## UNIVERSITY OF MYSORE <br> Postgraduate Entrance Examination November - 2021



(Read carefully the instructions given in the Question Booklet)


## SUBJECT: Chemistry/Organic Chemistry

MAXIMUM MARKS : 50
(Including time for filling O.M.R. Answer sheet)

## INSTRUCTIONS TO THE CANDIDATES

1. The sealed question paper booklet containing 50 questions enclosed with O.M.R. Answer Sheet is given to you.
2. Verify whether the given question booklet is of the same subject which you have opted for examination.
3. Open the question paper seal carefully and take out the enclosed O.M.R. Answer Sheet outside the question booklet and fill up the general information in the O.M.R. Answer sheet. If you fail to fill up the details in the form as instructed, you will be personally responsible for consequences arising during evaluating your Answer Sheet.
4. During the examination:
a) Read each question carefully.
b) Determine the Most appropriate/correct answer from the four available choices given under each question.
c) Completely darken the relevant circle against the Question in the O.M.R. Answer Sheet. For example, in the question paper if "C" is correct answer for Question No.8, then darken against SI. No. 8 of O.M.R. Answer Sheet using Blue/Black Ball Point Pen as follows:

Question No. 8. (A) (B) (D) (Only example) (Use Ball Pen only)
5. Rough work should be done only on the blank space provided in the Question Booklet. Rough work should not be done on the O.M.R. Answer Sheet.
6. If more than one circle is darkened for a given question, such answer is treated as wrong and no mark will be given. See the example in the O.M.R. Sheet.
7. The candidate and the Room Supervisor should sign in the O.M.R. Sheet at the specified place.
8. Candidate should return the original O.M.R. Answer Sheet and the university copy to the Room Supervisor after the examination.
9. Candidate can carry the question booklet and the candidate copy of the O.M.R. Sheet.
10. The calculator, pager and mobile phone are not allowed inside the examination hall.
11. If a candidate is found committing malpractice, such a candidate shall not be considered for admission to the course and action against such candidate will be taken as per rules.
12. Candidates have to get qualified in the respective entrance examination by securing a minimum of 8 marks in case of SC/ST/Cat-I Candidates, 9 marks in case of OBC Candidates and 10 marks in case of other Candidates out of 50 marks.

## INSTRUCTIONS TO FILL UP THE O.M.R. SHEET

1. There is only one most appropriate/correct answer for each question.
2. For each question, only one circle must be darkened with BLUE or BLACK ball point pen only. Do not try to alter it.
3. Circle should be darkened completely so that the alphabet inside it is not visible.
4. Do not make any unnecessary marks on O.M.R. Sheet.
5. Mention the number of questions answered in the appropriate space provided in the O.M.R. sheet otherwise O.M.R. sheet will not be subjected for evaluation.

1) Which orbital has the set of quantum number $\mathrm{n}=3,1=2, \mathrm{~m}=+1$ ?
(A) $\mathrm{d}_{\mathrm{z}}{ }^{2}$
(B) $\mathrm{d}_{\mathrm{xz}}$
(C) $\mathrm{d}_{\mathrm{yz}}$
(D) $\mathrm{d}_{\mathrm{xy}}$
2) Anil, Kapil, Rahul and Sunil had arranged the following isoelectronic species in order of their decreasing ionic radii. Who had provided the correct order?
(A) Anil: $\mathrm{Ca}^{2+}>\mathrm{K}^{+}>\mathrm{S}^{2-}>\mathrm{Cl}^{-}$
(B) Kapil: $\mathrm{Cl}^{-}>\mathrm{S}^{2-}>\mathrm{Ca}^{2+}>\mathrm{K}^{+}$
(C) Rahul: $\mathrm{S}^{2-}>\mathrm{Cl}^{-}>\mathrm{K}^{+}>\mathrm{Ca}^{2+}$
(D) Sunil: $\mathrm{K}^{+}>\mathrm{Ca}^{2+}>\mathrm{Cl}^{-}>\mathrm{S}^{2-}$
3) Pauling's electronegativity values for elements are useful in predicting
(A) Ionization potential of elements
(B) Oxidation number of elements
(C) Coordination number of elements
(D) Polarity of bonds in molecules
4) A group of four students $A, B, C$ and $D$ has arranged the oxygen species in the different order. One of the student has provided the correct order of bond strength is
(A) Student $\mathrm{A}, \mathrm{O}_{2}>\mathrm{O}_{2}^{+}>\mathrm{O}_{2}^{-}>\mathrm{O}_{2}{ }^{2-}$
(B) Student $\mathrm{B}, \mathrm{O}_{2}{ }^{2-}>\mathrm{O}_{2}^{-}>\mathrm{O}_{2}^{+}>\mathrm{O}_{2}$
(C) Student $\mathrm{C}, \mathrm{O}_{2}^{+}>\mathrm{O}_{2}>\mathrm{O}_{2}^{-}>\mathrm{O}_{2}{ }^{2-}$
(D) Student D, $\mathrm{O}_{2}{ }^{2-}>\mathrm{O}_{2}^{-}>\mathrm{O}_{2}^{+}>\mathrm{O}_{2}$
5) A chemist has determined the amount of iron $(\mathrm{n}=4)$ and reported the results (in grams) are $0.3039,0.3049,0.3043$ and 0.3041 . The mean and median of the results are respectively
(A) 0.3043 and 0.3042
(B) 0.3039 and 0.3042
(C) 0.3042 and 0.3043
(D) 0.3039 and 0.3049
6) An incorrect statement about the nickel (dimethylglyoximate) complex is
(A) Red coloured complex with a tetrahedral geometry
(B) Red coloured complex with a square planar geometry
(C) Red coloured complex with symmetrical H-bonding
(D) Red coloured complex formed with a bidentate ligand DMG
7) a lanthanoid contraction is due to
(A) Increasing nuclear charge
(B) Decreasing nuclear charge
(C) Decreasing screening effect
(D) Negligible screening effect of f-orbitals
8) Fullerene contains
(A) C -C bonds with bond length of 145.3 pm
(B) $\mathrm{C}=\mathrm{C}$ bonds with bond length of 138.8 pm
(C) C -C bonds with bond length of 142 pm
(D) Both (A) and (B)
9) Four students Ankitha, Arpitha, Anusha and Arshitha have calculated the magnetic moments of $\mathrm{Ti}^{3+}, \mathrm{V}^{3+}, \mathrm{Cr}^{3+}$ and $\mathrm{Mn}^{3+}$. One of the students has arranged the magnetic moments of these ions in increasing order properly. The correct order is
(A) Ankitha : $\mathrm{Ti}^{3+}<\mathrm{V}^{3+}<\mathrm{Cr}^{3+}<\mathrm{Mn}^{3+}$
(B) Arpitha: $\mathrm{Mn}^{3+}<\mathrm{Ti}^{3+}<\mathrm{V}^{3+}<\mathrm{Cr}^{3+}$
(C) Anusha: $\mathrm{Cr}^{3+}<\mathrm{Mn}^{3+}<\mathrm{Ti}^{3+}<\mathrm{V}^{3+}$
(D) Arshitha : $\mathrm{V}^{3+}<\mathrm{Cr}^{3+}<\mathrm{Mn}^{3+}<\mathrm{Ti}^{3+}$
10) An incorrect statement about liquid ammonia is
(A) Alkali metals dissolve in liq. ammonia to form a blue colour solution
(B) Blue coloured solution is composed of ammoniated electrons
(C) Boiling point of liquid ammonia is $102.3^{\circ} \mathrm{C}$
(D) The blue solution has a non-oxidising property
11) Two different coloured complexes of $\left[\mathrm{Co}\left(\mathrm{NH}_{3}\right)_{4} \mathrm{Cl}_{2}\right]^{+}$are exist due to
(A) Linkage isomerism
(B) Geometrical isomerism
(C) Coordination isomerism
(D) Ionisation isomerism
12) Loss of a $\beta$-particle is equivalent to
(A) Increase in one proton only
(B) Decrease of one neutron only
(C) Both (A) and (B)
(D) Increase of mass of nuclei
13) Which one of the following exhibits a different property from the rest of the group?
(A) $\left[\mathrm{Zn}\left(\mathrm{NH}_{3}\right)_{6}\right]^{2+}$
(B) $\left[\mathrm{Ni}\left(\mathrm{NH}_{3}\right)_{6}\right]^{2+}$
(C) $\left[\mathrm{Co}\left(\mathrm{NH}_{3}\right)_{6}\right]^{3+}$
(D) $\left[\mathrm{Fe}(\mathrm{CN})_{6}\right]^{3-}$
14) Bayer, Hall, Mond and Serpeck have developed methods for the purification of metals. One of the methods is different from other three methods. The different method is
(A) Bayer's process
(B) Hall's process
(C) Mond's process
(D) Serpeck's process
15) Which of the following alloy is not containing element tin in its composition?
(A) Bellmetal
(B) German silver
(C) Bronze
(D) Solder
16) The number of isomers of pentane is
(A) 2
(B) 1
(C) 4
(D) 3
17) The product formed in the following reaction is
$\mathrm{C}_{6} \mathrm{H}_{5} \mathrm{MgBr}+\mathrm{CH}\left(0 \mathrm{C}_{2} \mathrm{H}_{5}\right)_{3} \rightarrow$
(A) $\mathrm{C}_{6} \mathrm{H}_{5} \mathrm{COOH}$
(B) $\mathrm{C}_{6} \mathrm{H}_{5} \mathrm{CHO}$
(C) $\mathrm{C}_{6} \mathrm{H}_{5} \mathrm{COC}_{6} \mathrm{H}_{5}$
(D) $\mathrm{C}_{6} \mathrm{H}_{5} \mathrm{COOC}_{2} \mathrm{H}_{5}$
18) The product formed in the following reaction is
 $\xrightarrow{\mathrm{H}^{+}}$?
(A)

(B)

(C)

(D)

19) The product formed in the following reaction is

(A)

(B)

(C)

(D)

20) The product formed in the following reaction is

(A) ter-butyl bromide
(B) isobutyl bromide
(C) n-butyl bromide
(D) isopropyl bromide
21) The increasing order of acidity is
(i) phenol
(ii) ortho-nitrophenol
(iii) meta-nitrophenol
(iv) para-nitrophenol
(A) (i) $<$ (ii) $<$ (iii) $<$ (iv)
(B) (ii) $<$ (i) $<$ (iv) $<$ (iii)
(C) (iv) $<$ (i) $<$ (ii) $<$ (iii)
(D) (i) $<$ (iii) $<$ (ii) $<$ (iv)
22) The condition for the formation of cyanohydrin is
(A) acidic
(B) basic
(C) neutral
(D) both acidic and neutral
23) The product formed in sandmeyer reaction is
(A) phenol
(B) benzoic acid
(C) benzene
(D) halobenzene
24) Oxidation of glucose with bromine water gives
(A) Gluconic Acid
(B) Glucaric Acid
(C) Glucuronic Acid
(D) N-Hexane
25) The major product formed in the following reaction is acetophenone oxime $\xrightarrow{\mathrm{H}_{2} \mathrm{SO}_{4}}$ ?
(A) N-methyl benzamide
(B) Acetanilide
(C) Benzanilide
(D) Benzoic acid
26) The natural dye is
(A) Congo red
(B) Malachite green
(C) Alizarin
(D) Phenolphthalein
27) The IUPAC name of isoprene is
(A) 3 methyl-1,3 butadiene
(B) 2 methyl-1,3 butadiene
(C) 2 methyl-1,3 pentadiene
(D) 3 methyl-1,3 pentadiene
28) The stretching frequency of $-\mathrm{C}=\mathrm{C}$ - is
(A) 1300-800 $\mathrm{cm}^{-1}$
(B) 1750-1700 $\mathrm{cm}^{-1}$
(C) 2300-2000 $\mathrm{cm}^{-1}$
(D) 1600-1400 $\mathrm{cm}^{-1}$
29) Orlon is a polymer of
(A) Tetraflouro ethylene
(B) Ethylene
(C) Acrylonitrile
(D) Vinyl chloride
30) Heterocyclic rings present in nicotine are
(A) Pyridine and pyrrole
(B) Pyridine and pyrrolidine
(C) Piperidine and pyrrole
(D) Piperidine and pyrrolidine
31) The rate of diffusion of methane at a given temperature is twice that of an unknown gas. The molar mass of the unknown gas is
(A) 4
(B) 8
(C) 32
(D) 64
32) Which of the following solutions will have the lowest freezing point?
(A) 0.1 molal $\mathrm{Ca}\left(\mathrm{NO}_{3}\right)_{2}$
(B) 0.2 molal glucose
(C) 0.1 molal $\mathrm{KNO}_{3}$
(D) 0.1 molal NaCl
33) pH of a solution obtained by mixing equal volumes of the solutions with pH 3 and pH 5 is
(A) 4
(B) 3.5
(C) 3.3
(D) 2
34) The ionic strength of 0.001 molal solution of $\mathrm{Na}_{2} \mathrm{SO}_{4}$ is
(A) 0.002
(B) 0.003
(C) 0.004
(D) 0.006
35) The pH of the buffer solution prepared by mixing 500 ml of 0.2 M aqueous ammonia and $0.1 \mathrm{M} \mathrm{NH}_{4} \mathrm{Cl}$ is (Given $\mathrm{K}_{\mathrm{b}}=2 \times 10^{-5}$ for aqueous ammonia)
(A) 9.6
(B) 8.4
(C) 10.6
(D) 12.4
36) When the temperature of 1 mol of a gas is increased by $1^{\circ} \mathrm{C}$ at constant pressure, the work done is
(A) -R
(B) 2 R
(C) $\mathrm{R} / 2$
(D) 3 R
37) For a non-linear triatomic gas, the value of the ratio of $\mathrm{C}_{\mathrm{p}}$ and $\mathrm{C}_{\mathrm{v}}$ at laboratory temperature is
(A) $7 / 5$
(B) $9 / 7$
(C) $8 / 3$
(D) $4 / 3$
38) When a gas is heated in a container of fixed volume, both internal energy and enthalpy of the gas increase. If $\Delta \mathrm{U}$ is the internal energy and $\Delta \mathrm{H}$ is the change in enthalpy, then
(A) $\Delta \mathrm{U}<\Delta \mathrm{H}$
(B) $\Delta \mathrm{U}=\Delta \mathrm{H}$
(C) $\Delta \mathrm{U}>\Delta \mathrm{H}$
(D) All three reactions are possible depending on temperature
39) To a mixture of acetic acid and sodium acetate, further amount of sodium acetate is added, the pH of the mixture
(A) Decreases
(B) Remains unchanged
(C) Increases
(D) Not predictable
40) Gold (Given: Atomic radius of gold $=0.144 \mathrm{~nm}$ ) crystallises in a face cantered unit cell. What is the length of the side of the unit cell?
(A) 203.6 pm
(B) 407.2 pm
(C) 203.6 nm
(D) 407.2 nm
41) The energy of light radiation corresponding to the wavelength of 200 nm is
(A) 5980 k cals/mole
(B) 59800 k cals/ mole
(C) 1429.5 k cals/mole
(D) 142.95 k cals/mole
42) The energy corresponding to sixth rotational state of rigid diatomic rotator is
(A) 12 B
(B) 18 B
(C) 30 B
(D) 42 B
43) The number of stretching modes of vibrations of $\mathrm{N}_{2} \mathrm{O}$ molecule are
(A) 2
(B) 3
(C) 4
(D) 5
44) Out of $\mathrm{Cu}, \mathrm{Ag}, \mathrm{Fe}$ and Zn , the metal which can displace all others from salt solution is
(A) Ag
(B) Cu
(C) Zn
(D) Fe
45) The initial concentration of $\mathrm{N}_{2} \mathrm{O}_{5}$ in the following first-order reaction $\mathrm{N}_{2} \mathrm{O}_{5} \rightarrow 2 \mathrm{NO}_{2}+1 / 2 \mathrm{O}_{2}$, was $1.2 \times 10^{-2} \mathrm{M}$ at 318 K . The concentration of $\mathrm{N}_{2} \mathrm{O}_{5}$ after 60 min was $0.2 \times 10^{-2} \mathrm{M}$. The rate constant of the reaction at 318 K is
(A) $0.0298 \mathrm{~min}^{-1}$
(B) $0.298 \mathrm{~min}^{-1}$
(C) $2.98 \mathrm{~min}^{-1}$
(D) $0.00298 \mathrm{~min}^{-1}$
46) The $t_{1 / 2}$ of a reaction is doubled as the initial concentration of the reactant is doubled, the order of reaction is
(A) 2
(B) 1
(C) $1 / 2$
(D) 0
47) The specific conductance of 0.01 M aqueous solution of $\mathrm{CH}_{3} \mathrm{COOH}$ is 0.0163 ohm ${ }^{-1} \mathrm{~cm}^{1}$, its equivalent conductance $\left(\mathrm{ohm}^{-1} \mathrm{~cm}^{2} \mathrm{~mol}^{-1}\right)$ is
(A) 3.26
(B) 1.63
(C) 16.3
(D) 32.6
48) The difference in volume or mass between the equivalence point and the endpoint is
(A) The indicator error
(B) The titration error
(C) The standard deviation
(D) The mean of the volume
49) Which of the following involves a type of reaction different from the rest of the group?
(A) Determination of iron using dichromate
(B) Determination of manganese dioxide using permanganate
(C) Determination of hardness of water using EDTA
(D) Determination of vitamin C using thiosulfate
50) In a group of four chemists Bhanupriya, Jyothipriya, Nanjupriya and Vishnupriya have reported flame tests for the detection of inorganic ions. Three of them have reported correctly, while one has reported in mismatch the colour is
(A) Bhanupriya: Lilac for potassium
(B) Jyothipriya: Crimson red for strontium
(C) Nanjupriya: Brick red for barium
(D) Vishnupriya: Golden yellow for sodium.

## Rough Work

## అభ్యథిรగษిగి శ్జอఒసేగఆు



 ఎంబదన్ను யరిరిలలిసిరి.



 జదాబ్దారరంగిరుత్తిర.


 లుత్తరహస్ను నిధణరిి.


 కుంబిర:




 ळలళెయల్లిన లుదాळరణ నైలణి.
 యృడ్బొలు.
 పిల్టలిద్యానిలయుద
 ஹృఁగబळుదు.




 అంచగఆన్ను யֹడియత్ర్ప్దు.

## ఓ.ఎం.ఆరా. ळలఆయన్ను కుంబలు ష్యృజసెగళు









Note : English version of the instructions is printed on the front cover of this booklet.

