

Question Booklet Series: **A**

Question Booklet Serial No.: **111608**

**CET (UG) – 2024**

**Important:** Please consult your Admit Card/Roll No. slip before filling your Roll Number on the Test Booklet and Answer Sheet.

Roll No.

(In Figure)

(In Words)

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O.M.R. Answer Sheet Serial No.

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Signature of Candidate: \_\_\_\_\_

Signature of Invigilator: \_\_\_\_\_

**SUBJECT: CHEMISTRY**

**Time: 70 Minutes**

**Number of Questions: 60**

**Total Marks: 120**

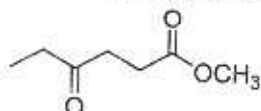
**DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO.**

**INSTRUCTIONS:**

1. Write your Roll No. on the Questions Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Question Booklet Serial No. on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball / Gel Pen only**.
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. The medium of examination shall be **English** only.
5. Please check that this Question Booklet contains **60** Questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of Test.
6. Each question has four alternative answer (A,B,C,D) of which only one is correct. For each question, darken only one bubble (A or B or C or D), whichever you think is the correct answer, on the Answer Sheet with **Black Ball / Gel Pen only**.
7. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Booklet. No marks will be deducted in such cases.
8. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the question given in the Question Booklet.
9. **Negative marking will be adopted for evaluation i.e. 25% of the marks of the question will be deducted for each wrong answer. A wrong answer means incorrect answer or wrong filling of bubble.**
10. The University will provide logarithmic table. Borrowing of log tables and any other material is not allowed.
11. For rough work only the blank sheet at the end of the Question Booklet be used.
12. The Answer Sheet is designed for computer evaluation. Therefore, if you do not follow the instructions given on the Answer Sheet, it may make evaluation by the computer difficult. **Any resultant loss to the candidate on the above account, i.e. not following the instructions completely, shall be of candidate only.**
13. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
14. In no case the Answer Sheet, the Question Booklet, or its part or any material copied/noted from this Booklet is to be taken out of the examination hall. Any candidate found doing so would be expelled from the examination.
15. **20 minutes** extra will be given to the visually handicapped/Person with Disability (PwD) for each paper.
16. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistance or found giving or receiving assistance or found using any other unfair means during the examination will be expelled from the examination by the Centre Superintendent/Observer whose decision shall be final.
17. Tele-communication equipment such as Cellular/cordless phones, pager, wireless, scanner, camera or any electronic/digital gadget etc., is not permitted inside the examination hall. **Use of calculator is not allowed.**
18. The candidates will not be allowed to leave the Examination Hall/Room before the expiry of the allotted time.

1.  $\text{Ca}^{2+}$  is isoelectronic with which of the following ion?  
(A)  $\text{H}^+$  (B)  $\text{Li}^+$  (C)  $\text{K}^+$  (D)  $\text{Mg}^{+2}$
2. The purple color of  $\text{KMnO}_4$  is due to:  
(A) Frenkel defect (B) Charge transfer transition  
(C) d-d Transition (D) Schottky defect
3. Maximum polarization or maximum percentage of covalent character is observed in which of the following salts of lithium:  
(A)  $\text{LiF}$  (B)  $\text{LiCl}$  (C)  $\text{LiBr}$  (D)  $\text{LiI}$
4. The angular shape of ozone molecule consists of:  
(A) Two  $\sigma$  bonds and one  $\pi$  bond (B) Two  $\sigma$  bonds and two  $\pi$  bonds  
(C) One  $\sigma$  bond and one  $\pi$  bond (D) Two  $\sigma$  bonds and three  $\pi$  bonds
5. Identify the correct electronic configuration for Gadolinium ion ( $\text{Gd}^{2+}$ ):  
(A)  $[\text{Xe}] 4f^5 5d^0 6s^2$  (B)  $[\text{Xe}] 4f^6 6s^2$  (C)  $[\text{Xe}] 4f^6 5d^1 6s^1$  (D)  $[\text{Xe}] 4f^7 5d^1$
6. 'Chlorophyll' a green color pigment responsible for photosynthesis in plants contains which of the following metal in its active center?  
(A) Fe (B) Mg (C) Mn (D) Co
7. Which of the following is the correct hybridization and magnetic nature of  $[\text{Co}(\text{NH}_3)_6]^{3+}$  ion?  
(A)  $\text{sp}^3\text{d}^2$ , diamagnetic (B)  $\text{sp}^3\text{d}^2$ , paramagnetic  
(C)  $\text{d}^2\text{sp}^3$ , diamagnetic (D)  $\text{d}^2\text{sp}^3$ , paramagnetic
8. Which among the following has highest first ionization energy?  
(A) Li (B) C (C) O (D) N
9. Which among the following ion will precipitate out as sulphide by passing  $\text{H}_2\text{S}$  gas through alkaline solution?  
(A)  $\text{Zn}^{2+}$  (B)  $\text{Hg}^{2+}$  (C)  $\text{Cu}^{2+}$  (D)  $\text{Bi}^{3+}$
10. What would be the molality of 1 molar  $\text{NaOH}$  solution?  
(A) 0.10 (B) 1.04 (C) 1.14 (D) 1.00
11. In which of the following compound peroxide linkage is not present?  
(A)  $\text{KMnO}_4$  (B)  $\text{CrO}_5$  (C)  $\text{H}_2\text{SO}_5$  (D)  $\text{H}_2\text{S}_2\text{O}_8$
12. Isotopes of an element differ by:  
(A) Number of electrons (B) Number of protons  
(C) Number of neutrons (D) Number of neutrons and protons
13. Which of the following has strong repulsion?  
(A) Lone pair-lone pair (B) Lone pair-bond pair  
(C) Bond pair-bond pair (D) All have equal repulsion
14. Ammonium dichromate on heating produce:  
(A)  $\text{NH}_3$  and  $\text{H}_2\text{O}$  (B)  $\text{N}_2$  and  $\text{H}_2\text{O}$  (C)  $\text{N}_2\text{O}$  and  $\text{H}_2\text{O}$  (D)  $\text{NO}_2$  and  $\text{H}_2\text{O}$

15. Which of the following is a stronger base?  
 (A)  $\text{PH}_3$  (B)  $\text{NH}_3$  (C)  $\text{SiCl}_4$  (D)  $\text{CCl}_4$
16. Which of the following compound hydrolyzes easily?  
 (A)  $\text{CCl}_4$  (B)  $\text{SiCl}_4$  (C)  $\text{SiO}_2$  (D)  $\text{SiC}$
17. Which oxidation state of copper is more stable in aqueous medium?  
 (A)  $\text{Cu(I)}$  (B)  $\text{Cu(II)}$  (C)  $\text{Cu(III)}$  (D)  $\text{Cu(IV)}$
18. When we pass steam over red-hot charcoal it produces:  
 (A)  $\text{CH}_4$  and  $\text{H}_2$  (B)  $\text{CO}_2$  and  $\text{H}_2$  (C)  $\text{CO}$  and  $\text{H}_2$  (D)  $\text{HCHO}$
19. What is the value of EAN of Co in complex  $[\text{Co}(\text{NH}_3)_6]^{3+}$ ?  
 (A) 32 (B) 35 (C) 24 (D) 36
20. Which of the following has high bond dissociation energy?  
 (A)  $\text{F}_2$  (B)  $\text{Cl}_2$  (C)  $\text{Br}_2$  (D)  $\text{I}_2$
21. The IUPAC name for the formula given below is:



- (A) Methyl-2-oxohexanoate (B) 3, 5- Dioxo hexylmethyl ether  
 (C) 1, 4- Dioxo hexylmethyl ether (D) Methyl-4-oxohexanoate
22. Which one of the following compound will not response to Lassaigne's test for nitrogen:  
 (A)  $\text{NH}_2\text{CONH}_2$  (B)  $\text{C}_6\text{H}_5\text{NHNH}_2$  (C)  $\text{NH}_2\text{NH}_2$  (D)  $\text{NH}_2\text{CONHNH}_2$
23. Arrange the following carbocation in order of increasing stability (least stable first):  
 I.  $(\text{CH}_3)_3\text{C}^+$  II.  $(\text{CH}_3)_2\text{CH}^+$  III.  $\text{CH}_3\text{CH}_2^+$  IV.  $^+\text{CH}_2\text{OCH}_3$   
 (A) I. < III. < II. < IV. (B) I. < II. < III. < IV.  
 (C) IV. < II. < III. < I. (D) III. < II. < I. < IV.
24. Which one of the following is electrophile?  
 (A)  $\text{H}_2\text{O}$  (B)  $\text{NH}_3$  (C)  $\text{H}_2\text{S}$  (D)  $\text{SnCl}_4$
25. Thermal decomposition of alkane in absence of air is called:  
 (A) Cracking (B) Isomerisation (C) Cyclisation (D) Dehydrogenation
26. In acid catalyzed dehydration of 3,3-dimethyl-2-butanol with conc.  $\text{H}_2\text{SO}_4$  the major product obtained is:  
 (A) 2,3-Dimethyl-2-butene (B) 3,3-Dimethyl-2-butene  
 (C) 2,3-Dimethyl-1-butene (D) 3,3-Dimethyl-1-butene
27. In the following reaction the compound X and Y are:  

$$\text{CH}_3\text{CH}_2\text{C}\equiv\text{CH} \xrightarrow[\text{II. C}_2\text{H}_5\text{Br}]{\text{I. NaNH}_2 / \text{Liq. NH}_3} \text{X} \xrightarrow{\text{Li} / \text{Liq. NH}_3} \text{Y}$$
  
 (A) X = 2-Hexyne; Y = *trans* - 3-Hexene (B) X = 3-Hexyne; Y = *trans* - 3-Hexene  
 (C) X = 3-Hexyne; Y = *cis* - 3-Hexene (D) X = 1-Hexyne; Y = 1-Hexene

28. Reaction of benzene with *iso*-butyl alcohol in presence of conc.  $H_2SO_4$  to give:  
 (A) *n*-Butyl benzene (B) *sec*-Butyl benzene  
 (C) *tert*.-Butyl benzene (D) *iso*-Butyl benzene
29. Which of the following gas contributes to greenhouse effect?  
 (A) Nitrogen (B) Oxygen (C) Methane (D) Hydrogen
30. Which of the following reagent is not suitable for synthesis of alkyl halide from alcohol?  
 (A)  $SOCl_2$  (B)  $PCl_3$  (C) Conc.  $HCl/ZnCl_2$  (D) Aq.  $NaCl$
31. Hydroboration oxidation of 2-methyl-2-butene give:  
 (A) 3-Methy-1-butanol (B) 2-Methy-2-butanol  
 (C) 3-Methy-butane-2,3-diol (D) 3-Methy-2-butanol
32. The best combination of reagents for synthesis of *tert*. butyl ethyl ether is:  
 (A)  $C_2H_5ONa / (CH_3)_3CBr$  (B)  $C_2H_5Br / (CH_3)_3CONa$   
 (C)  $(CH_3)_2C=CH_2 / C_2H_5ONa$  (D)  $(CH_3)_3CNH_2 / C_2H_5ONa$
33. Which of the following compound will not respond to Cannizzaro's reaction?  
 (A) Benzaldehyde (B) Acetaldehyde  
 (C) Formaldehyde (D) Trimethyl acetaldehyde
34. How many aldol products are possible when a mixture of acetaldehyde and propionaldehyde are treated with dil.  $KOH$  solution?  
 (A) Four (B) Two (C) Three (D) One
35. The most suitable reagent to convert acetophenone to benzoic acid is:  
 (A)  $CrO_3$  (B) alkaline  $KMnO_4$  (C)  $I_2 / NaOH$  (D) Tollen's reagent
36. In the following reaction sequence the product Y is  

$$C_6H_5CN \xrightarrow{H_2/Ni} X \xrightarrow{NaNO_2/HCl} Y$$
  
 (A) N-Nitrosobenzyl amine (B) Benzyl amine  
 (C) Benzyl alcohol (D) p-Nitrosobenzyl amine
37. The best possible route for synthesis of fluorobenzene in the laboratory is:  
 (A) Reaction of bromobenzene with sodium fluoride.  
 (B) Reaction of benzene with hydrofluoric acid.  
 (C) Direct fluorination of benzene.  
 (D) Thermolysis of benzenediazonium tetrafluoroborate.
38. The monomer of Nylon -6 is:  
 (A) Caprolactam (B) Acrylonitrile (C) p-Tolyl isocyanate (D) Vinyl chloride
39. The pyrimidine bases present in DNA are  
 (A) Cytosine and Adenine (B) Cytosine and Guanine  
 (C) Cytosine and Thymine (D) Cytosine and Uracil

40. Alkyl benzene sulphonates are important intermediate in production of:  
 (A) Soaps (B) Perfumes  
 (C) Synthetic detergents (D) Antibiotics
41. In a given sample of  $\text{H}_2\text{O}_2$  each 100 ml of solution contains 68 mg of  $\text{H}_2\text{O}_2$ . The molarity of the solution is:  
 (A) 20 M (B) 2M (C) 0.2 M (D) 0.02 M
42. The freezing point of a solution prepared from 1.25 g of non-electrolyte and 20 g of water is 271.9 K. If the molar depression constant is  $1.86 \text{ K mol}^{-1}$ , then the molar mass of the solute is  
 (A) 105.7 (B) 106.7 (C) 115.3 (D) 93.9
43. What is the percentage sodium in a breakfast cereal which is advertised to contain 110 mg of sodium per 100 g of cereal?  
 (A) 0.110% (B) 1.10% (C) 11% (D) 110%
44. Which of the following state functions is an extensive property of the system?  
 (A) Temperature (B) Volume (C) Refractive index (D) Pressure
45. A chemical reaction  $\text{A} \rightleftharpoons \text{B}$  is said to be in equilibrium when  
 (A) Complete conversion of A to B has taken place  
 (B) Conversion of A to B is only 50% complete  
 (C) Only 10% conversion of A to B has taken place  
 (D) Rate of transformation of A to B is just equal to rate of transformation of B to A in system
46. In a reversible process,  $\Delta S_{\text{sys}} + \Delta S_{\text{surr}}$  is:  
 (A)  $> 0$  (B)  $< 0$  (C)  $\geq 0$  (D)  $= 0$
47. With increase in pressure, the mean free path:  
 (A) Increases (B) Decreases (C) Becomes zero (D) Remains constant
48. The decomposition of  $\text{N}_2\text{O}_4$  to  $\text{NO}_2$  is carried out at  $280^\circ\text{C}$  in chloroform. When equilibrium is reached, 0.2 mol of  $\text{N}_2\text{O}_4$  and  $2 \times 10^{-3}$  mol of  $\text{NO}_2$  are present in 2L solution. The equilibrium constant for the equation  $\text{N}_2\text{O}_4 \rightleftharpoons 2 \text{NO}_2$  is:  
 (A)  $1 \times 10^{-2}$  (B)  $2 \times 10^{-3}$  (C)  $1 \times 10^{-5}$  (D)  $2 \times 10^{-5}$
49. The rate constant of nth order has units:  
 (A)  $\text{mol}^{(1-n)} \text{ litre}^{(n-1)} \text{ sec}^{(-1)}$  (B)  $\text{mol}^{(1-n)} \text{ litre}^{(1-n)} \text{ sec}^{(-1)}$   
 (C)  $\text{mol}^{(1-n)} \text{ litre}^{(n-1)} \text{ sec}$  (D)  $\text{mol}^{(1-2n)} \text{ litre}^{(n-2)} \text{ sec}$
50. The chemical reactions in which reactants require high amount of activation energy are generally:  
 (A) Instantaneous (B) Spontaneous (C) Slow (D) Fast
51. For a first order reaction, the plot of  $\log k$  against  $1/T$  is a straight line. The slope of the line is equal to:  
 (A)  $E_a/R$  (B)  $2.303/E_a \times R$  (C)  $E_a/2.303$  (D)  $-E_a/2.303 \times R$

52. A liquid mixture which boils without change in the composition is called a/an:  
 (A) Binary liquid mixture (B) Azeotropic mixture  
 (C) Isotropic mixture (D) Isobaric mixture
53. The increase in the value of molar conductivity of acetic acid with dilution is due to  
 (A) Increase in degree of ionisation (B) Increase in self ionisation of water  
 (C) Increase in potential value (D) Decrease in interionic forces
54. Pick out the incorrect statement:  
 (A) Equivalent conductance increases with dilution  
 (B) Specific resistance increases with dilution  
 (C) Specific conductance increases with dilution  
 (D) Molar conductance increases with dilution
55. The resistance of 0.05 N  $\text{CH}_3\text{COOH}$  is found to be 100 ohm. If the cell constant is  $0.037\text{cm}^{-1}$ , the molar conductivity of the solution is:  
 (A)  $3.7\text{ ohm}^{-1}\text{cm}^2\text{mol}^{-1}$  (B)  $7.4\text{ ohm}^{-1}\text{cm}^2\text{mol}^{-1}$   
 (C)  $37\text{ ohm}^{-1}\text{cm}^2\text{mol}^{-1}$  (D)  $74\text{ ohm}^{-1}\text{cm}^2\text{mol}^{-1}$
56. A buffer solution is prepared by mixing 10 ml of 0.1 M acetic acid and 20 ml of 0.5 M sodium acetate and then diluted to 100 ml with distilled water. If the  $\text{pK}_a$  of  $\text{CH}_3\text{COOH}$  is 4.76, what is the pH of the buffer solution prepared?  
 (A) 5.21 (B) 4.34 (C) 4.76 (D) 5.94
57. The equation giving variation of heat of a reaction with temperature is known as:  
 (A) Kirchoff's equation (B) Vant Hoff isotherm equation  
 (C) Vant Hoff isochore equation (D) Hess's law
58. A person adds 1.71 gram of sugar ( $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ ) in order to sweeten his tea. The number of carbon atoms added are (molecular mass of sugar = 342):  
 (A)  $0.6 \times 10^{22}$  (B)  $1.6 \times 10^{22}$  (C)  $2.6 \times 10^{22}$  (D)  $3.6 \times 10^{22}$
59. Which of the following will have the largest pH?  
 (A) M/10 HCl (B) M/100 HCl (C) M/10 NaOH (D) M/100 NaOH
60. The partial pressure of a solution component is directly proportional to its mole fraction. This statement is known as:  
 (A) Henry's law (B) Raoult's law  
 (C) Distribution law (D) Ostwald's dilution law

x-x-x