1. Metallurgy

Govt. Answer key is compiled lesson wise. By using this answer key, expected answer for particular question can be understood

1. What is the role of Limestone in the extraction of Iron from its oxide Fe_2O_3? (June 20, Sep 20)

Key Answer	Mark
Lime stone (CaO) is used as a basic flux	2

2. Which type of ores can be concentrated by froth flotation method? Give two examples for such ores. (June-2020, Mar-23)

Key Answer	Mark
Sulphide ores	1
Example: 1) Galena (PbS)	½
2) Zinc blende (ZnS)	½

3. Explain the following terms with suitable examples. i) Gangue ii) Slag (PTA-2, Sep-2020)

Key Answer	Mark
(i) Gangue: Correct explanation + one example	½ + ½
(ii) Slag: Correct explanation + one example	½ + ½

4. What is the difference between minerals and ores? (June 20, May, 22, Mar 2024)

Key Answer	Mark
Any two (or) three differences	3

5. Describe a method for refining nickel. (or) Explain Mond's process (PTA-3, May – 22, June 23)

Key Answer	Mark
Two correct equations with temperature $Ni_{(s)} + 4CO_{(g)} \xrightarrow{350\ K} [Ni(CO)_4]_{(g)}$ $[Ni(CO)_4]_{(g)} \xrightarrow{460\ K} Ni_{(s)} + 4CO_{(g)}$	1 ½ 1 ½

6. Give the limitations of Ellingham diagram. (June-23)

Key Answer	Mark
Any Two limitation	1 ½ + 1 ½

7. Explain Zone refining process with an example, (PTA-6, Mar-2020, Mar-23)

Key Answer	Mark
Fractional crystallization	1
The impurities will prefer to remain in the molten region.	
Explanation	3
Examples: Ge (or) Si (or) Ga (or) semiconductor	1

8. Describe the role of the following in the process mentioned.
Silica in the extraction of copper (Mar 24)

Key Answer	Mark
Silica acts as acidic flux (or) Correct equation only	2

9. Write about calcination. (PTA-4) (or) What is calcination? (Mar-2024)

Key Answer	Mark
Correct explanation (or) Correct Equation	2

10. Write about gravity separation or hydraulic wash? (May-22)

Key Answer	Mark
Correct explanation (or) Any one example of ores	2 1

11. Write about liquation process of refining a metal? (June-23)

Key Answer	Mark
Correct explanation	2

12. Explain froth floatation method. (Aug 2021)

Key Answer	Mark
Sulphide ores are concentrated by froth flotation process	1
Water + pine oil + Eucalyptus oil + sodium ethyl xanthate	1
Foam is produced by passing air into the mixture	1
Ore particles are watted by the oil rise to the surface along with the froth	1
Diagram	1

2. p-Block Elements-I

Govt. Answer key is compiled lesson wise. By using this answer key, expected answer for particular question can be understood

1. Write a short note on anomalous properties of the first element of p-block. (Sep-20, Aug 2021) (Gem Guide Q. No: 1)

Key Answer	Mark
Small size of first member	1
High ionization enthalpy and high electronegativity	1
Absences of d-orbital in their valence shell	1

2. Give the uses of borax. (Aug-21) (Gem Guide Q. No: 3)

Key Answer	Mark
Any two uses	2

3. Write a short note on hydroboration. (June-23) (Gem Guide Q. No: 9)

Key Answer	Mark
$B_2H_6 + 6RCH = CHR \longrightarrow 2B(RCH - CH_2R)_3$	2
Mentioning anti markovnikov addition.	1

4. Give one example for each of the following: (June-23) (Gem Guide Q. No: 10)

a) Icosagens b) Tetragen c) Pnictogen d) Chalcogan

Key Answer	Mark
Each one example	$4 \times ½ = 2$

5. How will you identify borate radical? Write the reaction involved. (or) write the ethyl borate test (Mar -23) (Gem Guide Q. No: 13)

Key Answer	Mark
$H_3BO_3 + 3C_2H_5OH \xrightarrow{conc.H_2SO_4} B(OC_2H_5)_3 + 3H_2O$ Triethyl borate (green edged flame)	2

6. How will you convert boric acid to boron nitride? (Mar -2024) (Gem Guide Q. No: 15)

Key Answer	Mark
Correct equation	2

7. A hydride of 2nd period alkali metal (A) on reaction with compound of Boron (B) to give a reducing agent (c). Identify A, B, and C. (June-2020) (Gem Guide Q. No: 16)

Key Answer	Mark
A - LiH (or) Lithium Hydride	½
B - B_2H_6 (or) Diborane	½
C - $LiBH_4$ (or) Lithium Borohydride	1

8. What is catenation? Describe briefly the catenation property of carbon.

(Mar-20, Sep -20, July – 22) (Gem Guide Q. No: 4)

Key Answer	Mar-2020
Correct definition	2
Any two conditions	2

9. Write a note on Fisher tropsch synthesis. (Mar -23) (Gem Guide Q. No: 5)

Key Answer	Mark
$nCO + (2n+1)H_2 \xrightarrow{500-700k,\ less\ than\ 50\ atm} C_nH_{(2n+2)} + nH_2O$ $nCO + 2nH_2 \xrightarrow{500-700k,\ less\ than\ 50\ atm} C_nH_{2n} + nH_2O$	3

10. Give the Uses of Silicones. (Mar -23) (Gem Guide Q. No: 7)

Key Answer	Mark
Any two uses	1+1

11. Describe the structure of diborane. (Mar -23) (Gem Guide Q. No: 8)

Key Answer	Mark
Correct structure	1
Any four points from the following. 1. Two BH_2 units are linked by two bridged hydrogens. 2. It has eight B-H bonds. 3. It has only 12 valence electrons unable to form normal covalent bonds. 4. The four terminal B-H bonds (2c-2e) bond. 5. Two B-H-B (3c-2e) or bridged bond. 6. The bridging hydrogen atoms are in a plane 7. The boron is sp^3 hybridized.	4×½ =2

12. Write the Uses of Boron. (Aug 21) (Gem Guide Q. No: 24)

Answer Key	Marks
Any three uses	3

13. Write the uses of boric acid (May-22, July -22, Mar -2024) (Gem Guide Q. No: 30)

Key Answer	May-2022
Any three uses	3

14. What is potash alum? How to prepare potash alum?

(June -2020) (Gem Guide Q. No: 38)

Key Answer	Mark
$K_2SO_4.Al_2(SO_4)_3.4Al(OH)_3 + 6H_2SO_4 \rightarrow K_2SO_4 + 3Al_2(so_4)_3 + 12H_2O$	1½
$K_2SO_4 + Al_2(SO_4)_3 + 24H_2O \rightarrow K_2SO_4.Al_2(SO_4)_3.24H_2O$	1½

15. Why the ionization enthalpy from aluminium to thallium is only a marginal difference? (Mar-2020) (Gem Guide Q. No: 52)

Key Answer	Mark
Due to the presence of inner 'd' and 'f' electron which has poor shielding effect compared to 's' and 'p' electrons.	3

16. What are silicates? (Mar -2024) (Gem Guide Q. No: 55)

Key Answer	Mark
Correct definition	2

3 p-Block Elements-II

Govt. Answer key is compiled lesson wise. By using this answer key, expected answer for particular question can be understood

1. What is inert pair effect? (May-22) (Gem Guide Q. No: 1)

Key Answer	Mark
Correct definition	2

2. Give the oxidation state of halogen in the following a) OF_2 b) O_2F_2 c) Cl_2O_3 d) I_2O_4 (Gem Guide Q. No: 4)

Key Answer	Mark
a) OF_2 = -1 b) $O_2F_2 \Rightarrow$ - 1 c) $Cl_2O_3 \Rightarrow$ + 3 d) I_2O_4 = +4	$4 \times ½ = 2$

3. What are interhalogen compounds? Give examples
(Aug -2021, May-22) (Gem Guide Q. No: 5)

Key Answer	Mark
Correct definition	2
Any two examples	2×½=1

4. Give the uses of helium.(Sep-2020, Aug-2021, June-23, Mar-2024) (Gem Guide Q. No: 7)

Key Answer	Mark
Any three points	3

5. Give the balanced equation for the reaction between chlorine with cold NaOH and hot NaOH. (Sep 20) (Gem Guide Q. No: 9)

Key Answer	Mark
Balanced Equations	3
Unbalanced Equations	2

6. Give a reason to support that sulphuric acid is a dehydrating agent. (or) prove the dehydrating property of sulphuric acid. (June-23, Mar -2024) (Gem Guide Q. No:12)

Key Answer	Mark
Any one balanced equation	2

7. Give the uses of argon (July 22) (Gem Guide Q. No: 15)

Key Answer	Mark
Uses	2

8. What type of hybridization occur in a)Br F_5 b)Br F_3 c)BrF d) IF_7
(June -2020) (Gem Guide Q. No: 22)

Key Answer	Mark
a) $BrF_5 \Rightarrow sp^3d^2$ b) $BrF_3 \Rightarrow sp^3d$ c) $BrF \Rightarrow sp^3$ d) $IF_7 \Rightarrow sp^3d^3$	$4 \times ½ = 2$

9. Complete the following reaction (Mar 23)
(i) $P_4 + NaOH + H_2O \rightarrow$ **(ii)** $Cu + H_2SO_4 \rightarrow$ **(iii)** $XeF_6 + H_2O \rightarrow$ **(Gem Guide Q. No: 23)**

Key Answer	Mark
Correct Equations	3

10. Write the uses of oxygen (May-22) (Gem Guide Q. No: 47)

Key Answer	Mark
Any two uses	2

11. Sulphuric acid is a dibasic acid. Prove it (Sep-2020) (Gem Guide Q. No: 51)

Key Answer	Mark
Any two balanced equation	2×1½ = 3

12. Explain the preparation of chlorine (Sep 20) (Gem Guide Q. No: 53)

Key Answer	Mark
Balanced Equation	2
Unbalanced Equation	1

13. How bleaching powder is prepared? (Mar 20, May 22) (Gem Guide Q. No: 54)

Key Answer	Mark
Balanced Equation	2
Unbalanced Equation (or) Theory only	1

14. HF acid is not stored in glass bottles. Why? (March -2020) (Gem Guide Q. No: 58)

Key Answer	Mark
HF react with glass	1
Balanced equation	2

15. Write the molecular formula and draw the structure of sulphurous acid and marshall's acid. (Mar 20) (Gem Guide Q. No: 70)

Key Answer	Mark
Two formula and Structure	1+2

16. Give the uses of phosphine or write about Holmes signal. (Sep-2020) (Gem Guide Q. No: 71)

Key Answer	Mark
A mixture of calcium carbide and calcium phosphide	1
liberates phosphine and acetylene	1
phosphine catches fire and ignites acetylene	1

17. Explain the bleaching action of sulphur dioxide. (Aug -2021, June-23) (Gem Guide Q. No: 76)

Key Answer	Mark
Reducing property	1
$SO_2 + 2H_2O \longrightarrow H_2SO_4 + 2[H]$	1
X(coloured)+ $2[H] \longrightarrow XH_2$ (colourless)	1
Correct explanation (or) equation	2

18. How chlorine is manufactured by Deacon's process?

(June -2020) (Gem Guide Q. No: 79)

Key Answer	Mark
Correct balanced equations	5

19. Write the properties of interhalogen compounds (July 22) (Gem Guide Q. No: 80)

Key Answer	Mark
Any five points	5

4. Transition and Inner Transition Elements

Govt. Answer key is compiled lesson wise. By using this answer key, expected answer for particular question can be understood

1. Describe the preparation of potassium dichromate. (Corona 20) (Gem Guide Q. No: 6)

Key Answer	Mark
Ore and Concentration method	1
Three equations	4

2. What is Lanthanide contraction? Explain its consequences.
(July 23, Mar 24) (Gem Guide Q. No: 7)

Key Answer	Mark
Correct explanation for lanthanide contraction	2
Consequences (or) Effects of lanthanide contraction	3×1=3

3. What are interstitial compounds? (Sep -2020, Aug 2021, June-23) (Gem Guide Q. No: 9)

Key Answer	Mark
Compound that is formed when small atoms like H, B, C or N are trapped in the interstitial holes in a metal lattice	**2**
One example	**1**

4. Calculate the number of unpaired electrons in Ti^{3+}, Mn^{2+} and calculate the spin only magnetic moment. (Aug – 2021) (Gem Guide Q. No: 10)

Key Answer	Mark
Ti^{3+} -1 unpaired e^-	½
Magnetic moment $\mu_s = \sqrt{n(n+2)}$ BM	1
Mn^{+2} –5 unpaired e^-	½
Magnetic moment of Ti^{3+} =1.73 BM	½
Magnetic moment of Mn^{+2} = 5.91 BM	½

5. Which is more stable? F e^{3+} or F e^{2+} - explain. (May-22, Mar – 2024) (Gem Guide Q. No: 13)

Key Answer	Mark
F e^{3+} is more stable than F e^{2+}	1
F e^{3+} - $[Ar]3d^5$	1
d^5 configuration (or) Half-filled d orbital	1

6. Compare lanthanides and actinides. (J-22, Mar -23) (Gem Guide Q. No: 15)

Key Answer	Mark
Any three differences	3×1=3

7. Which metal in the 3d series exhibits +1 oxidation state most frequently. why?
(Sep-2020) (Gem Guide Q. No: 25)

Key Answer	Mark
Copper	1
In +1 oxidation state it forms cu^+ ion with stable $3d^{10}$ configuration. It attains state configuration	1

8. What is Zigler-Natta catalyst? How poly propylene polymer is obtained? Give its use.
(July 22) (Gem Guide Q. No: 33)

Key Answer	Mark
Balanced equation	2
Use	1

9. What are the properties of interstitial compounds? (May-2022) (Gem Guide Q. No: 34)

Key Answer	Mark
Any three properties	3

10. What is chromyl chloride test? (March-2020) (Gem Guide Q. No: 38)

Key Answer	Mark
Balanced equation	3

11. Classify the following elements into d-block and f-block element.

(Mar 20) (Gem Guide Q. No: 44)

(i) Tungsten (ii) Ruthenium (iii) Promethium (iv) Einsteinium

Key Answer	Mark
Tungsten ⇒ d-block	½
Ruthenium ⇒ d-block	½
Promethium ⇒ f-block	½
Einsteinium ⇒ f-block	½

12. Why d block elements exhibit variable oxidation states?

(Aug – 2021) (Gem Guide Q. No: 51)

Key Answer	Mark
The energy difference between (n-1)d and ns orbitals are very small	2