **Option C:** Both are **O(1)** — **Incorrect**, as SLLdel is not constant time.
- **Option D:** SLLdel is **O(n)** and DLLdel is **O(1)** — **Correct**, as explained above.

**Correct Answer is 4.**

**33. Correct Answer is: (3)**

Post order traversal sequence => Left-Right-Root




g c d b f e a is the post order traversal sequence.

So, Correct option is 3.

**34. Correct Answer is: (3)**

To determine which word cannot be formed using the letters of IMPASSIONABLE, let's analyze each option and check if all its letters exist in the given word.

1. IMPASSABLE
   Letters: I, M, P, A, S, S, A, B, L, E
   All these letters are present in IMPASSIONABLE
2. IMPOSSIBLE
   Letters: I, M, P, O, S, S, I, B, L, E
   All these letters are present in IMPASSIONABLE
3. IMPASSIVE
   Letters: I, M, P, A, S, S, I, V, E
   The letter V is not present in IMPASSIONABLE
4. IMPASSION
   Letters: I, M, P, A, S, S, I, O, N
   All these letters are present in IMPASSIONABLE

The word that cannot be formed is IMPASSIVE (option C) because the letter V is missing in IMPASSIONABLE.

**35. Correct Answer is: (4)**

$\det(-3P) = (-3)^4 \det P = 81 \times 10 = 810.$

**36. Correct Answer is: (4)**

$x^3 - 1 = 0$

$x^3 - 1^3 = (x-1)(x^2 + x + 1) = 0$

$\therefore x^2 + x + 1 = 0$