

# RAMAKRISHNA MISSION VIDYAMANDIRA

Belur Math, Howrah – 711 202

## UG ADMISSION TEST – 2025

### CHEMISTRY

Date : 24-06-2025

Full Marks : 50

Time: 11.00 a.m – 12.00 noon

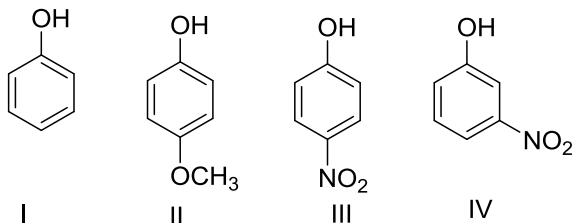
#### Instructions for the Candidates

- Answer all the questions given below. Each question carries **2 marks**. No negative marking.
- **Tick (✓) the most appropriate option** on the **ANSWER SHEET**.
- The tick must be very clear — if it is smudgy or not clear, no marks will be awarded.
- **Any rough work must be done in the supplied rough sheet(s).**
- No programmable but only scientific calculator is allowed.
- **Candidates must return the rough sheet(s) along with the ANSWER SHEET.**

1. The difference between the heats of reaction (in kJ) at constant pressure and constant volume at 25°C for the reaction  $2C_6H_6(l) + 15O_2(g) \rightarrow 12CO_2(g) + 6H_2O(l)$   
a) -7.43                      b) 3.72                      c) - 3.72                      d) 7.43
2. If the reactant concentration vs time plot is found to be linear with negative slope, the order of the reaction is —  
a) 0                              b) 1                              c) 2                              d) cannot be determined
3. Which of the following aqueous solutions has osmotic pressure nearest to that of an equimolar solution of  $K_4[Fe(CN)_6]$ ?  
a)  $Na_2SO_4$                       b)  $BaCl_2$                       c)  $Al_2(SO_4)_3$                       d)  $C_{12}H_{22}O_{11}$
4. Which of the followings is an intensive property—  
a) Charge                      b) Conductance                      c) Equivalent conductance                      d) None of the above
5. pH of a  $10^{-8}$  M solution of HCl is —  
a) 8                              b) 6                              c) between 6 and 7                      d) Between 7 and 8
6. At standard condition, EMF of the cell  $Fe^{3+}(aq) + H_2(g) \rightarrow 2H^+(aq) + Fe^{2+}(aq)$  is 0.77 V. The  $E^0_{Fe^{3+}/Fe^{2+}}$  is  
a) +0.77                      b) -0.77                      c) +1.54                      d) None of the above
7. At the same temperature and pressure, which of the following gases will have the highest kinetic energy per mole?  
a)  $H_2$                               b)  $O_2$                               c)  $CH_4$                               d) Same for all of the above
8. The relation between equilibrium constant  $K_1$  for the reaction  $CO(g) + \frac{1}{2}O_2(g) \rightarrow CO_2(g)$ . So the equilibrium constant  $K_2$  for the reaction  $2CO(g) + O_2(g) \rightarrow 2CO_2(g)$  is –  
a)  $K_1 = K_2$                       b)  $2K_1 = K_2$                       c)  $K_1 = K_2^2$                       d)  $K_1^2 = K_2$

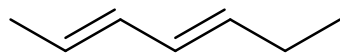
9. The real gas molecules can have the velocity range from 0 to infinity, but a certain velocity is possessed by the most number of molecules. Which of the following functions can have such feature with a single maximum?
- a)  $f(x) = x^2 \sin(x)$       b)  $f(x) = x e^{-x}$       c)  $f(x) = x^{-1} e^x$       d)  $f(x) = x \sin(x)$
10. A radioactive material is found on 2<sup>nd</sup> June, 2025, a Monday and it becomes half of its original amount on 4<sup>th</sup> June, 2028. Which day, is it?
- a) Sunday      b) Saturday      c) Wednesday      d) Friday
11. In the Bohr's orbit, the ratio of total kinetic energy and the total energy of the electron is
- a) -2      b) -1      c) +2      d) 0
12. Consider the following ions: i)  $\text{Ni}^{2+}$     ii)  $\text{Co}^{2+}$     iii)  $\text{Cr}^{2+}$     iv)  $\text{Fe}^{3+}$   
The correct sequence of increasing number of unpaired electrons in these ions is
- a) i < ii < iii < iv    b) iv < ii < iii < i    c) i < iii < ii < iv    d) iii < iv < ii < i
13. The correct order of bond order values among the following  
i)  $\text{NO}^-$     ii)  $\text{NO}^+$     iii)  $\text{NO}$     iv)  $\text{NO}^{2+}$     v)  $\text{NO}^{2-}$
- a) i < iv < iii < ii < v      b) v = ii < i < iv < iii  
c) v < i < iv = iii < ii      d) ii < iii < iv < i < v
14. The shape of  $\text{XeO}_2\text{F}_2$  molecule is
- a) square planar      b) trigonal bipyramidal      c) tetrahedral      d) see-saw
15. The oxidation state of Fe in the brown ring complex  $[\text{Fe}(\text{H}_2\text{O})_5\text{NO}]\text{SO}_4$  is
- a) +1      b) +2      c) +3      d) +4
16. Among the complexes  $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ ,  $[\text{Fe}(\text{CN})_6]^{3-}$ ,  $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$ ,  $[\text{FeCl}_6]^{3-}$ , more stability is shown by
- a)  $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$     b)  $[\text{Fe}(\text{CN})_6]^{3-}$     c)  $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$     d)  $[\text{FeCl}_6]^{3-}$
17. The colour of the flame observed during the flame test of calcium salt is
- a) Apple green      b) Brick red      c) Lilac      d) Golden yellow
18. Which one of the following ions is most stable in aqueous solutions?
- a)  $\text{Mn}^{3+}$       b)  $\text{Cr}^{3+}$       c)  $\text{V}^{3+}$       d)  $\text{Ti}^{3+}$
19. Which of the following compounds is not an example of electrophile:
- a)  $\text{BF}_3$       b)  $\text{H}_3\text{O}^+$       c)  $\text{O}_3$       d)  $(\text{CH}_3)^+$

20. Arrange the following compounds with increasing order of acidity:



- a) I < II < III < IV      b) II < I < III < IV      c) II < I < IV < III      d) III < II < I < IV

21. The double bonds in following molecule can be represented as :



- a) Z,Z                      b) E,E                      c) E,Z                      d) Z,E

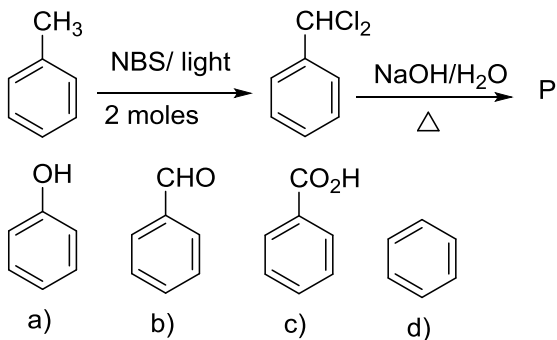
22. Ethyl bromide and allyl bromide can be distinguished by:

- a) Alcoholic AgNO<sub>3</sub>                      b) Comparing their colours  
c) Burning the compound on high flame      d) Cold Aqueous KOH solution

23. A compound 'A' has a molecular formula C<sub>2</sub>Cl<sub>3</sub>OH. 'A' reduces Fehling solution and on oxidation produces a monocarboxylic acid, 'B'. 'A' can also be obtained by the action of Cl<sub>2</sub> on ethanol. 'A' is:

- a) Chloral                      b) Chloroform                      c) 3,3,3-trichloroethanol      d) Chloroacetic acid

24. The structure of the product 'P' in the following reaction is :



25. Mutarotation is not shown by which of the following carbohydrate?

- a) D-glucose                      b) D-fructose                      c) D-lactose                      d) D-sucrose

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