Sr. No. : 110897

CET (PG) – 2017

Booklet Series Code : A

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

	(In Figures)	(In Words)
Roll No. :		.....

O.M.R. Answer Sheet Serial No. :

Signature of the Candidate : .....

Subject : M.Sc. (Hons. School/2 Years Course)–Chemistry

Time : 90 Minutes] **[Maximum Marks : 75**

No. of Questions : 75] **[Total No. of Printed Pages : 16**

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

INSTRUCTIONS :

1. Write your Roll No. on the Question Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Subject and Series Code of Question Booklet on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point/Black Gel Pen.**
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. To open the Question Booklet remove the paper seal gently when asked to do so.
5. Please check that this Question Booklet contains **75** questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of test.
6. Each question has four alternative answers (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 Point/Black Gel Pen.**
7. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Sheet. No marks will be deducted in such cases.
8. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the questions given in the Question Booklet.
9. Negative marking will be adopted for evaluation i.e., 1/4th 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. For calculations, use of simple log tables is permitted. Borrowing of log tables and any other material is not allowed.
11. For rough work only the sheets marked "Rough Work" 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 the 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. 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.
16. **Telecommunication equipment such as pager, cellular phone, wireless, scanner, etc., is not permitted inside the examination hall. Use of calculator is not allowed.**

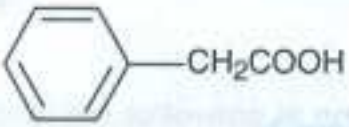
SEAL

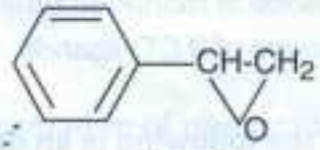
1. **Which of the following radiations has highest frequency ?**

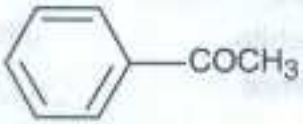
(A) Microwave (B) Radio-wave

(C) Infra-red (D) Gamma rays

2. **A compound of molecular formula C_8H_8O has a strong infrared absorption band near 1690 cm^{-1}. The most probable structure for the compound is :**

(A) 

(B) 

(C) 

(D) 

3. **The stretching vibration frequencies of C = N (alkyl Cyanide) is in the region of (in cm^{-1}).**

(A) 1600–1250 (B) 2260–2240

(C) 2900–2800 (D) 3500–3300

4. **Toluene, in ^{1}HNMR spectroscopy gives :**

(A) no signal (B) only one signal

(C) two signals (D) six signals

5. **An acetic acid was neutralized to 90% by adding NaOH. If the pH of the resulting solution is 4.70, the K_a of acetic acid is :**

(A) 1.795×10^{-4} (B) 1.795×10^{-5}

(C) 6.712×10^{-4} (D) 6.712×10^{-5}

6. **In a mixture of HNO_3 and H_2SO_4 :**

(A) HNO_3 acts as an acid (B) H_2SO_4 acts as a base

(C) Base act as acid (D) HNO_3 act as a base

7. **Ammonium compound which does not give NH_3 on heating is :**

(A) NH_4Cl (B) NH_4NO_2

(C) $(NH_4)_2CO_3$ (D) $(NH_4)_2SO_4$

8. **$[Fe_2(CO)_9]$ is a diamagnetic carbonyl compound because of :**

(A) presence of one CO as bridging group

(B) metal-metal (Fe-Fe) bond in molecule

(C) presence of monodenatate ligand

(D) presence of 9 CO ligands

9. **Which of the following is an example of Zinc ore ?**

(A) Magnetite (B) Malachite

(C) Cryolite (D) Willemite

10. **The stereochemical character of S_N2 reaction is :**

(A) retention (B) inversion

(C) racemization (D) both inversion and retention

11. **Benzyne is generated from :**

(A) Chlorobenzene in presence of sodamide in liquid NH_3

(B) Benzene with sodium in liquid NH_3

(C) Benzene in liquid NH_3

(D) The action of heat on benzoic acid

12. **The I-effect of Cl is maximum in :**

(A) $CH_3CH_2CH_2\underset{\displaystyle Cl}{\underset{|}{C}}HCOOH$ (B) $CH_3CH_2\underset{\displaystyle Cl}{\underset{|}{C}}HCH_2COOH$

(C) $CH_3\underset{\displaystyle Cl}{\underset{|}{C}}HCH_2CH_2COOH$ (D) $\underset{\displaystyle Cl}{\underset{|}{C}}H_2CH_2CH_2CH_2COOH$

13. **The nitrine is not formed by the photolysis of :**

(A) NO_2 (B) NH_3

(C) N_2H_4 (D) RN_3

14. **Betaine is an intermediate in :**

(A) Robinson annulation (B) Wolff-Kishner reduction

(C) Witting reaction (D) Birch reduction

15. **Which of the following gives characteristic deep colour with $FeCl_3$?**

(A) Acetone (B) Acetic acid

(C) Ethanol (D) Phenol

16. **Which of the following is not involved in formation of photochemical smog ?**

(A) NO (B) O_3

(C) C_xH_y (D) SO_2

17. **Ozone layer is present in :**

(A) troposphere (B) stratosphere

(C) mesosphere (D) exosphere

18. **The most convenient spectroscopic technique to establish the presence of intermolecular hydrogen bonding in hydroxy compound is :**

(A) UV (B) IR

(C) EPR (D) Mass

19. **The compound whose mass spectrum shows m/e values at 156 (M^+, base peak), 127 and 29 is :**

(A) C_2H_5Br (B) CH_3I

(C) CH_3Br (D) C_2H_5I

20. **Which is most commonly used to dry organic liquids :**

(A) lithium (B) sodium

(C) potassium (D) rubidium

21. Amongst the following, the complex ion that would show strong Jahn-Teller distortion is :

(A) $[Cr(H_2O)_6]^{2+}$ (B) $[Ti(H_2O)_6]^{3+}$

(C) $[Co(H_2O)_6]^{2+}$ (D) $[Fe(H_2O)_6]^{2+}$

22. In photosynthesis the PS-I absorb light of wavelength :

(A) 680 nm (B) 700 nm

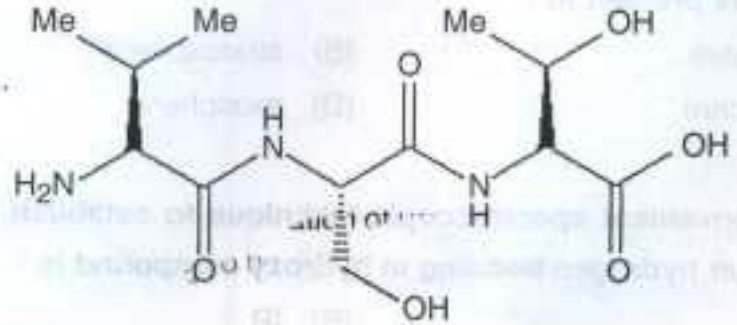
(C) 780 nm (D) 600 nm

23. The number of S-S bonds in sulphur trioxide trimer (S_3O_9) is :

(A) 3 (B) 2

(C) 1 (D) 0

24. The correct sequence of the amino acids present in the tripeptide given below is :



(A) Val-Ser-Thr (B) Val-Thr-Ser

(C) Leu-Ser-Thr (D) Leu-Thr-Ser

25. When aniline is treated with fuming sulphuric acid at 475 K, it gives :

(A) Sulphanilic acid (B) Aniline sulphate

(C) o-aminobenzenesulphonic acid (D) m-aminobenzenesulphonic acid

26. 1 mL of 10% aq. NaCl solution is added to 10 mL red gold sol. In presence of 25 g of starch, the colour change from red to blue is just prevented. Starch has gold number :

(A) 0.025 (B) 0.25

(C) 250 (D) 2.5

27. **In the proton NMR spectrum of 1-chloropropan-2-ol, the number of signals are :**
(A) 6 (B) 5
(C) 4 (D) 3

28. **The number of bridging carbonyl groups present in $Fe_2(CO)_9$ is :**
(A) 2 (B) 5
(C) 6 (D) 3

29. **Anhydrous $AlCl_3$ is covalent but hydrated $AlCl_3.6H_2O$ is ionic because :**
(A) $AlCl_3$ dissolves in CS_2
(B) $AlCl_3$ has planar structure
(C) IE of Al is low
(D) Hydration energy of Al compensates of IE

30. **The ground state term symbol for high spin Ni^{2+} is :**
(A) ^3F (B) ^3P
(C) ^1D (D) ^3D

31. **Aluminium phosphate is 100% ionized in 0.01 molal aqueous solution. Hence $\Delta T_b/K_b$ is :**
(A) 0.01 (B) 0.015
(C) 0.0175 (D) 0.02

32. **Absorbance A and Transmittance T are related as :**
(A) $A = \log T$ (B) $A = -\log T$
(C) $A = \log \frac{1}{T}$ (D) $A = -\log \frac{1}{T}$

33. **As per the kinetic theory of ideal gases, which of the following statements is NOT correct ?**
(A) gas particles have mass but no volume
(B) particles are in a Brownian motion between collisions
(C) during the collision, the system does not lose energy
(D) particles exert same force per unit area on all sides of the container

34. **The Nernst Distribution law need no modification with change in which of the following molecular state of the solute :**

(A) Association of the solute in one of the solvents
(B) Dissociation of the solute in one of the solvents
(C) Dissociation of the solute in both the solvents
(D) The solute enters into chemical combination with one of the solvents

35. **The rate law for reaction between the substances A and B is given by : Rate = $k[A]^n[B]^m$, on doubling the concentration of A and halving the concentration of B, the ratio of the new rate to the earlier rate of reaction will be :**

(A) $m+n$ (B) $n-m$
(C) $2^{(n-m)}$ (D) $1/2^{m+n}$

36. **Which of the following halogens had the highest bond energy ?**

(A) F_2 (B) Cl_2
(C) Br_2 (D) I_2

37. **Hydrolysis of urea by urease is :**

(A) first order at high concentration of urea
(B) zero order at high concentration of urea
(C) independent of the concentration of urea
(D) first order with respect to both urea and urease.

38. **An enzyme which catalyse the breakdown of starch into maltose is :**

(A) Zymase (B) Diastase
(C) Invertase (D) Maltase

39. **The complex used as an anticancer agents is :**

(A) mer-$[Co(NH_3)_3Cl_3]$ (B) Cis-$[PtCl_2(NH_3)_2]$
(C) Cis-$K_2[PtCl_2Br_2]$ (D) $Na_2[CoCl_4]$

40. **Mg is an important component of which biomolecule occurring extensively in living world ?**

(A) Haemoglobin (B) Chlorophyll
(C) Ferrodoxin (D) ATP

41. **Vitamin B-12 contains :**

(A) Cobalt (B) Magnesium

(C) Iron (D) Nickel

42. **0.2 g of an organic compound on complete combustion produces 0.44 g of CO_2, then the percentage of carbon in it is :**

(A) 50 (B) 60

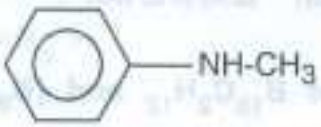
(C) 70 (D) 80

43. **Copper wire test is called :**

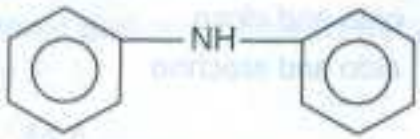
(A) Dumas test (B) Liebig test

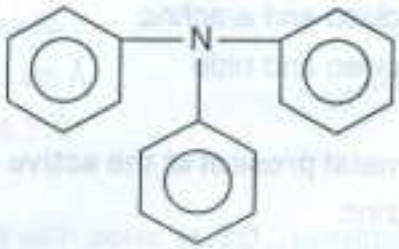
(C) Beilstein's test (D) Fusion test

44. **Which of the following amines will give positive isocyanide test :**

(A) 

(B) 

(C) 

(D) 

45. **The protein which controls the amount of sugar in blood is :**

(A) Heamoglobin (B) Oxytocin

(C) Insulin (D) Ptylain

46. **Which of the following reagents is used for the separation of primary, secondary and tertiary amines ?**

(A) CH_3COCl (B) C_6H_5COCl

(C) $C_6H_5SO_2Cl$ (D) R_2Zn

47. **The reactive intermediate involved in the conversion of phenol to salicyldehyde using chloroform and sodium hydroxide is :**

(A) Cl_2C (B) Cl_2CH^+

(C) Cl_2CH^- (D) Cl_2CH^+

48. **Among the compounds Fe_3O_4, $NiFe_2O_4$ and Mn_3O_4 :**

(A) $NiFe_2O_4$ and Mn_3O_4 are normal spinels

(B) Fe_3O_4 and Mn_3O_4 are normal spinels

(C) Fe_3O_4 and Mn_3O_4 are inverse spinels

(D) Fe_3O_4 and $NiFe_2O_4$ are normal spinels

49. **The number of manganese ions in tetrahedral and octahedral sites, respectively in Mn_3O_4 are :**

(A) One Mn^{2+} and two Mn^{3+} (B) one Mn^{3+} and two Mn^{2+}

(C) two Mn^{3+} and one Mn^{2+} (D) two Mn^{2+} and one Mn^{3+}

50. **According to Wade's rule, the structures of $B_{10}C_2H_{12}$ and $[B_9C_2H_{11}]^{2-}$ respectively are :**

(A) closo and arachno (B) nido and closo

(C) closo and nido (D) nido and arachno

51. **The metal present at the active site of the protein carboxypeptidase A is :**

(A) zinc (B) molybdenum

(C) magnesium (D) cobalt

52. **The total number of metal-metal bonds in $Ru_3(CO)_{12}$ and $Co_4(CO)_{12}$ respectively, is :**

(A) 3 and 6 (B) 4 and 5

(C) zero and 4 (D) 3 and 4

53. **The charge on the colloidal particle is not due to :**

(A) Preferential adsorption (B) Electrical double layer

(C) Self dissociation (D) Presence of acidic or basic group

54. In a reaction 4 moles of HNO_3 accept 12 moles electron from a reducing agent. The nitrogeneous reduction product of HNO_3 is :

(A) N_2 gas (B) NO_2 gas

(C) NH_3 gas (D) NO gas

55. One Faraday of electricity will liberate one gram atom of the metal from the solution of :

(A) NaCl (B) $BaCl_2$

(C) $CuSO_4$ (D) $AlCl_3$

56. In a face centred cubic arrangement of A and B atoms whose A atoms are at the corner of the unit cell and B atoms at the face centres. One of the A atom is missing from one corner in unit cell. The simplest formula of compound is :

(A) A_7B_3 (B) A_7B_{24}

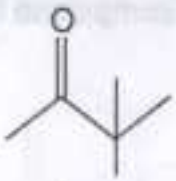
(C) AB_3 (D) $A_{7/8}B_3$

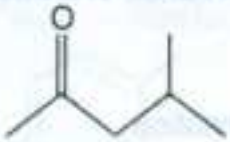
57. CsBr crystal has BCC structure. It has an edge length of 4.3Å. The shortest interionic distance between Cs^+ and Br^- ions is :

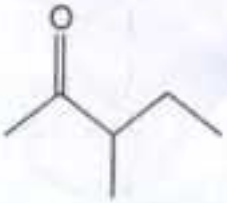
(A) 3.72 Å (B) 1.86 Å

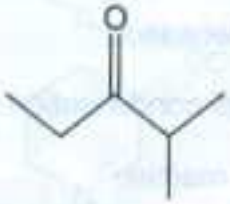
(C) 7.44 Å (D) 4.3 Å

58. When 2, 3-dimethyl-2, 3-butanediol is heated with conc. H_2SO_4, product formed is :

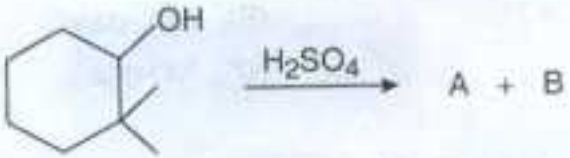
(A) 

(B) 

(C) 

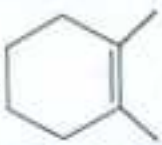
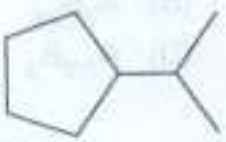
(D) 

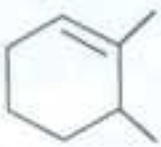
59. Identify the product A and B in the following reaction :



(A) A =  B = 

(B) A =  B = 

(C) A =  B = 

(D) A =  B = 

60. Condensation of an aliphatic or aromatic aldehyde with an active methylen compound in presence of a base of form α, β unsaturated compound is know as :

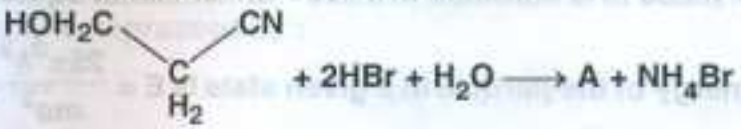
(A) Aldol condensation

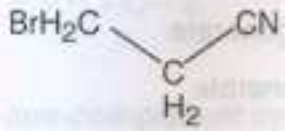
(B) Perkin condensation

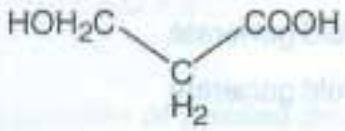
(C) Knoevenagel condensation

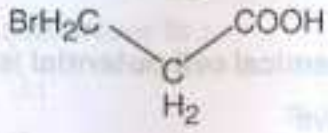
(D) Cannizzaro reaction

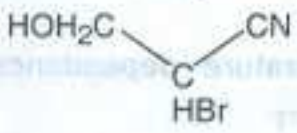
61. The product A in the following reaction is :



(A) 

(B) 

(C) 

(D) 

62. A compound containing carbon, hydrogen and bromine has molecular formulae C_4H_9Br. It gave the following Proton NMR data :

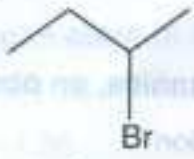
(i) Doublet, $\delta = 1.04$, 6H

(ii) Doublet, $\delta = 3.33$, 2H

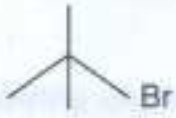
(iii) multiplet, $\delta = 1.95$, 1H

Assign a plausible structure to the compound

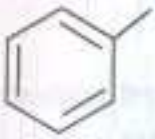
(A) 

(B) 

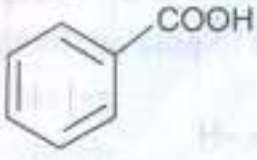
(C) 

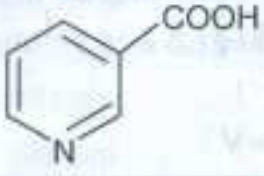
(D) 

63. The product formed in the oxidation of quinoline by $KMnO_4$ followed by heating is :

(A) 

(B) 

(C) 

(D) 

64. A particle of mass m is confined in a two – dimensional square box with side a. the eigen-energy of the particle in a given state is $E = \frac{25\pi^2\hbar^2}{ma^2}$. The state is :

(A) 4-fold generate
(B) 3-fold generate
(C) 2-fold generate
(D) non-generate

65. The temperature - dependence of an electrochemical cell potential is :

(A) $\Delta G/nFT$
(B) $\Delta H/nF$
(C) $\Delta S/nF$
(D) $\Delta S/nFT$

66. Which of the following elements shows maximum number of different oxidation states in its compounds ?

(A) Eu
(B) Zn
(C) Gd
(D) Am

67. In quantum mechanics, an observable is represented by :

(A) A wave-function
(B) An eigen function
(C) An operator
(D) A complex valued function

68. Identify the extensive property from the following :

(A) Temperature
(B) Volume
(C) Pressure
(D) Refractive index

69. Point out the correct relationship :

(A) $\left(\frac{\partial A}{\partial V}\right)_P = -T$
(B) $\left(\frac{\partial A}{\partial T}\right)_P = -P$
(C) $\left(\frac{\partial G}{\partial P}\right)_T = V$
(D) $\left(\frac{\partial G}{\partial T}\right)_P = -H$

70. In terms of number of phases (P), Components (C) and degrees of freedom (F), the phase rule is expressed as :

(A) $P + C = F + 2$ (B) $P + F = C + 2$

(C) $F = P + C - 2$ (D) $P - F = C + 2$

71. In a one-component system, the maximum number of phases that can coexist in equilibrium is :

(A) 3 (B) 1

(C) 2 (D) 4

72. The equivalent conductivity at infinite dilution of NH_4Cl, NaOH and NaCl are 139.8, 214.8 and 110.6 Ω^{-1} cm^2 eq^{-1} respectively. Calculate equivalent conductivity (in Ω^{-1} cm^2 eq^{-1}) at infinite dilution for NH_4OH.

(A) 185.6 (B) 465.2

(C) 35.6 (D) 244

73. The ionization energy (in eV) of the hydrogen atom in the ground state is :

(A) –13.6 (B) –1.36

(C) 13.6 (D) 1.36

74. A unit cell in a solid which have the following crystallographic dimensions belong to which crystal system : $\alpha = \beta = \gamma = 90°$ and $a = b \neq c$.

(A) Monoclinic (B) Orthorhombic

(C) Hexagonal (D) Tetragonal

75. A reflection from (111) planes of a cubic crystal was observed at a glancing angle of 11.2°C when X-rays of wavelength 154pm were used. What is the length of the side of the unit cell ? Given sin 11.2° = 0.1944

(A) 396 pm (B) 454 pm

(C) 576 pm (D) 686 pm