

This Question Paper contains 8 Printed Pages.

052(E)

(MARCH, 2007)

Time : 3.00 Hours]

[Maximum Marks : 100

Instructions :

1. This question paper has total **60** questions and **all** are **compulsory**.
2. Write your answer to the point and as instructed in the question.
3. Begin new section from new page and maintain the order of questions.
4. Use log-table or simple calculator for calculations.
5. Draw a neat and clean diagram with necessary labellings, wherever required.

Atomic weights :

H = 1, O = 16, K = 39, Mn = 55 gms / mole

SECTION - A

Question Nos. from 1 to 16 are multiple choice type.

16

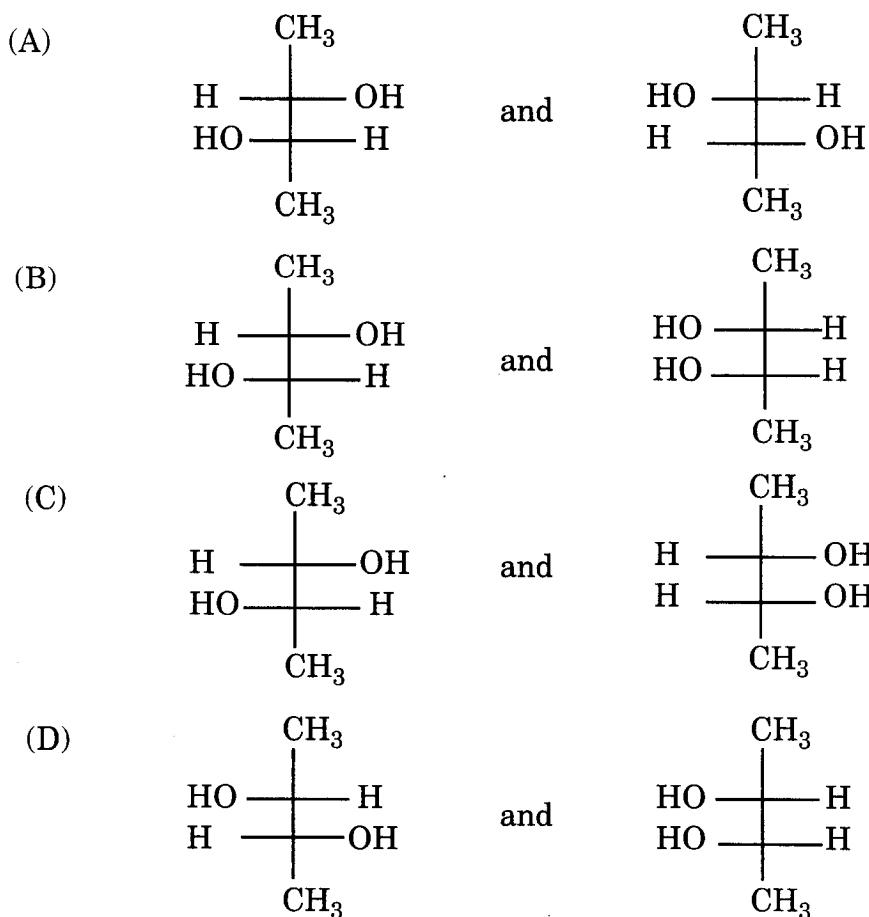
*Each carries **ONE** mark. Select the correct option from the following.*

1. For which of the following sets of 4 quantum numbers an electron will have the highest energy?

	n	l	m	s
(A)	3	2	1	$\frac{1}{2}$
(B)	4	2	-1	$\frac{1}{2}$
(C)	4	1	0	$-\frac{1}{2}$
(D)	5	0	0	$-\frac{1}{2}$
2. The number of Na^+ ions filling all octahedral voids in NaCl structure are :
(A) 6 (B) 12 (C) 13 (D) 14
3. What is the normality of 1 M KMnO_4 solution?
(A) 0.1 N (B) 2 N (C) 0.5 N (D) 5 N

4. Zn gives H_2 gas with H_2SO_4 and HCl, but not with HNO_3 because
- (A) NO_3^- is reduced before reduction of hydronium ion.
 (B) HNO_3 is weaker acid than H_2SO_4 and HCl.
 (C) In electrochemical series Zn is above hydrogen.
 (D) Zn acts as an oxidizing agent when reacts with HNO_3 .
5. The second order rate constant is usually expressed as
- (A) mole liter sec^{-1} (B) mole $^{-1}$ liter $^{-1} sec^{-1}$
 (C) mole liter $^{-1} sec^{-1}$ (D) mole $^{-1}$ liter sec^{-1}
6. ZSM-5 converts
- (A) Benzene to Toluene (B) Alcohol to Petrol.
 (C) Toluene to Benzene (D) Heptane to Toluene
7. An element (X) forms compounds of the formula XCl_3 , X_2O_5 and Ca_3X_2 , but does not form XCl_5 . Which of the following is the element X?
- (A) B (B) Al
 (C) N (D) P
8. What is responsible for the stability of +3 oxidation state in inner transition elements?
- (A) Ionization energy.
 (B) Hydration energy.
 (C) Ionization energy and Hydration energy.
 (D) Electronic configuration.
9. The nuclear reaction accompanied with the emission of Neutrons is
- (A) ${}_6C^{12} + {}_1H^1 \longrightarrow {}_7N^{13}$
 (B) ${}_{13}Al^{27} + {}_2He^4 \longrightarrow {}_{15}P^{30}$
 (C) ${}_{15}P^{30} \longrightarrow {}_{14}Si^{30} + 1e^0$
 (D) ${}_{96}Am^{241} + {}_2He^4 \longrightarrow {}_{97}Bk^{241} + 1e^0$

10. Which of the following pairs of compounds are enantiomers?



11. Which of the following alcohol will not be easily oxidized by $\text{K}_2\text{Cr}_2\text{O}_7$ in dil. H_2SO_4 ?

- (A) CH_3OH (B) $\text{CH}_3\text{CH}_2\text{OH}$
 (C) $(\text{CH}_3)_3\text{C.OH}$ (D) $\text{CH}_3\text{CH.OH.CH}_3$

12. Identify the wrong statement from the following.

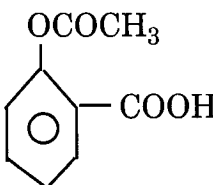
- (A) Salicylic acid is monobasic acid.
 (B) Methyl salicylate is an ester.
 (C) Salicylic acid gives violet colour with neutral FeCl_3 as well as brisk effervescence with NaHCO_3 .
 (D) Methyl salicylate does not occur in natural oils.

13. Dimethylterephthalate and ethylene glycol react to form

- (A) Nylon 6 (B) Nylon 66
 (C) Decron (D) Neoprene

14. Two vitamins absorbed from the intestine along with fats are

- (A) A, D (B) A, B
(C) A, C (D) D, B

15. The compound  is used as

- (A) antiseptic (B) antibiotic
(C) analgesic (D) pesticide

16. A 16 year old boy came to the doctor with main complaints of frequent sneezing, watering from nose and eyes, intense itching in eyes, and cold. He has past history of allergy to dust. The doctor prescribes most probably which of the following drugs.

- (A) Norethindrone (B) Lansoprazole
(C) Reserpine (D) Chlorpheniramine

SECTION - B

Question Nos. from 17 to 32 are very short answer type questions.

16

Each question carries **ONE** mark.

17. State the relationship of cartesian co-ordinates x, y and z to spherical polar co-ordinates r, θ and ϕ .
18. Give examples, one of each, of ferromagnetic and anti-ferromagnetic substances.
19. How many atoms are needed for the formation of one unit cell of bcc configuration? Why?
20. For which reaction, the Enthalpy will be zero?
21. In the flue cell, the electroenergy produced during the formation of 1 mol $\text{H}_2\text{O} (l)$ is equal to 50 K.cal. and standard free energy of water is 68.32 K. cal./mol. Find out the efficiency of the Flue cell.
22. Give the structural formula of O-hydroxy amino ethyl benzoate.
23. What is Tyndall effect?
24. Give the equation of obtaining Sodium salt of triphosphoric acid.

25. Write the theoretical and practical electron configuration of Cerium ($Z = 58$).
26. Give the formula and IUPAC name of Sodium Nitroprusside.
27. Sodium's stable isotope is ${}_{11}\text{Na}^{23}$. If we take ${}_{11}\text{Na}^{24}$, it shows which type of radioactivity? Show it by equation.
28. What is causing fermentation of D-glucose? And which glucose is not fermented by the same?
29. Show the possible isomers of $\text{C}_6\text{H}_6\text{O}_2$ with their common names. (any two).
30. Complete the equation.

$$\text{CH}_3\text{CN} + \text{CH}_3\text{CH}_2\text{OH} + \text{H}_2\text{O} \xrightarrow[\Delta]{\text{Conc. H}_2\text{SO}_4}$$
 Acetonitrile Ethenol
31. Give the basic difference between glycylalanine and alanyl glycine.
32. What is Leuco salt?

SECTION - C

*Question Nos. from 33 to 48 are short answer type Questions.
 Each question carries TWO marks.*

32

33. Give molecular electron configuration of O_2 molecule and explain its magnetic properties.

OR

What is Van der Waals' attraction? On which factors do it depend?

34. What is Hybridization? Give hybridization, geometrical shape and bond angle of $\text{Fe}(\text{CO})_5$.
35. Write a short note on : Frenkel Defects.
36. Find out mole fractions of solute and solvent of 1 molal aqueous solution.

OR

How many millimoles of CO_2 will dissolve in 900 ml water, when CO_2 gas is passed from water at 25°C .

($K_{\text{H}} = 6.02 \times 10^{-4}$ bar and partial pressure of CO_2 is 2×10^{-8} bar).

37. Explain the expansion of ideal gas in vacuum and change in Entropy.
38. Write Second Law of Thermo-dynamics and its limitations.
39. Give the structural formulas of Phosphonic acid and Pyrophosphoric acid.

OR

Give the equation of Aluminium with dil. HCl and conc. alkali.

40. "Although first ionization energy is less than second ionization energy, M^{1+} compounds of transition elements can not be made easily in comparison to M^{2+} compounds." Explain.

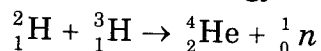
OR

Mention the uses of Lanthanides. (any four)

41. $[Ni F_4]^{2-}$ is diamagnetic, whereas $[Ni(CN)_4]^{2-}$ is paramagnetic. Explain.

42. Write a note on Breeder Reactor.

43. Calculate the energy released in the following fusion reaction.



(Mass : ${}^2_1H = 2.014$; ${}^3_1H = 3.016$; ${}^4_2He = 4.003$, $n = 1.009 \text{ amu}$)

44. Give the organic conversion of the following.
Isopropyl Alcohol from acetaldehyde.

OR

Acetoxime from Isopropyl Alcohol.

45. Write conversion of
P-hydroxy azobenzene from Aniline.
46. Explain Carbyl test with equation (any one).
47. Mention full names, polymer structure and uses of PTFE and PAN.
48. Write a note on Pheromones.

SECTION - D

36

Question Nos. 49 to 60 are long answer type questions.

Each question carries **THREE** marks. Answer the following to the point.

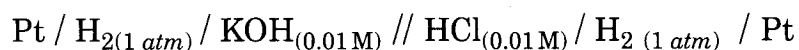
49. What is meant by Molal Elevation constant? Derive formula for Molal Elevation constant.

OR

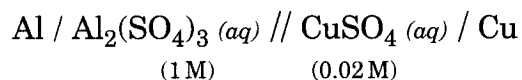
What is meant by Molal Depression constant?

Derive formula for Molal Depression constant.

50. The potential of the following given cell is 0.59 volt. Calculate the ionic product of Water (K_w).

**OR**

Calculate cell voltage of the following electrochemical cell at 25°C and write cell reaction.



$$(E^\circ \text{Al}^{3+} / \text{Al} = -1.66 \text{ V}; \quad E^\circ \text{Cu} / \text{Cu}^{2+} = -0.34 \text{ V})$$

51. The decomposition of N_2O_5 dissolved in Carbon tetrachloride decomposes at definite temperature as follows.



This reaction is of 1st order and its rate constant is $5.0 \times 10^{-4} \text{ sec}^{-1}$. For this reaction initial conc. of N_2O_5 is 0.25 mole / litre.

- (i) What time will be required for completion of 75% of reaction?
- (ii) What will be the concentrations of N_2O_5 and NO_2 after 30 minutes from the start of the reaction?

52. Derive formula of Langmuir Absorption Isotherm and express the equation at low and high pressure situations.

53. Give only equations of production of Chlorine and Iodine.

OR

Mention equations of the formation of XeF_2 , XeF_4 and XeF_6 with their structures.

54. Write points of tendency of transition metal ions to form complex compounds.

55. Explain hybridization, geometrical shape and magnetic properties of complex compound $\text{K}_4[\text{Fe}(\text{CN})_6]$.

OR

Show geometrical isomers in cis-trans and facial meridional results of metal ion Fe and Co bearing 6 co-ordination number.

56. Explain steps of R & S nomenclature.

57. Explain and give equations of industrial manufacturing of Salicylic acid by Kolbe-Schmitt reaction.

58. Explain Wolff-Kishner and Clemmenson reduction reactions.

OR

Give only equations of dehydration reactions of amides and its Hoffman reaction.

59. Explain Filler, Plasticizer and Anti-oxidants.

60. Explain classification of Lipids.
