15.STOICHIOMETRY
MOLE CONCEPT
SOLUTIONS
TEACHING TASK
JEE MAIN LEVEL QUESTIONS

1. Which of the following is a hexa-atomic molecule

   1) Phosphorus 2) Sulphur 3) Ethane 4) Methane

Answer:None

Solution:Phosphorus (P): Exists as tetra-atomic molecules (P_4).

Sulphur (S): Exists as octa-atomic molecules (S_8).

Ethane (C_2H_6): Has a total of eight atoms (two carbon and six hydrogen).

Methane (CH_4): Has a total of five atoms (one carbon and four hydrogen).

2. The no. of electrons present in one mole of Azide ion are $\left(N_3^-\right)$

   1) 21N 2) 20N 3) 22N 4) 43N

Answer:3

Solution:N_3^- ion:

Each N atom has 7 electrons $\rightarrow$ 3N atoms = 21 electrons.

Extra 1 electron due to -1 charge $\rightarrow$Total = 22 electrons per ion.

For 1 mole (N ions), total electrons = 22 × N = 22N.

3. The number of neutrons in one mole of hydrogen is

   1) N 2) 0.5N 3) 0 4) 2N

Answer:3

Solution:Hydrogen (^1H) has no neutrons (only 1 proton).

1 mole of H atoms = N atoms × 0 neutrons = 0 neutrons.

4. The total number of atoms of all elements present in 1 mole of ammonium dichromate is

   1) 14 2) 19 3) 6×10^{29} 4) 114×10^{23}

Answer:2

Solution:Formula unit: $(NH_4)_2Cr_2O_7$ $\rightarrow$ 2N + 8H + 2Cr + 7O = 19 atoms.

1 mole contains 19 × N atoms.

5. How many moles of Barium carbonate will contain 1.5 moles of oxygen atoms

   1) 1 mole 2) 0.5 mole 3) 0.25 mole 4) 0.4 mole

Answer:2

Solution:$BaCO_3$ has 3 oxygen atoms per mole.

To get 1.5 moles of O, divide by 3:Moles of $BaCO_3 = \frac{1.5}{3} = 0.5mole$

6. Total number of species present in 1 mole of potash alum in terms of avagadro

number, 'N' are

1) 3N 2) 5N 3) 8N 4) 32N

Answer:4

Solution: The chemical formula of potash alum is $K_2SO_4.Al_2(SO_4)_3.24H_2O$

Avogadro's number is represented by N.

Count the total number of species

Total K^+ ions:2

Total Al^{3+} ions:2

Total SO_4^{2-} ions:3

Total H_2O molecules: 24

Total species:2+2+3+24=32

Total species in 1 mole: 32N

7. Which of the following contain 9 X 10^{23} oxygen atoms ?

1) 0.25 moles of glucose 2) 0.5 moles of ethyl alcohol

3) 1.0 mole of dimethyl ether 4) 0.01 moles of sucrose

Answer:1

Solution:0.25 moles glucose ($C_6H_{12}O_6$) $\rightarrow$ 1.5N O atoms

0.5 moles ethanol (C_2H_5OH) $\rightarrow$ 0.5N O atoms

1.0 mole dimethyl ether (CH_3OCH_3) $\rightarrow$ 1N O atoms

0.01 moles sucrose ($C_{12}H_{22}O_{11}$) $\rightarrow$ 0.11N O atoms

1) 0.25 moles glucose gives 9.03×10^{23} O atoms).

8. How many atoms are contained in one mole of sucrose ($C_{12}H_{22}O_{11}$)?

1) $45 \times 6.02 \times 10^{23}$ atoms/mole 2) $5 \times 6.62 \times 10^{23}$ atoms/mole

3) $5 \times 6.02 \times 10^{23}$ atoms/mole 4) None of these

Answer:1

Solution:Understand the Formula of Sucrose ($C_{12}H_{22}O_{11}$):

Carbon (C): 12 atoms

Hydrogen (H): 22 atoms

Oxygen (O): 11 atoms

Total atoms per molecule:12(C)+22(H)+11(O)=45atoms.

1 mole of any substance contains Avogadro's number (N) of molecules, where $N=6.022\times10^{23}$

For sucrose:Total atoms=45atoms/molecule$\times6.022\times10^{23}$molecules/mole.

Total atoms=$45\times6.022\times10^{23}$atoms/mole.

9. A sample of phosphorus trichloride (PCl_3) contains 1.4 moles of the substance. How many atoms are there in the sample?

1) 4 2) 5.6 3) 8.431×10^{23} 4) 3.372×10^{24}

Answer:4

Solution:Understand the Molecular Structure of PCl_3:

Phosphorus trichloride (PCl_3) consists of:1 phosphorus (P) atom,3 chlorine (Cl) atoms

Total atoms per molecule of PCl_3:1(P)+3(Cl)=4atoms.

Calculate Total Atoms in 1.4 Moles of PCl3:

1 mole of PCl_3 contains Avogadro's number (N) of molecules, where $N=6.022\times10^{23}$

Atoms per mole of PCl3:

$4\text{atoms/molecule}\times6.022\times10^{23}\text{molecules/mole}=2.4088\times10^{24}$ atoms/mole.

For 1.4 moles:$1.4\text{moles}\times2.4088\times10^{24}$ atoms/mole$=3.372\times10^{24}$atoms.

10. The number of electrons in a mole of hydrogen molecule is

1) 6.02×10^{23} 2) 12.046×10^{23} 3) 3.0115×10^{23} 4) Indefinite

Answer:2

Solution:Understand the Hydrogen Molecule (H_2):

Each hydrogen atom (H) has 1 electron.

A hydrogen molecule (H_2) consists of 2 hydrogen atoms, so it has:2electrons per H_2 molecule.

Calculate Electrons in 1 Mole of H2:

1 mole of any substance contains Avogadro's number (N) of molecules, where $N=6.022\times10^{23}$

For H_2:Total electrons$=2\text{electrons/molecule}\times6.022\times10^{23}\text{molecules/mole}$.

Total electrons$=12.044\times10^{23}$

11. How many years it would take to spend Avogadro's number of rupees at the rate of 10 lac rupees per second?

1) 1.9090×10^{15} year 2) 1.9099×10^{10} year

3) 1.9800×10^{5} year 4) 1.978×10^{20} year

Answer:2

Solution:Given Data:

Avogadro's number (N)$=6.022\times10^{23}$ rupees.

Spending rate = 10^{6}rupees/second.

$$\text{Time (seconds)}=\frac{Total rupees}{Rate}=\frac{6.023\times10^{23}}{10^{6}}=6.023\times10^{17}\,Seconds$$

Convert Seconds to Years:

1 year = 60×60×24×365 seconds $=3.154\times10^{7}$seconds

$$\text{Time (years)}=\frac{6.022\times10^{17}}{3.154\times10^{7}}\approx1.909\times10^{10}\,years$$

12) Maximum number of atoms are present in

1) 11.2 lit. of SO_2 at STP 2) 22.4 lit. of Helium at STP

3) 22.4 lit of hydrogen 4) 11.2 litres of methane at STP

Answer:4

Solution:At STP (Standard Temperature and Pressure):

1 mole of any gas occupies 22.4 L.

Number of atoms = Number of molecules × atoms per molecule.

Option 1: 11.2 L of SO_2

Moles of SO_2 = 11.2/22.4=0.5 mole.

SO_2 molecule: 1 S + 2 O = 3 atoms/molecule.

Total atoms = $0.5\times6.022\times10^{23}\times3=9.033\times10^{23}$.

Option 2: 22.4 L of He

Moles of He = 22.4/22.4=1 mole.

He is monatomic: 1 atom/molecule.

Total atoms = $1\times6.022\times10^{23}\times1=6.022\times10^{23}$

Option 3: 22.4 L of H2

Moles of H_2 = 1 mole.

H_2 molecule: 2 atoms/molecule.

Total atoms = $1\times6.022\times10^{23}\times2=12.044\times10^{23}$

Option 4: 11.2 L of CH4

Moles of CH_4 = 0.5 mole.

CH_4 molecule: 1 C + 4 H = 5 atoms/molecule.

Total atoms = $0.5\times6.022\times10^{23}\times5=15.055\times10^{23}$

Option 4 (11.2 L of CH_4) has the maximum number of atoms.

ADVANCED LEVEL QUESTIONS

MULTIPLE CORRECT ANSWER TYPE

11. Which of the following contains same number of atoms

1) 1 mole of H_2 2) 2mole of CO_2 3) 2 mole of He 4) 0.5 mole of O_3

Answer:1,3

Solution:1) 1 mole of H_2=2 atoms

Total Atoms=2(N)=2N

2) 2mole of CO_2=1+2=3 Atoms

Total atoms=3x2xN=6N

3) 2 mole of He=2(1)=2 atom

Total atoms =2xN=2N

4) 0.5 mole of O_3=0.5x3=1.5atoms

Total atoms=1.5N

Option 1 (1 mole of H_2) and Option 3 (2 mole of He) both contain 2N atoms.

12. The gas having same number of molecules as 0.5 mole of oxygen is

1) 0.5 moles of O_3 2) 0.5 moles of SO_3 3) 0.5 mole of SO_2 4) 0.5 mole of hydrogen

Answer:1,2,3,4

Solution:Avogadro's Law: Equal volumes of gases at the same temperature and pressure contain equal numbers of molecules.

Moles $\rightarrow$ Molecules: Depends only on the number of moles, not the gas identity.

STATEMENT TYPE

1. A and R are correct R is the correct explanation of A
2. A and R are correct R is not the correct explanation of A
3. A is correct, but R is wrong
4. A is wrong, but R is correct

13. Assertion (A): Mole is equal to 6.022×10^{23} particles.
Reason (R): 6.022×10^{23} particles is known as avagadro number

Answer:1

Solution:Assertion :True — By definition, 1 mole of any substance contains 6.022×10^{23} entities (atoms, molecules, ions, etc.)

Reason :True — This is the definition of Avogadro's number.

COMPREHENSION TYPE

14. The numbers of atoms present in 0.166 mooles of ozone is

1) N_A 2) $3N_A$ 3) $\frac{N_A}{6}$ 4) $\frac{N_A}{2}$

Answer:4

Solution:We are given:Amount of ozone (O_3) = 0.166 moles

We need to find the number of atoms, not molecules.

Let N_A = Avogadro's number = 6.022×10^{23}

1 molecule of ozone (O3) contains 3 atoms of oxygen.

So,1 mole of O_3 molecules contains:1 mole$\times 3 \times N_A = 3N_A$ atoms.

Therefore,"0.166 moles of O_3 contains:$0.166 \times 3N_A = 0.498N_A = N_A/2$

15. Which of the following is a reasonable value for the numbers of atoms in 0.25 moles of helium ?

1) 0.25 2) 4.0 3) 4.1×10^{-23} 4) 1.5×10^{23}

Answer:4

Solution:Number of atoms = Number of moles × Avogadro's number (N).

Avogadro's number (N) $= 6.022 \times 10^{23}$ atoms/mole.

Helium (He) is a monatomic gas (1 atom per molecule).

Calculation:

Number of atoms=0.25moles×6.022×10 ^{23}atoms/mole=1.5055×10 ^{23}atoms.

INTEGER TYPE

16. The number of oxygen atoms present in 0.25 moles of calcium carbonate

Answer:4.5165×10^{23}

Solution:Formula of Calcium Carbonate: $CaCO_3$

Contains 3 oxygen atoms per molecule.

Total Oxygen Atoms:

Number of atoms=Moles×Avogadro's number×Atoms per molecule

=0.25moles×6.022×10 ^{23}×3=4.5165×10^{23} oxygen atoms

17. 1 mole of Sulphuric acid contains _____ moles of hydrogen atoms

Answer:2

Solution:Formula of Sulphuric Acid: H_2SO_4

Contains 2 hydrogen atoms per molecule.

Moles of Hydrogen Atoms:

1mole H_2SO_4×2H atoms/molecule=2moles of H atoms.

MATRIX MATCHING TYPE

18.**Answer:1-C,2-A,3-D,4-B**

Column-I (For 1 mole)	**Column-II**
1) Nitric oxide	C) 1.204×10^{24} atoms
2) Hydronium ion	A) 2.408×10^{24} atoms
3) Silver ions	D) 2.770×10^{25} electrons
4) Glucose	B) 1.445×10^{25} atoms

Solution:1) Nitric oxide (NO)

Formula: NO $\rightarrow$ 1 N + 1 O = 2 atoms/molecule.

Total atoms in 1 mole:2×6.022×10 ^{23}=1.204×10 ^{24}atoms.

2) Hydronium ion (H_3O^+)

Formula: $H_3O^+ \rightarrow$ 3 H + 1 O = 4 atoms/ion.

Total atoms in 1 mole:4×6.022×10 ^{23} =2.408×10 ^{24} atoms.

3) Ag^+ has 46 electrons (Ag atomic number = 47, minus 1 lost electron).

Total electrons:46×6.022×10 ^{23}=2.770×10 ^{25}electrons.

Glucose ($C_6H_{12}O_6$)

Formula: $C_6H_{12}O_6 \rightarrow$6 C + 12 H + 6 O = 24 atoms/molecule.

Total atoms in 1 mole:24×6.022×10^{23}=1.445×10^{25}atoms

LEARNER'S TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

1. Atomicity is the number of

1) Protons present in the atom 2) Neutrons present in the atom

3) Atoms present in the molecule 4) Atoms present in 1 gram mole of a substance

Answer:3

Solution:Atomicity refers to the number of atoms in one molecule of a substance (e.g., $O_2 \rightarrow$ atomicity = 2).

2. Which of the following is the smallest particle of matter that exist independently?

A) Atom B) Molecule C) element D) compound

Answer:B

Solution:Molecules (e.g., O_2, H_2O) can exist independently, while atoms (e.g., He, Ne) may or may not.

3. Which of the following is correct match

1) Atomic hydrogen - 6.022×10^{23} atoms 2) Zinc vapour - 6.022×10^{23} atoms

3) Ammonia - 6.023×10^{23} molecules 4) All the above

Answer:4

Solution:1 mole of any substance contains Avogadro's number (6.022×10^{23}) of particles:

Atomic hydrogen (H): 6.022×10^{23} atoms.

Zinc vapour (Zn): 6.022×10^{23} atoms.

Ammonia (NH_3): 6.022×10^{23} molecules.

4. Which of the following is the correct formula to calculate number of moles

1) No. of moles = $\frac{\text{Number of particles}}{6.023 \times 10^{23}}$

2) No. of moles = 6.023×10^{23} / Number of particles

3) Both A & B 4) None

Answer:1

Solution: No. of moles = $\frac{\text{Number of particles}}{6.023 \times 10^{23}}$

5. Number of atoms present is one mole of Hydrogen gas

1) 1 mole 2) 2 moles 3) 3 moles 4) 4 moles

Answer:2

Solution:H_2 has 2 atoms/molecule $\rightarrow$ 1 mole H_2 = $2 \times 6.022 \times 10^{23}$ atoms = 2 moles of atoms.

6. Number of electrons present in 1 mole of sodium ion

1) 10 moles 2) 11 moles 3) 12 moles 4) 9 moles

Answer:1

Solution:Na (atomic number 11) loses 1 electron to form $Na^+ \rightarrow 10$ electrons/ion.
1 mole $Na^+ = 10 \times 6.022 \times 10^{23}$ electrons = 10 moles of electrons.

7. Number of atoms present in 2 moles of Hydrogen sulphide

1) 12.046×10^{23} 2) 18.069×10^{23} 3) 6.023×10^{23} 4) 3.0115×10^{23}

Answer:2

Solution:H_2S has 3 atoms/molecule $\rightarrow$ 2 moles $H_2S = 2 \times 3 \times 6.022 \times 10^{23} == 3.613 \times 10^{2}4$ atoms.

Closest option: 18.069×10^{23} (typo; likely meant $3.613 \times 10^{2}4$).

8. Number of moles of sub atomic particles present in 1 mole of Hydrogen atoms

1) 0 2) 1 3) 2 4) 4

Answer:3

Solution:Hydrogen atom (^1H): 1 proton + 1 electron = 2 subatomic particles/atom.
1 mole H = $2 \times 6.022 \times 10^{23}$ particles = 2 moles of subatomic particles.

9. The number of revolving sub atomic particles in 1 mole of helium is

1) 0 2) 2 3) 1 4) 4

Answer:2

Solution:Helium (He): 2 electrons/atom (revolving) + 2 protons/neutrons (non-revolving).
1 mole He = $2 \times 6.022 \times 10^{23}$ electrons = 2 moles of revolving particles.

10. if 10^{23} molecules are removed from 1 mole of NO_2 the number of molecules remaining are

1) 6.023 2) 5.023 3) 5.023×10^1 4) 5.023×10^{23}

Answer:4

Solution:1 mole $NO_2 = 6.022 \times 10^{23}$ molecules.
Remaining molecules = $6.022 \times 10^{23} - 1 \times 10^{23} = 5.022 \times 10^{23}$.

JEE MAIN LEVEL QUESTIONS

11. One mole of CO_2 contains

a) 6.02×10^{23} atoms of C b) 6.02×10^{23} atoms of O

c) 18.1×10^{23} molecules of CO_2 d) 3 gram of carbon.

Answer:A

Solution:Understand 1 Mole of CO_2

Avogadro's number (N)=6.022×10^{23} entities/mole.
1 mole of CO_2 contains:6.022×10^{23} molecules of CO_2

1 atom of C and 2 atoms of O per molecule.

12. Which of the following contains maximum number of atoms ?

a) 2.0 mole of S_8. b) 6.0 mole of S

c) 5.5 mole of SO_2. d) 4 moles of CO

Answer:C

Solution:a) S8: 8 atoms/molecule $\rightarrow 2 \times 8 \times 6.022 \times 10^{23} = 9.635 \times 10^{24}$ atoms.

b) S: 1 atom/molecule $\rightarrow 6 \times 6.022 \times 10^{23} = 3.613 \times 10^{24}$ atoms.

c) SO2: 3 atoms/molecule $\rightarrow 5.5 \times 3 \times 6.022 \times 10^{23} = 9.936 \times 10^{24}$ atoms.

d) CO: 2 atoms/molecule $\rightarrow 4 \times 2 \times 6.022 \times 10^{23} = 4.818 \times 10^{24}$ atoms.

13. 1 mole of ${}^{14}_{7}N^{-3}$ ions contains

1) $7 \times 6.023 \times 10^{23}$ electrons 2) $7 \times 6.023 \times 10^{23}$ protons

3) $7 \times 6.023 \times 10^{23}$ neutrons 4) $14 \times 6.023 \times 10^{23}$ protons

Answer:2,3

Solution:Atomic number (Z) = 7 $\rightarrow$7 protons

Mass number (A) = 14

Neutrons = 14 – 7 = 7 neutrons

Charge = 3- $\rightarrow$ means 3 extra electrons than protons

So, electrons = 7 + 3 = 10 electrons

Avogadro's number $N_A = 6.022 \times 10^{23}$

Number of:Electrons = $10N_A$

Protons = $7N_A$

Neutrons = $7N_A$

14. One mole of sodium represents

1) 6.02×10^{23} atoms of sodium 2) 6.02×10^{23} molecules of sodium

3) Both A & B 4) None

Answer:1

Solution:1 mole of any substance, be it atoms/molecules /ions or even sub-atomic particles like

electrons, protons or neutrons, they all contain Avogadro Number 6.02×10^{23}particles.

So, 1 mole of sodium = 6.02×10^{23} atoms of sodium

or, 1 mole of sodium =23 g ,which is its atomic mass per mole.

15. The charge present on 1 mole electrons is

1) 96500 Coulombs 2) Coulomb 3) 1.60×10^{-19} C 4) 0.1 Faraday

Answer:1

Solution:1 mole of electrons = 1 Faraday =96,500 C.

16) Which of the follwing contians less number of molecules

1) 0.25 moles of CO_2 2) 0.5 mole of SO_2

3) 1 mole of hydrogen 4) 1 mole of helium

Answer:1

Solution:1Molecules = moles × Avogadro's number (N).

0.25 mol CO_2 = 0.25N.

Others: 0.5N (SO_2), 1N (H_2/He).

17) Maximum number of electrons are present in

1) 1 mole of SO_2 2) 0.2 moles of NH_3

3) 1.5 moles of oxygen 4) 2 mole atoms of of sulphur

Answer:1,4

Solution:SO_2: 32 e^-(16 per S + 8 per O × 2) $\rightarrow$1 × 32 × N = 32N.

NH_3: 10 e^- $\rightarrow$ 0.2 × 10 × N = 2N.

O_2: 16 e^- $\rightarrow$ 1.5 × 16 × N = 24N.

S (atomic): 16 e^- $\rightarrow$ 2 × 16 × N = 32N.

18) Atomicity of oleum $(H_2S_2O_7)$is

1) 11 2) 8 3) 7 4) 18

Answer:1

Solution:Atomicity of oleum $(H_2S_2O_7)$=2 H + 2 S + 7 O = 11 atoms.

19) The number of moles present in 1.505 x 10^{23} molecules of H_2SO_4 is

1) 2.5 2) 0.5 3) 4 4) 0.25

Answer:4

Solution:Moles= $\frac{1.505\times10^{23}}{6.023\times10^{23}}$ =0.25.

20) The number of carbon atoms present in 0.1 moles of carbon monoxide are

1) 3.01 × 10^{23} 2) 3.01 × 0^{22} 3) 6.02 × 10^{23} 4) 6.02 x 10^{22}

Answer:4

Solution:CO: 1 C/molecule $\rightarrow$ 0.1 × 6.022 × 10^{23} = 6.022 × 10^{22} atoms.

ADVANCED LEVEL QUESTIONS

MULTIPLE CORRECT ANSWER TYPE

21) A pair of gasses having same number of atoms are

1) 1 mole of H_2 2) 2 moles of He 3) 0.25 moles of CO_2 4) 1 mole of N_2

Answer:1,2,4

Solution:Calculate Total Atoms for Each Option:

Avogadro's number (N) = 6.022×10^{23}entities/mole.

Option 1: 1 mole of H_2

H_2 is diatomic (2 atoms/molecule).

Total atoms = $1\times2\times N=2N$.

Option 2: 2 moles of He

He is monatomic (1 atom/molecule).

Total atoms = $2\times1\times N=2N$.

Option 3: 0.25 moles of CO_2

CO_2 has 3 atoms/molecule (1 C + 2 O).

Total atoms = $0.25\times3\times N=0.75N$.

STATEMENT TYPE

22. Assertion (A): 1 mole of magnesium ion contains 12 moles of protons
Reason (R): Mole is equal to 6.022×10^{23} particles.

Answer:2

Solution:Evaluate Assertion (A):

Magnesium ion (Mg^{2+}):

Atomic number of Mg = 12 $\rightarrow$ 12 protons per ion.

1 mole of Mg^{2+} = $12\times6.022\times10^{23}$ protons = 12 moles of protons.

Conclusion: Assertion (A) is correct.

Evaluate Reason (R):

Definition of mole:

1 mole = 6.022×10^{23}particles (Avogadro's number).

Conclusion: Reason (R) is correct.

INTEGER TYPE

23. The number of moles of elctrons in 2 moles of Aluminium ions is _____

Answer:20

Solution:Atomic number of Al = 13 $\rightarrow$ Neutral Al has 13 electrons.

Al^{3+} loses 3 electrons $\rightarrow$10 electrons per ion.

Total Electrons in 2 Moles of Al^{3+}:

Electrons=2moles $Al^{3+}\times10$ electrons/ion=20moles of electrons

24. 1 mole of protons charge in faraday is _____

Answer:1

Solution:Charge of 1 Proton:

Proton charge = $+1.602\times10^{-19}$C.

Charge of 1 Mole of Protons:

1mole protons$\times1.602\times10^{-19}$C/proton$\times6.022\times10^{23}$protons/ mole=96,485C=1Faraday (F).

MATRIX MATCHING TYPE

25)Answer:A-4,B-3,C-2,D-1

List - I (No. of moles of compound)	**List - II** (No. of moles of the oxygen atoms)
A) 1.5 Moles of $BaCO_3$	4) 4.5
B) 2 moles of H_2SO_4	3) 8
C) 2.5 moles of $ZnCO_3$	2) 7.5
D) 0.5 mole of glucose	1) 3

Solution:

A) 1.5 Moles of $BaCO_3$

Total moles of O: $1.5\times3=4.5$

B) 2 moles of H_2SO_4

Total moles of O: $2\times4=8$

C) 2.5 moles of $ZnCO_3$

Total moles of O: 2.5×3=7.5

D) 0.5 mole of glucose($C_6H_{12}O_6$)

Total moles of O: 0.5×6=3

KEY

				TEACHING TASK					
				JEE MAIN LEVEL QUESTIONS					
1	2	3	4	5	6	7	8	9	10
none	3	3	2	2	4	1	1	4	2
11	12								
2	4								
				ADVANCED LEVEL QUESTIONS					
11	12	13	14	15	16	17	18		
1,3	1,2,3,4	1	4	4	4.5165×10	2	1-C,2-A,3-D,4-B		
				LEARNER'S TASK					
				CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)					
1	2	3	4	5	6	7	8	9	10
3	B	4	1	2	1	2	3	2	4
				JEE MAIN LEVEL QUESTIONS					
11	12	13	14	15	16	17	18	19	20
A	C	2,3	1	1	1	1,4	1	4	4
				ADVANCED LEVEL QUESTIONS					
21	22	23	24	25					
1,2,4	2	20	1	A-4,B-3,C-2,D-1					

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