# VIDYASAGAR UNIVERSITY
MIDNAPORE

## COMMON ENTRANCE TEST FOR PG ADMISSION, 2019

**Question Booklet No. 1915881**
**Subject: CHEMISTRY**
**Subject Code No.: 19**

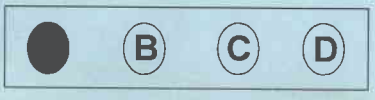
Full Marks : 200
**Question Booklet Series: C**

Answer all the questions. Each question has the same weightage.

**Read the following instructions carefully before you start answering.**

### INSTRUCTIONS

1. The question Booklet is printed in four Series e.g. (A), (B), (C) and (D). The candidate has to indicate the Series of the question booklet in the space provided in the OMR Answer Sheet . For example, if the candidate gets Series (A) booklet, he / she has to indicate on the front side of the OMR Answer Sheet with Black ink ball point pen only as indicated below:




2. There are 50 questions inside this question booklet. Immediately after you have been instructed to open this question booklet, ensure that any page / question is not missing / not printed / torn /repeated. In case you find any defect anywhere in the question booklet, immediately get it replaced by the Invigilator.

3. Each question carries 4 marks. 1(one) mark will be deducted for each wrong answer(negative marking).

4. Write your Form No and put signature in the space provided.

5. Before answering, write down the necessary information on the OMR Answer Sheet as per your Application Form and Admit Card in the specific space provided.

6. With each question you will find 4 possible answers marked by the letters A, B, C & D. Read each question carefully and find out which answer, according to you, is correct / most appropriate / best. Indicate your answer by darkening the appropriate circle completely in the OMR Answer Sheet corresponding to the question. For marking answers, use black ink ball pen only. If 'B' is the correct answer in a case, mark as below:


7. Do not fold or make any stray marks on the OMR Answer Sheet.

8. You can use the blank space of the last page for rough work. Do not tear it off from the Question Booklet.

9. After the examination has been over, you must submit OMR Answer Sheet to the Invigilator.

10. OMR Answer Sheet is designed for computer evaluation. If you do not follow the instructions given above and shown in the OMR Answer Sheet, it may make evaluation by computer difficult. Any resultant loss to the candidate on the above account shall be of the candidate only.

11. No candidate shall be allowed to use Mobile phone. Log tables or Calculator of any description in the examination hall / room.

SEALED

1. The reducing power of $M^{2+}$ ions ($M^{2+}$=$Ge^{2+}$, $Pb^{2+}$, $Sn^{2+}$) is in the order:
(A) $Sn^{2+} > Ge^{2+} > Pb^{2+}$ (B) $Ge^{2+} > Sn^{2+} > Pb^{2+}$ (C) $Pb^{2+} > Sn^{2+} > Ge^{2+} >$ (D) $Sn^{2+} > Pb^{2+} > Ge^{2+}$

2. Which of the following salts does not exist?
(A) $NaH_2PO_2$ (B) $NaH_3P_2O_7$ (C) $NaH_2PO_3$ (D) $NaH_2PO_4$

3. The metal-metal bond orders in the dimolybdenum species $[Mo_2(SO_4)_4]^{4-}$, $[Mo_2(HPO_4)_4(H_2O)_2]^{2-}$ and $[Mo_2(SO_4)_4(H_2O)_2]^{3-}$ are:
(A) 3.0, 4.0 and 3.5, respectively (B) 4.0, 3.0 and 3.5, respectively
(C) All 4.0. (D) 3.5, 3.0 and 4.0, respectively

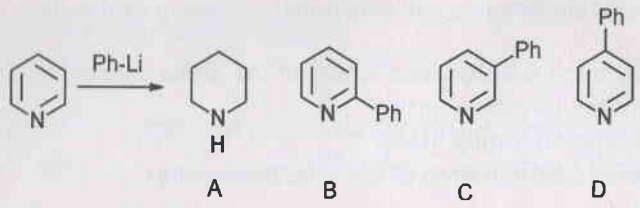
4. The hydrolysis of urea by urease is:
(A) first order at high concentration of urea (B) zero order at high concentration of urea
(C) independent of the concentration of urea (D) first order with respect to both urea and urease

5. The absorbance of solution having 20% transmittance is:
(A) 0.301 (B) 0.699 (C) 1.301 (D) 1.699

6. Which one of the following pairs consist of a good oxidizing and a good reducing agent respectively?
(A) Ce (III), In (III) (B) Ce (IV), Eu (III) (C) Ce (III), Eu (II) (D) Ce (IV), Sm (II)

7. The specific conductance of 0.1 (N) KCl solution is 0.0129 mho $cm^{-1}$. The resistance of the solution in the cell is 100 ohm. The cell constant of the cell will be:
(A) 1.10 $cm^{-1}$ (B) 1.29 $cm^{-1}$ (C) 0.56 $cm^{-1}$ (D) 2.80 $cm^{-1}$

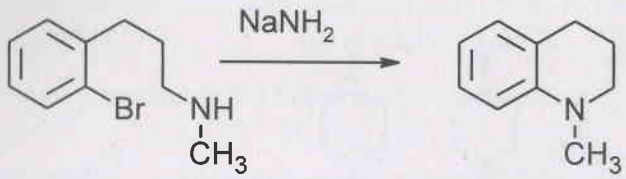
8. In the following transformation, the major product formed is:




9. Cyclopropyl cation **1** and cyclopropyl anion **2** respectively are


(A) both aromatic (B) aromatic and antiaromatic
(C) both antiaromatic (D) antiaromatic and aromatic

10. The following transformation occurs via:

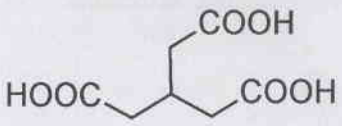



(A) a free radical (B) an anion (C) a carbocation (D) an aryne

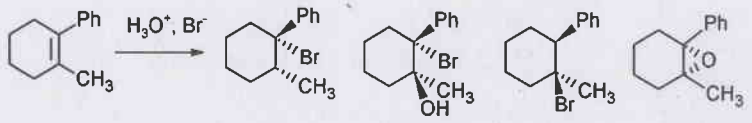
11. $^1$H-NMR spectrum of $CH_3CH_2NO_2$ would show
(A) a triplet and a quartet (B) a triplet and a doublet
(C) a doublet of a triplet (D) none of the above

12. If $\Delta G°$ is zero for a reaction, then which one of the following is correct?
(A) $\Delta H = 0$ (B) $\Delta S = 0$
(C) equilibrium constant is 1 (D) rate constant is 1

13. The IUPAC nomenclature of
(A) tri-carboxymethyl methane
(B) (carboxymethyl) pentane-dioic acid
(C) isobutane-tricarboxylic acid
(D) none of the above




14. The major product formed in the following reaction is:




(A) (B) (C) (D)

15. $NCl_3$ is hydrolyzed by water to produce:
(A) $NH_2$-$NH_2$ and HCl (B) $NH_2Cl$ and HOCl (C) $NH_3$ and HCl (D) $NH_2OH$ and HOCl

16. The magnitude of this quantity does not indicate the departure of a real gas from ideal gas behavior:
(A) compressibility factor (B) Joule-Kelvin coefficient
(C) fugacity (D) entropy

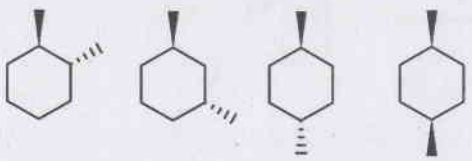
17. Which of the following statements regarding IR spectroscopy is wrong?
(A) infrared radiation is higher in energy than UV radiation.
(B) infrared spectra record the transmission of IR radiation.
(C) molecular vibrations are due to periodic motions of atoms in molecules, and include bond stretching, torsional changes, and bond angle changes.
(D) infrared spectra give information about bonding features and functional groups in molecules.

18. If the migrating group in Beckamann rearrangement is chiral then which of the given statements are true?
(A) there will be inversion of configuration of the migrating group
(B) there will be retention of configuration of the migrating group
(C) there will be both retention and inversion of configuration of the migrating group
(D) there is nothing to do with configuration

19. The wave function in the ground state of H-atom is given by $\Psi = (1/\pi a^3)^{1/2}\, e^{-r/a}$. The average value of 'r' is:
(A) 0 (B) 0.5 $a$ (C) 1.5 $a$ (D) 2.5 $a$

20. For strong electrolyte the plot of molar conductance versus $c^{1/2}$ is:
(A) parabolic (B) circular (C) sinusoidal (D) linear

21. The most stable isomer among the following is:



(A) (B) (C) (D)

22. Co-enzyme is:
(A) a nucleic acid
(B) an inorganic ion
(C) a vitamin which reacts with the enzyme
(D) a carbohydrate is required for enzymatic function

23. There are two electrode concentration cells of Ag electrode in $AgNO_3$. In the first cell concentration of one electrode is 1 (M) and the other electrode is 0.1 (M) and EMF is 0.06 V. In the second cell concentration of one electrode is 1 (M) and the other electrode is 0.01 (M). EMF of the second cell is:
(A) 0.12 V (B) 0.06 V (C) 0.09 V (D) 0.16 V

24. How would you expect the CMC of the following surfactants to vary:
i) sodium dodecylsulfate, ii) Tween 20 and iii) dodecyltrimethyl ammonium bromide.
(A) i<ii<iii (B) iii>i>ii (C) i=iii>ii (D) i=ii<iii

25. Probability of finding a quantum Harmonic Oscillator at mid-position for its ground and first excited state is $P_1$ and $P_2$ respectively. Which of the following is correct?
(A) $P_1 = P_2$ (B) $P_1 > P_2$ (C) $P_1 < P_2$ (D) $P_2 \geq P_1$

26. The structures of $[Os(O)_2(S_2O_3)_2]^{2-}$ and $[OsCl(O)_4]^-$ are:
(A) both trigonal bipyramidal
(B) octahedral and square pyramidal, respectively.
(C) tetrahedral and trigonal bipyramidal, respectively.
(D) square planar and square pyramidal, respectively.

27. The main products obtained on heating the Cs, Mg and Sr in an excess of oxygen at atmospheric pressure are:
(A) all superoxides
(B) superoxide, oxide and peroxide, respectively
(C) peroxide, superoxide and oxide, respectively
(D) oxide, peroxide and superoxide, respectively

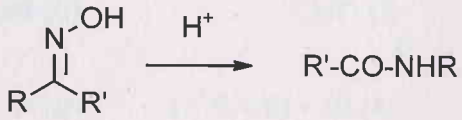
28. Which of the following contains P-P bond?
(A) $P_2O_7^{4-}$ (B) $P_2O_6^{4-}$ (C) $P_2O_5^{4-}$ (D) $PO_5^{3-}$

29. The S-P-S bond angle in $P_4S_3$ is:
(A) 109.5° (B) 120° (C) 90° (D) 60°

30. What is the number of rotational degrees of freedom in carbon dioxide?
(A) one (B) two (C) three (D) four

31. The following transformation is an example of

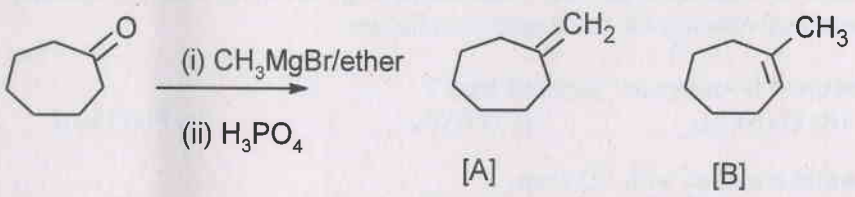
(A) Lossen rearrangement (B) Curtius rearrangement
(C) Hoffman degradation (D) Beckmann rearrangement




32. Enthalpy of an ideal gas depends on:
(A) pressure (B) temperature (C) volume (D) molecular weight

33. In a reaction the order with respect to $OH^-$ ion is -1. The species acts as a/an:
(A) catalyst (B) neutralizing agent (C) promoter (D) inhibitor

34. The major product in the following transformation is:



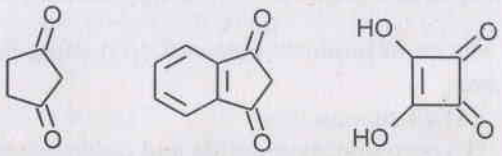

(A) [A] is major product
(B) [B] is the major product
(C) Both [A] and [B] are formed in 1:1 ratio
(D) none of these

35. On treatment with a base, an aqueous solution of an aromatic compound "X" converted to "Y" showing a shift of the absorption maxima from 318.5 nm to 400 nm by UV-Visible spectroscopy. The compounds "X" and "Y" are:
(A) 4-nitrophenol and 4-nitrophenolate anion
(B) 4-nitrobenzoic acid and 4-nitrobenzoate anion
(C) phenol and phenolate anion
(D) benzoic acid and benzoate anion

36. The common sources of Li, Na and K elements are:
(A) trona, spodumene and sylvite, respectively
(B) spodumene, trona and sylvite, respectively
(C) sylvite, spodumene and trona, respectively
(D) spodumene, trona and barite, respectively

37. Consider the following:
1. $(\partial H/\partial P)_T = C_P$ 2. $(\partial G/\partial P)_T = V$ 3. $(\partial T/\partial P)_H = \mu_{JT}$
Which of the above are the thermodynamic relations?
(A) 2 only (B) 3 only (C) 1 and 2 (D) 2 and 3

38. The correct order of acidity of the following compounds is:



1 2 3

(A) 2>1>3
(B) 1>2>3
(C) 3>1>2
(D) 1>3>2

39. Photochemical smog always contains:
(A) CO (B) $CH_4$ (C) $O_3$ (D) NO

40. Which of the following wave functions can be solution of Schrödinger equation for all: values of x (x > 0)?
(A) $\Psi = A\ Sec(x)$ (B) $\Psi = A\ tan(x)$ (C) $\Psi = A\ exp(x^2)$ (D) $\Psi = A\ exp(-x^2)$

41. The stability order of the following carbocations
(I) $Ph_3C^+$, (II) $Ph_2CH^+$, (III) $PhCH_2^+$, (IV) $Me_2CH^+$
is:

(A) IV > III > II > I (B) IV > II > III > I (C) III > II > IV > I (D) I > II > III > IV

42. The Bayer's angle strain is expected to be minimum in:
(A) cyclooctane (B) cyclohaxane (C) cyclopentane (D) cyclodecane

43. Which of the following statements is wrong?
(A) UV absorption is attributable to electronic transitions.
(B) UV spectra provide information about valence electrons.
(C) IR absorption is attributable to transitions between rotational energy levels of whole molecules.
(D) NMR spectrometers use radiofrequency electromagnetic radiation.

44. Which of the following compound is known as "sugar of lead"?
(A) $PbCl_2$ (B) $Pb(NO_3)_2$ (C) $PbSO_4$ (D) $Pb(OAc)_2$

45. When acetone is dissolved water enriched with $^{18}O$ then
(A) recovered acetone will not contain $^{18}O$
(B) recovered acetone will contain $^{18}O$
(C) recovered acetone will contain $^{13}C$
(D) recovered acetone will contain $^{2}H$

46. The double bond equivalents of the following compounds: $C_7H_6O_2$, $C_3H_7N$, $C_{10}H_7Cl$ and $C_{12}H_{16}N_2O$ respectively are:
(A) 5, 1, 7, 6 (B) 4, 1, 7, 6 (C) 5, 2, 7, 6 (D) 3, 2, 7, 6

47. Which of the following oxo-cation is most stable?
(A) $NO^+$ (B) $PO^+$ (C) $BiO^+$ (D) $AsO^+$

48. Pyrosilicates are the silicates in which two tetrahedral units are linked at:
(A) two points (B) three points (C) four points (D) one point

49. How many CO ligands can be replaced by two NO ligands when a homoleptic octahedral metal carbonyl undergoes substitution reaction?
(A) 2 (B) 4 (C) 3 (D) 1

50. The amino acid containing two chiral centers is:
(A) alanine (B) tryptophan (C) leucin (D) isoleucin