

Roll No.....

Total No. of Questions : 4]

[Total No. of Printed Pages : 13

11thARNKD(W/Z) JKLUT-2025

1209-C

CHEMISTRY

Time : 3 Hours]

[Maximum Marks : 70

Note:- “Attempt any 60 Marks out of 70 Marks”.

General Instructions:

1. There are total of four sections in the question paper. All questions are compulsory.

Section-A contains 10 Objective Type Questions/Multiple Choice Questions of 1 mark each. 1×10=10

Section-B contains 9 Very Short Answer Type Questions of 2 marks each to be answered in 20-30 words. 2×9=18

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Turn Over

Section-C contains 9 Short Answer Type Questions of 3 marks each to be answered in 100-150 words. $3 \times 9 = 27$

Section-D contains 3 Long Answer Type Questions of 5 marks each to be answered in 150-200 words. $5 \times 3 = 15$

2. Use log tables, if necessary, use of scientific calculator is not allowed.

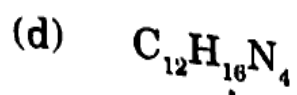
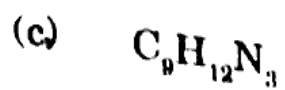
SECTION-A

(Multiple Choice Questions)

(1 mark each)

1. Select the correct one:
- (i) A compound with empirical formula C_3H_4N has molecular mass 108 amu, the molecular formula is:
- (a) C_3H_4N

[3]



(ii) The number of radial nodes in 3S orbital are:

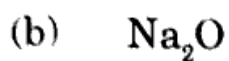
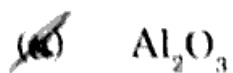
~~(a)~~ 2

(b) 0

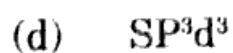
(c) 1

(d) 3

(iii) Which one of the following is most acidic?



(iv) The hybridization of IF_7 is:



[5]

(v) Which of the following is an intensive property?

(a) Volume

(b) Temperature

(c) Mass

☒ (d) Internal energy

(vi) The hydronium ion concentration i.e $[H_3O^+]$ of a solution is 2×10^{-5} M, its pH is:

2×10^{-5}

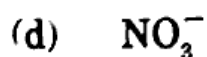
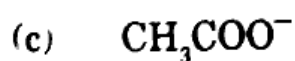
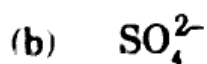
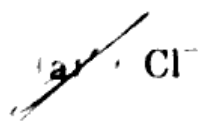
(a) 5

(b) 7

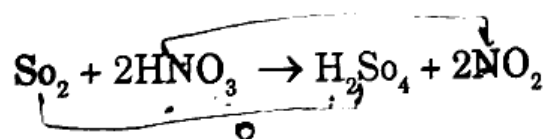
☒ (c) 4.7

(d) 3

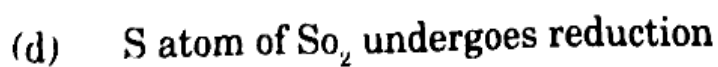
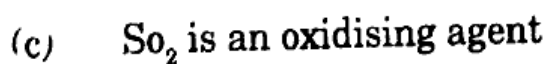
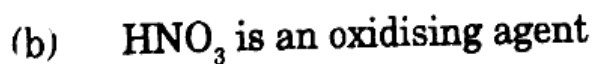
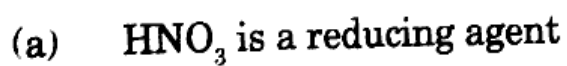
(vii) Which of the following is a strongest conjugate base?



(viii) In the following chemical reaction



Which of the following is correct?



(ix) The oxidation state of carbon in CO_3^{2-} is :

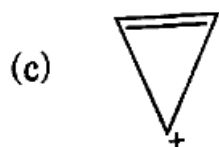
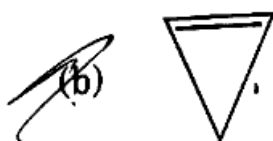
~~(a)~~ -2

(b) +2

(c) -4

(d) +4

(x) Which of the following is aromatic?



SECTION-B

(Very Short Answer Type Questions)

(2 marks each)

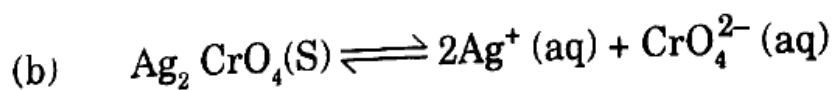
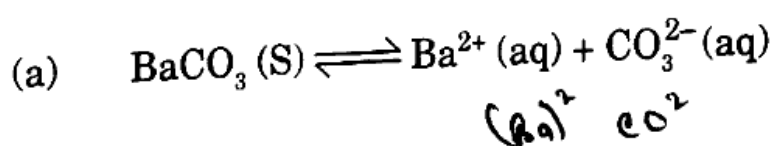
2. Answer the following questions :

(i)

State two limitations of Mendeleev's periodic table.

(ii)

Define solubility product. Write solubility product expression for :



(iii)

Give two examples of redox reaction.

(iv) What is meant by qualitative analysis? Name one method used for the estimation of Nitrogen in an organic compound.

(v) What are Nucleophiles? Give two examples of nucleophiles.

(vi) What are Carbanions? Give example.

(vii) Why are alkynes more acidic than alkenes and alkanes?

(viii) Give the mechanism of Sulphonation of benzene.

(ix) What is Markovnikov's addition?

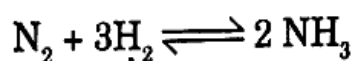
SECTION-C

(Short Answer Type Questions)

(3 marks each)

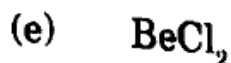
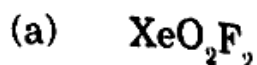
8. Answer the following questions.

- (i) How many grams of NH_3 are produced when 6 grams of H_2 gas reacts with excess of N_2 gas through the following reaction.



- (ii) Explain the law of multiple proportion with examples.
- (iii) Derive de-Broglie's wave equation for dual nature of matter. Give its significance.
- (iv) Define ionization enthalpy. Explain its trend in a group.
- (v) What is VSEPR theory? Explain the shape of H_2O molecule on the basis of VSEPR theory.

(vi) What is the hybridization of following molecules?



(vii) What is state function? Explain internal energy as a state function.

(viii) Explain various factors affecting the state of equilibrium.

(ix) What are conformers? Write the conformations of ethane.

SECTION-D

(Long Answer Type Questions)

(5 marks each)

4. Answer the following questions.

- (i) Explain Rutherford's gold-foil experiment. What are the limitations of Rutherford's model of atom?

OR

What is an Orbital? Describe the shapes of S, P and d-orbitals.

- (ii) What is molar heat capacity at constant pressure (C_p) and constant volume (C_v)? Derive the relationship between the two (C_p and C_v).

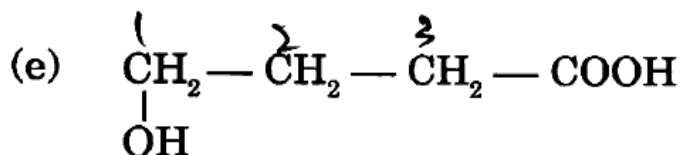
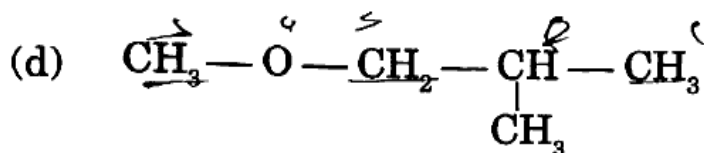
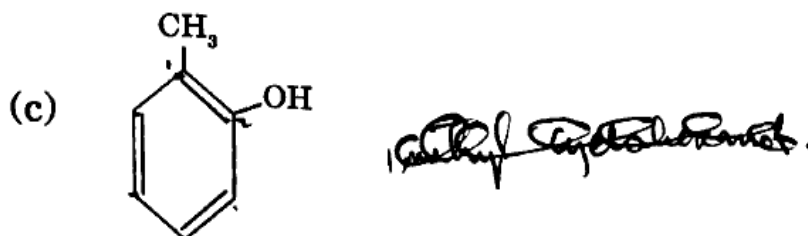
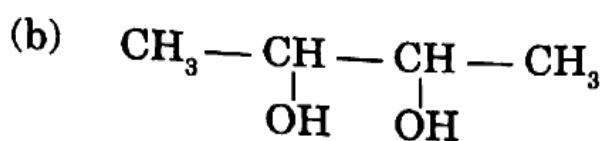
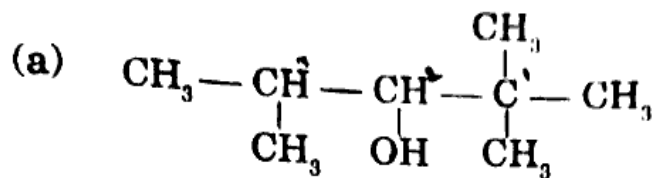
OR

What is enthalpy of formation? State and explain Hess's law of constant heat summation. <https://www.jkboseonline.com>

- (iii) What is hyper-conjugation? Explain the stability of carbocations on the basis of hyperconjugation.

OR

Write the IUPAC names of the following organic compounds.



Roll No.

Z-9-A

[Total No. of Printed Pages : 8]

Total No. of Questions : 4]

11th ARF(SZ)JKUT2024-25

209-A

CHEMISTRY

[Maximum Marks : 70]

Time : 3 Hours]

General Instructions :-

- (i) There are total four Sections in the question paper. All questions are compulsory.
- (ii) Section-A contains ten Objective Type Questions/Multiple Choice Questions of 1 mark each. (1×10=10)
- (iii) Section-B contains nine Very Short Answer Type Questions of 2 marks each to be answered in 20 to 30 words. (2×9=18)
- (iv) Section-C contains nine Short Answer Type Questions of 3 marks each to be answered in 100 to 150 words. (3×9=27)
- (v) Section-D contains three Long Answer Type Questions of 5 marks each to be answered in 150 to 200 words. (5×3=15)
- (vi) Use log tables, if necessary. Use of scientific calculators is not allowed.

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209-A

Z-9-A

Turn Over

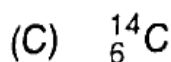
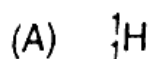
Section-A

(Objective Type Questions/Multiple Choice Questions)

1 each

1. Select the correct one :

(i) Which of the following is the standard for atomic mass ?



(ii) Which of the following contains maximum number of atoms ?

(A) 6.023×10^{21} molecules of CO_2 (B) 22.4 L of CO_2 at STP(C) 0.44 g of CO_2

(D) None of these

(iii) The discovery of nucleus was done by :

(A) J. J. Thomson

(B) Chadwick

(C) Rutherford

(D) Moseley

(iv) The most electronegative element in the periodic table is :

(A) Nitrogen

(B) Oxygen

(C) Chlorine

(D) Fluorine

(v) Hydrogen molecule is :

- (A) Polar
- (B) Ionic
- (C) Covalent
- (D) Non-Polar ✓

(vi) Carbon in ethylene involves the hybridisation :

- (A) sp^3
- (B) sp^2
- (C) sp ✓
- (D) None of these

(vii) Internal energy does not include :

- (A) Nuclear energy
- (B) Vibrational energy
- (C) Rotational energy
- (D) Energy of gravitational pull ✓

(viii) An oxidation process involves :

- (A) Increase in oxidation number
- (B) Decrease in oxidation number
- (C) Addition of electrons
- (D) Removal of electronegative element

(ix) Which of the following is an electrophile ?

- (A) AlCl_4^- (B) BCl_3
 (C) NH_3 (D) CH_3OH

(x) Which of the following represents the general formula of alkenes ?

- (A) C_nH_{2n} (B) $\text{C}_n\text{H}_{2n-2}$
 (C) $\text{C}_n\text{H}_{2n+2}$ (D) $\text{C}_n\text{H}_{2n+1}$

Section-B

2 each

(Very Short Answer Type Questions)

2. Answer the following questions :

- (i) What are the main postulates of Dalton's Atomic theory ?
- (ii) Define ionisation enthalpy. What are its units ?
- (iii) Explain, why H_2S is a gas while H_2O is liquid, even though both S and O are elements of the same group.
- (iv) What do you understand by open and isolated systems ? Give examples.
- (v) What are buffer solutions ? How can you say that buffers are used as an important part of many industrial processes ?

- ✓(vi) State Le Chatelier's principle. Give one example of its application in chemical industries.
- (vii) What are carbocations ? How are they classified ? Give their order of stability.
- (viii) What is Wurtz Reaction ? How can it be used to prepare butane ?
- (ix) Discuss briefly the structure of a triple bond.

Section-C

(Short Answer Type Questions)

3 each

3. Answer the following questions :

- (i) N and O combine with H to form NH_3 and H_2O and they combine with each other to form NO_2 . Which law is illustrated ? Explain briefly.
- ✓(ii) What are Quantum Numbers ? Explain the significance of any two of the Quantum numbers.
- ✓(iii) State Modern periodic law. What are the main features of the long form of the periodic table ?

- (iv) What is hybridisation ? Explain sp^2 hybridisation with an example.
- (v) State first law of thermodynamics and give a mathematical expression for it. Mention two examples to support the law.
- (vi) Explain term enthalpy. How does it differ from internal energy ?
- (vii) What are strong and weak electrolytes ? Derive an expression for the calculation of the degree of ionisation of a weak electrolyte.
- (viii) H_2S acts only as reductant where as SO_2 acts as both oxidant and reductant. Why ? <https://www.jkboseonline.com>
- (ix) Discuss various types of organic reactions (any three) with examples.

Section-D

(Long Answer Type Questions)

5 each

4. Answer the following questions :

- (i) State and explain Heisenberg's uncertainty principle.

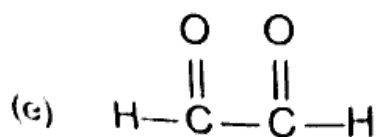
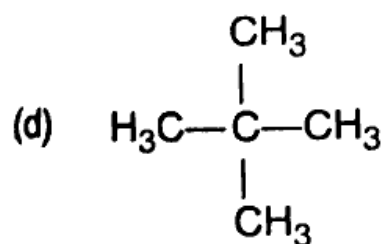
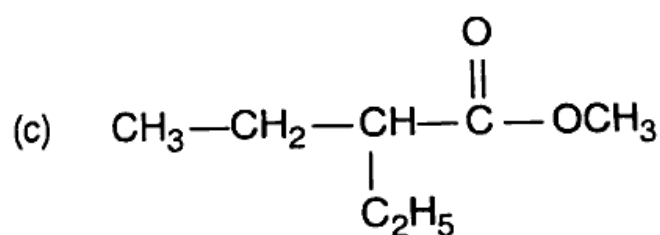
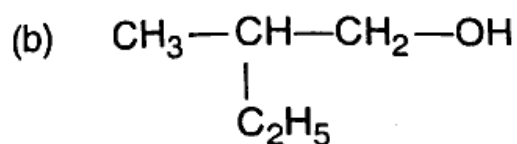
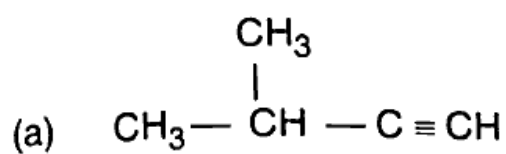
Or

Define an atomic orbital. Discuss the shapes of s , p and d orbitals.

- (ii) Explain inductive effect and electromeric effect.

Or

Write IUPAC names of the following compounds :



- (iii) What is Ozonolysis ? How it can be used to determine the position of double bond in an unknown alkene ?

Or

Write short notes on the following :

- (a) Markovnikoff's rule
- (b) Friedel-Crafts acylation
- (c) Benzene resonance

Roll No.

Z-9-B

Total No. of Questions : 4]

[Total No. of Printed Pages : 8

11th ARF(SZ)JKUT2024-25

209-B

CHEMISTRY

Time : 3 Hours]

[Maximum Marks : 70

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- (iv) Section-C contains *nine* Short Answer Type Questions of 3 marks each to be answered in **100 to 150** words. (3×9=27)
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11th ARF(SZ)JKUT2024-25

209-B

Turn Over

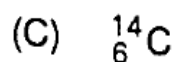
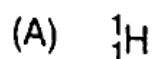
Z-9-B

Section-A

(Objective Type Questions/Multiple Choice Questions) 1 each

1. Select the correct one :

(i) Which of the following is the standard for atomic mass ?

(ii) The number of gram molecules of oxygen in 6.02×10^{24} CO molecules is :

(A) 10 g molecules

(B) 5 g molecules

(C) 1 g molecule

(D) 0.5 g molecule

(iii) The Principle Quantum Number of an electron represents :

(A) Size of the orbital

(B) Spin angular momentum

(C) Orbital angular momentum

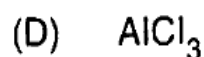
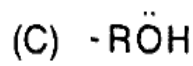
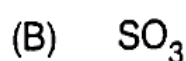
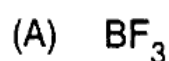
(D) Space orientation of the orbital

(iv) Which has the smallest size ?

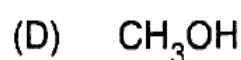
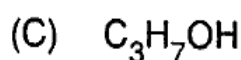
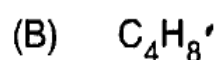
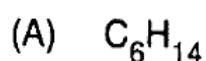


- (v) The triple bond consists of :
- (A) Three sigma bonds
 - (B) Three Pi bonds
 - (C) Two sigma bonds and one Pi bond
 - (D) One sigma and two Pi bonds
- (vi) Atomic orbitals of carbon in CO_2 are :
- (A) sp -hybridised
 - (B) sp^3d hybridised
 - (C) sp^2 hybridised
 - (D) sp^3 hybridised
- (vii) Internal energy of a substance/system is :
- (A) State function
 - (B) Path function
 - (C) Neither state nor path function
 - (D) Both state function as well as path function
- (viii) The oxidation number of iron in Fe_3O_4 is :
- (A) +2
 - (B) +3
 - (C) $8/3$
 - (D) $2/3$

(ix) Which of the following is a nucleophile ?



(x) Which of the following is an unsaturated compound ?



Section-B

(Very Short Answer Type Questions)

2 each

2. Answer the following questions :

(i) What are the main postulates of Dalton's Atomic theory ?

(ii) What do you understand by representative elements ? Name the groups whose elements are called representative elements.

(iii) Explain, why H_2S is a gas while H_2O is liquid, even though both S and O are elements of the same group.

(iv) What do you understand by open and isolated systems ? Give examples.

(v) What are buffer solutions ? How can you say that buffers are used as an important part of many industrial processes ?

- (vi) Explain common ion effect with a suitable example.
- (vii) What are carbanions ? Give examples. What is their order of stability ?
- (viii) What is Wurtz Reaction ? How can it be used to prepare butane ?
- (ix) Discuss briefly the structure of a triple bond.

Section-C

(Short Answer Type Questions)

3 each

3. Answer the following questions :

- (i) N and O combine with H to form NH_3 and H_2O and they combine with each other to form NO_2 . Which law is illustrated ? Explain briefly.
- (ii) What are Quantum Numbers ? Explain the significance of any *two* of the Quantum numbers.
- (iii) What do you mean by Periodic properties of elements ? Explain.
Name any *three* such properties.

- (iv) What is hybridisation ? Explain sp^2 hybridisation with an example.
- (v) State first law of thermodynamics and give a mathematical expression for it. Mention *two* examples to support the law.
- (vi) Define entropy and free energy. How are they related to each other ?
- (vii) What are strong and weak electrolytes ? Derive an expression for the calculation of the degree of ionisation of a weak electrolyte.
- (viii) H_2S acts only as reductant where as SO_2 acts as both oxidant and reductant. Why ? <https://www.jkboseonline.com>
- (ix) Discuss various types of organic reactions (any *three*) with examples.

Section-D

(Long Answer Type Questions)

5 each

4. Answer the following questions :

- (i) State and explain Heisenberg's uncertainty principle.

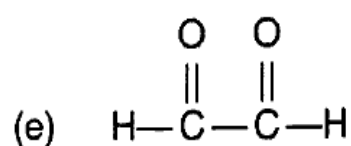
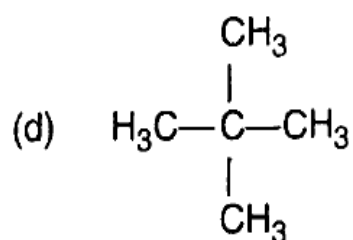
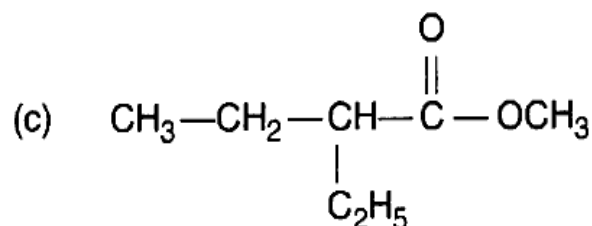
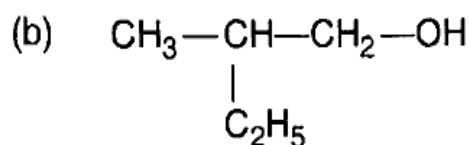
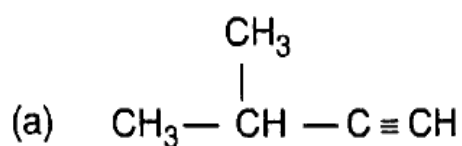
Or

Define an atomic orbital. Discuss the shapes of s , p and d orbitals.

- (ii) Explain inductive effect and electromeric effect.

Or

Write IUPAC names of the following compounds :



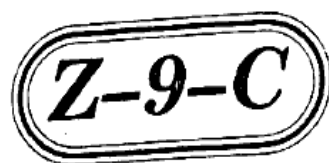
- (iii) What is Ozonolysis ? How it can be used to determine the position of double bond in an unknown alkene ?

Or

Write short notes on the following :

- (a) Markovnikoff's rule
- (b) Friedel-Crafts acylation
- (c) Benzene resonance

Roll No.



Total No. of Questions : 4]

[Total No. of Printed Pages : 8

11th ARF(SZ)JKUT2024-25

209-C

CHEMISTRY

Time : 3 Hours]

[Maximum Marks : 70

General Instructions :-

- (i) There are total four Sections in the question paper. All questions are compulsory.
- (ii) Section-A contains *ten* Objective Type Questions/Multiple Choice Questions of 1 mark each. (1×10=10)
- (iii) Section-B contains *nine* Very Short Answer Type Questions of 2 marks each to be answered in 20 to 30 words. (2×9=18)
- (iv) Section-C contains *nine* Short Answer Type Questions of 3 marks each to be answered in 100 to 150 words. (3×9=27)
- (v) Section-D contains *three* Long Answer Type Questions of 5 marks each to be answered in 150 to 200 words. (5×3=15)
- (vi) Use log tables, if necessary. Use of scientific calculators is not allowed.

11th ARF(SZ)JKUT2024-25
Z-9-C

209-C

Turn Over

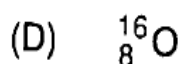
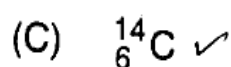
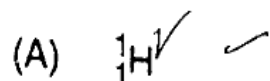
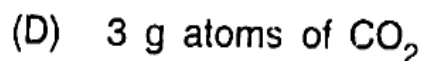
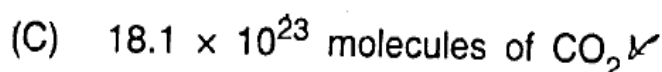
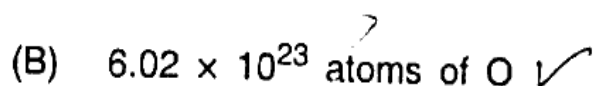
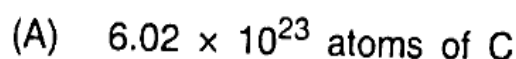
Section-A

(Objective Type Questions/Multiple Choice Questions)

1 each

1. Select the correct one :

(i) Which of the following is the standard for atomic mass ?

(ii) One mole of CO_2 contains :(iii) Number of orbitals in a shell having principle Quantum number n is :

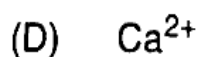
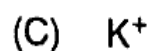
(A) $n + 2$

(B) $2n^2$

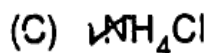
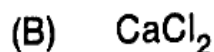
(C) n^2

(D) $2n$ ✓

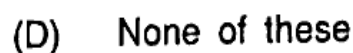
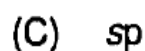
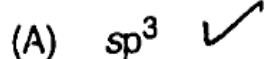
(iv) Which of the following ions has the smallest radius ?



(v) Which of the following contains both covalent and ionic bonds ?



(vi) Carbon in methane involves the hybridisation :



(vii) Which of the following is an intensive property ?

(A) Heat capacity

(B) Mass

(C) Density ✓

(D) Volume

(viii) The oxidation number of oxygen in OF_2 is :

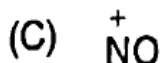
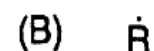
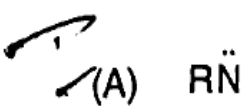
(A) +2 ✓

(B) -2

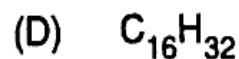
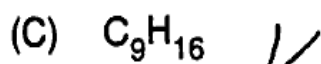
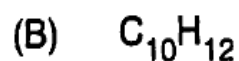
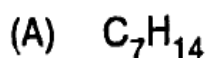
(C) +1

(D) -1

(ix) Which of the following is a free radical ?



(x) Which of the following molecular formulae belongs to the alkyne series ?



Section-B

(Very Short Answer Type Questions)

2 each

2. Answer the following questions :

(i) What are the main postulates of Dalton's Atomic theory ? ✓

(ii) What are transition elements ? Why are they so called ? Write their general electronic configuration. ✓

(iii) ✓ Explain, why H_2S is a gas while H_2O is liquid, even though both S and O are elements of the same group.

(iv) ✓ What do you understand by open and isolated systems ? Give examples.

✓ (v) What are buffer solutions ? How can you say that buffers are used as an important part of many industrial processes ?

✓ (vi) What do you mean by dynamic nature of Equilibrium ? Explain.

(vii) ✓ What are free radicals ? How are they formed ? Explain the classification of alkyl free radicals.

(viii) What is Wurtz Reaction ? How can it be used to prepare butane ?

✓ (ix) Discuss briefly the structure of a triple bond.

Section-C

(Short Answer Type Questions)

3 each

3. Answer the following questions :

(i) ✓ N and O combine with H to form NH_3 and H_2O and they combine with each other to form NO_2 . Which law is illustrated ? Explain briefly.

(ii) ✓ What are Quantum Numbers ? Explain the significance of any two of the Quantum numbers.

(iii) ✓ State and explain :

(a) Ionisation enthalpy

(b) Electronegativity

2 (iv) What is hybridisation ? Explain sp^2 hybridisation with an example.

- ✓ (v) State first law of thermodynamics and give a mathematical expression for it. Mention two examples to support the law.
- ✓ (vi) What are intensive and extensive properties ? Give two examples of each.
- ✓ (vii) What are strong and weak electrolytes ? Derive an expression for the calculation of the degree of ionisation of a weak electrolyte.
- ✓ (viii) H_2S acts only as reductant where as SO_2 acts as both oxidant and reductant. Why ? <https://www.jkboseonline.com>
- (ix) Discuss various types of organic reactions (any *three*) with examples.

Section-D

(Long Answer Type Questions)

5 each

4. Answer the following questions :

- ✓ (i) State and explain Heisenberg's uncertainty principle.

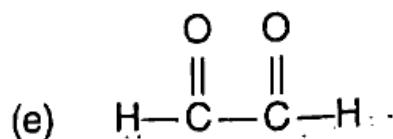
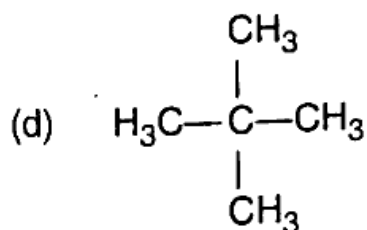
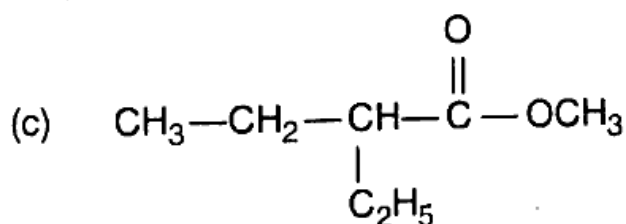
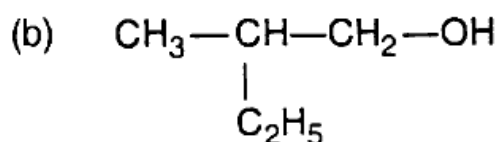
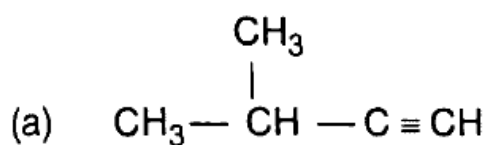
Or

Define an atomic orbital. Discuss the shapes of *s*, *p* and *d* orbitals.

- (ii) Explain inductive effect and electromeric effect.

Or

Write IUPAC names of the following compounds :



- (iii) What is Ozonolysis ? How it can be used to determine the position of double bond in an unknown alkene ?

Or

Write short notes on the following :

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- (b) Friedel-Crafts acylation
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