3. At the commencement of examination, the question booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and compulsorily examine it as below: (i) To have access to the Question Booklet, tear off the paper sed on the edge of this cover page. Do not accept a booklet without sticker-seal and do not accept an open booklet. (ii) Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faulty booklets due to pages/questions missing or duplicate or not in serial order or any other discrepancy should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced on any extra time will be given. (iii) After this verification is over, the Test Booklet. Number should be entered on this Test Booklet. Number should be entered on this Test Booklet. Number should be entered on this Test Booklet. 4. Each item has four alternative responses marked (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item. Example: (A) (B) (D) where (C) is the correct response. 5. Your responses to the items are to be indicated in the OMR Sheet given to you. If you mark at any place other than in the circle in the Answer Sheet, except for the space allotted for the relevant entries, which may disclose your identity, you will render yourself in the paper should be explained for the relevant entries, which may disclose your identity, you will render yourself in the paper should be supported to the reversible to the invigilators at the end of the searnination compulsority and must not carry with your ourself the Examination compulsority and must not carry with your ourself the Examination compulsority and must not carry with your ourself the Examination compulsority and must not carry with your ourself the Examination compulsority and must not carry with your ourself the Examination of the carry	Test Paper : II Test Subject : CHEMICAL SCIENCES Test Subject Code : A-02-02 Name & Signature of Invigilator	Test Booklet Serial No. : OMR Sheet No. : Hall Ticket No. [Figures as per admission card]			
Subject: CHEMICAL SCIENCES Maximum Marks; 100 Number of Pages in this Booklet: 16 Instructions for the Candidates 1. Write your Hall Ticket Number in the space provided on the top of this page. 2. This paper consists of fifty multiple-choice type of questions. 3. All the commencement of examination, the question booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and computionly examine it as below: (i) To have access to the Question Booklet, tear off the pages and on the edge of this cover page. Do not accept a booklet without sticker-seal and do not accept an open booklet. (ii) Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faulty booklets due to pages/questions missing or duplicate or not in serial order or any other discrepancy should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes, Afterwards, neither the Question Booklet will be replaced not any extra time will be given. (iii) After this verification is over, the Test Booklet. 4. Each item has four alternative responses marked (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item. Example: (A) (B) (D) (D) (D) (D) (D) (D) (D) (D) (D) (D	Name :	Signature :			
Minterpolations for the Candidates	Subject :	CHEMICAL SCIENCES			
1. Write your Hall Ticket Number in the space provided on the top of this page. 2. This pager consists of fifty multiple-choice type of questions. 3. At the commencement of examination, the question booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and corropulsorily examine it as below: (i) To have access to the Question Booklet, tear off the paper seal on the edge of this cover page. Do not accept a booklet without sticker-seal and do not accept an open booklet. (ii) Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faulty booklets due to pages/questions missing or duplicate or not in serial order or any other discrepancy should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given. (iii) After this verification is over, the Test Booklet. Number should be entered in the OMR Sheet Number should be entered on this Test Booklet. 4. Each item has four alternative responses marked (A), (B), (C) and (D). You have to darken the cincle as indicated below on the correct response against each item. Example: (A) B)	Number of Pages in this Booklet : 16	Number of Questions in this Booklet : 50			
entries, which may disclose your identity, you will render yourself liable to disqualification. 9. You have to return the test question booklet and OMR Answer Sheet to the invigilators at the end of the examination compulsorily and must not carry it with you outside the Examination Hall. 10. Use only Blue/Black Ball point pen. 11. Use of any calculator or log table etc., is prohibited. 12. There is no negative marks for incorrect answers.	1. Write your Hall Ticket Number in the space provided on the top of this page. 2. This pager consists of fifty multiple-choice type of questions. 3. At the commencement of examination, the question booklet will be given to you. In the first 5 minutes, you are requested to oper the booklet and compulsorily examine it as below: (i) To have access to the Question Booklet, tear off the pape seal on the edge of this cover page. Do not accept a booklet without sticker-seal and do not accept an open booklet. (ii) Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faulty booklets due to pages/questions missing or duplicate or not in serial order or any other discrepancy should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given. (iii) After this verification is over, the Test Booklet Number should be entered in the OMFI Sheef and the OMFI Shee Number should be entered in the OMFI Sheef and the OMFI Shee Number should be entered in the interest as indicated below on the correct response against each item. Example: (A) (B) (C) and (D). You have to darken the circle as indicated below on the correct response against each item. Example: (A) (B) (D) (D) where (C) is the correct response. 5. Your responses to the items are to be indicated in the OMFI Sheef given to you, if you mark at any place other than in the circle in the Answer Sheet, it will not be evaluated. 6. Read instructions given inside carefully. 7. Rough Work is to be done in the end of this booklet. 8. If you write your name or put any mark on any part of the OMFI.	 මා ලාප වූ පැරණි අවසරය පුංගේ වා ප්රේ. ඔබේ පයන පැණසි. මා ලාදු පළමණ සඳ පැළතුවල පැළතුවල පළමණ පරිති සංඛ. පර්තු පළමණ සඳ පැළතුවල පාත්ත පරිති සංඛ. පර්තු ප්‍රත්‍ය සඳ පැළතුවල ප්‍රත්‍ය පරිති සංඛ. ප්‍රත්‍ය ප්‍ය ප්‍ය ප්‍ය ප්‍ය ප්‍ය ප්‍ය ප්‍ය ප			
and must not carry it with you outside the Examination Hall. 10. Use only Blue/Black Ball point pen. 11. Use of any calculator or log table etc., is prohibited. 12. There is no negative marks for incorrect answers.	liable to disqualification. 9. You have to return the test question booklet and OMR Answer	 కరీక్ష ప్రాల్థయిన తర్వారి మీ సర్విస్తాన్నా మరియు OMR సిక్కార్ని తప్పనిసరిగా సరీప్రస్విస్తమైనకేక ఇక్కారి. వాలిని సరీక్ష గినీ బయలను తీసుకునేలైనాడను. 			
	and must not carry it with you outside the Examination Hall. 10. Use only Blue/Black Ball point pen. 11. Use of any calculator or log table etc., is prohibited.	 సరి/నిల్ల రెంగు పోర్ పాయించి పెద్ద మాత్రమ ఉపయోగించారి. లగవిశ్రమ్ చేబుల్, క్యారీమ్,కేబల్లు, ఎండ్ర్వైన్ పరికరాలు మొదంగునవి పరీక్షగావలే ఉపయోగించడం నిషేధం. 			









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CHEMICAL SCIENCES

Paper - II

- The correct increasing order of second ionization energy of elements X, Y, Z with respective atomic numbers 19, 20, 38 is
 - (A) X, Y, Z
 - (B) X, Z, Y
 - (C) Z, Y, X
 - (D) Z, X, Y
- 2. Nicotine molecule is composed of
 - I. Pyridine
 - II. Furan
 - III. Pyrrolidine
 - IV. Pyrimidine

The correct statement is

- (A) I and II
- (B) I and III
- (C) II and IV
- (D) I and IV

- Condensation of water vapour is accompanied by
 - (A) a decrease in entropy
 - (B) an increase in entropy
 - (C) no change in entropy
 - (D) either increase or decrease in entropy
- The characteristic feature of an electroactive ion among the following in normal voltammetry is
 - (A) Residual current
 - (B) Diffusion current
 - (C) Summit potential
 - (D) Half-wave potential
- The reaction 3 NH₄I+BiN NH₃(I) BiI₃+4 NH₃ belongs to which type ?
 - (A) Complex formation
 - (B) Redox
 - (C) Solvolysis
 - (D) Acid-base

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Non-aromatic species among the following





The correct combination is

- (A) I and IV
- (B) III and IV
- (C) II and III
- (D) I and III

(A)
$$\overline{M}_n = \overline{M}_w$$
 and $\overline{M}_n = \overline{M}_w$

(B)
$$\overline{M}_n = \overline{M}_w$$
 and $\overline{M}_w > \overline{M}_n$

(C)
$$\overline{M}_n > \overline{M}_w$$
 and $\overline{M}_w > \overline{M}_n$

(D)
$$\overline{M}_w > \overline{M}_n$$
 and $\overline{M}_n = \overline{M}_w$

 The distance dependence of potential energy in ion-ion type interaction is

- 9. The most stable among the following is
 - (A) LiF
 - (B) Lil
 - (C) HgF
 - (D) Bel

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- The ions with paramagnetic character among the following are
 - I. Na*
 - II. Fe3+
 - III. VO2+
 - IV. Sc3+
 - (A) I, II
 - (B) II, III
 - (C) III, IV
 - (D) II, IV
- Retinol is
 - (A) enzyme
 - (B) hormone
 - (C) vitamin
 - (D) provitamin
- Toluene in proton decoupled ¹³C NMR spectrum gives
 - (A) 5 signals
 - (B) 4 signals
 - (C) 3 signals
 - (D) 6 signals

- 13. The Miller indices of a cubic crystal plane $\text{which intercepts the } x, y \text{ and } z \text{ axes at } \frac{1}{2} a \, ,$
 - 2/₃b and ∞c are
 - (A) 12 =
 - (B) 430
 - (C) 230
 - (D) 23 ×
- 14. The increase in the molar conductance of KNO₃ with increase in the dilution of its aqueous solution is due to the
 - (A) increase in the speed of the solvent

molecules

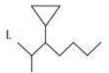
- (B) increase in the transport numbers of K* and NO_a ions
- (C) increase in the velocities of K⁺ and NO₃⁻ ions
- (D) increase in the number of K⁺ and NO₃⁻ions

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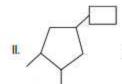


- Gas liquid chromatography is used for the separation of compounds that have/are
 - I. Low vapour pressure
 - II. High vapour pressure
 - III. Stable at high temperatures
 - IV. Unstable at high temperatures
 - (A) I, III
 - (B) II, III
 - (C) I, IV
 - (D) II, IV
- 16. Assertion (A): HF is the strongest acid in water among HF, HCI, HBr and HI
 - Reason (R) : HF has the largest electronegativity difference among all
 - (A) Both A and R are true and R is the correct explanation of A
 - (B) Both A and R are true, but R is not the correct explanation of A
 - (C) A is true, but R is false
 - (D) A is false, but R is true

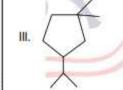
17. Match the following:



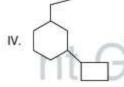
 1, 1,1-Dimethyl-3isopropyl cyclopentane



 1-Cyclobutyl-3ethylcyclo-hexane



 1,1,2,3- Tetramethylcyclobutane



 3-cyclopropyl-2methyl-heptane

 1-cyclobutyl-3,4dimethyl cyclopentane

е

2

IV

(B)

3

2

(B)

5

2

(C)

2

3

(D)

5

2

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- 18. D-Erythrose on oxidation gives
 - (A) (+) tartaric acid
 - (B) (±) tartaric acid
 - (C) meso-tartaric acid
 - (D) (-) tartaric acid
- radiation is used to record the ESR spectrum of a radical.
 - (A) Ultraviolet
 - (B) Infrared
 - (C) Microwave
 - (D) Radio frequency
- 20. The difference in molar heat capacities

(Cp - Cv) of any gas is equal to

- (A) $P\left(\frac{\partial V}{\partial E}\right)$
- (B) $V\left(\frac{\partial E}{\partial P}\right)$
- (C) $P\left(\frac{\partial V}{\partial T}\right)$
- (D) $T\left(\frac{\partial P}{\partial A}\right)$

21. Assertion (A): A liquid can be used as

the stationary phase in a chromatography technique.

- Reason (R) : A liquid has the property of moving.
- (A) Both A and R are true and R is the correct explanation of A
- (B) Both A and R are true, but R is not the correct explanation of A
- (C) A is true, but R is false
- (D) A is false, but R is true
- 22. In the reaction

X is

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- 23. Which of the following molecules do not have IR active vibrations?
 - (A) H
 - (B) NO
 - (C) N₂O
 - (D) CH₄
- 24. Assertion (A): A quarter Faraday of electricity passed through an aqueous solution of AICl₃ solution produces $\frac{1}{12} \times \text{At.wt. of AI.}$
 - Reason (R): One Faraday of electricity passed through a solution
 - of an ion produces one equivalent weight of that ion.
 - (A) Both A and R are true and R is the correct explanation of A
 - (B) Both A and R are true, but R is not the correct explanation of A
 - (C) A is true, but R is false
 - (D) A is false, but R is true

25. Name the reaction :

$$R-CHO+R_3'N+I$$

or

 $R_3'P$
 $+R_3'N \text{ or } R_2''P$

- (A) Baylis-Hillman Reaction
- (B) Baylis Reaction
- (C) Morita-Baylis-Hillman Reaction
- (D) Hillman Reaction
- 26. The value of the Planck's constant is
 - (A) 6.626×10-34 JS
 - (B) 6.626×10-27 JS
 - (C) 1.380×10⁻²³JK⁻¹
 - (D) 9.109×10⁻³¹ Kg
- 27. Assertion (A) :SOCl₂ in liquid SO₂ is an acid
 - Reason (R): Liquid SO₂ autoionises to give SO²⁺ and SO₃²⁻
 - (A) Both A and R are true and R is the correct explanation of A
 - (B) Both A and R are true, but R is not the correct explanation of A
 - (C) A is true, but R is false
 - (D) A is false, but R is true

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28. Identify the photo product:

- (A) Phenanthrene
- (B) Naphthalene
- (C) Anthracene
- (D) Phenylnaphthalene
- 29. If an arbitrary wave function is used to calculate the energy of a quantum mechanical system the calculated energy is never less than the true energy of the system. This statement is
 - (A) Heisenberg uncertainty principle
 - (B) Perturbation theory
 - (C) Law of conservation of energy
 - (D) Variation principle

- Mn₂P₂O₇(s)
 [∆]→ Mn₂P₂O₇(l) is characterized by
 - No weight loss in TGA
 - II. Weight loss in TGA
 - III. Exothermic peak in DTA
 - IV. Endothermic peak in DTA
 - (A) I, III
 - (B) II, III
 - (C) I, IV
 - (D) II, IV
- 31. Match the following:
 - I. Furyl acrylic acid 1. Skraup from furfural synthesis
 - 8-quinolinol from 2. Perkin reaction
 0-amino phenol
 - III. Indole-3carboxaldehyde
- Bischler-Napieralski reaction
- IV. 1-Methyl Isoquinoline from β-phenyl ethyl amine
- reaction

4. Reimer-Tieman

- Grignard reaction
- I II III IV A) 1 3 5 2
- (A) 1 3 5 2
- (B) 4 2 1 5
- (C) 2 1 4 3
- (D) 2 3 1 4

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32. A hypothetical molecule has a configuration $1\sigma_g^2 \ 1\sigma_u^2 \ 2\sigma_g^2 \ 1\pi_u^4 \ 1\pi_g^4 \ 2\sigma_u^2$ What is its bond order ?

- (A) 1
- (B) 2
- (C) 0
- (D) 1.5

33. The selection rules for the appearance of Q branch in the rotational-vibrational spectrum of a diatomic molecule are

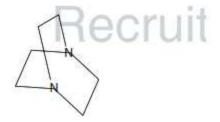
(A)
$$\Delta V = +1$$
, $\Delta J = 0$

(B)
$$\Delta V = +1, \Delta J = +1$$

(C)
$$\Delta v = -1$$
, $\Delta J = -1$

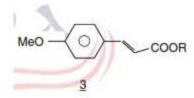
(D)
$$\Delta v = -1$$
, $\Delta J = 0$

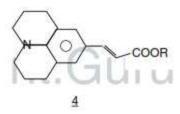
34. Identify the symmetry element present in



- (A) C 3V
- (B) D_{3H}
- (C) C_{2V}
- (D) C 3H

 Arrange the given molecules with the increasing absorption maxima





- (A) 1;3;2;4
- (B) 2;3;1;4
- (C) 4;3;2;1
- (D) 3;4;1;2

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36. The crystal field stabilization energy values of [Fe(CN)₆]³⁻ and [CoF₆]³⁻ considering pairing energy (PE) are respectively

I.
$$-2.0 \, \Delta_o + 2 PE$$

- (A) I, II
- (B) II, III
- (C) III, IV
- (D) II, IV
- Assertion (A): The pH of pure water at 80°C is less than 7.0.
 - Reason (R) : The ionic product of water increases with increase in temperature.
 - (A) A is false and R is true
 - (B) A is true and R is false
 - (C) Both A and R are true and R is the correct explanation of A
 - (D) Both A and R are true but R is not the correct explanation of A

38. Identify the following as "R" or "S"

- (A) R; R; S;
- (B) S;S;S;
- (C) S; R; R;
- (D) S;R;S;
- 39. Match the following:

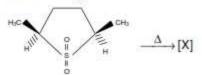
List - I	List - II		
(Phenomenon)	(Related		
	technique)		

- I. Koopman's rule
- Raman spectroscopy
- II. Polarizability
- Photoelectron spectroscopy
- III. Spin-spin coupling
- Mossbauer spectroscopy
- IV. Dipole moment
- NMR spectroscopy
- Infrared spectroscopy

- B) 2 1 4 5
- (C) 3 1 4 5
- (D) 3 5 4 1

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40. In the following reaction



the major product [X] is

- (A) E, E 2, 4-hexadiene
- (B) Z, E 2, 4-hexadiene
- (C) Z, Z 2, 4-hexadiene
- (D) E, Z-2, 4-hexadiene

41. Match the following:

List - I

List-II

(Process)

(Catalyst used)

- I. Hydroformylation 1. Rh(Ph P) CI
- II. Monsanto
- 2. Co₂(CO)₈

acetic acid

process

- III. Hydrogenation
- 3. [Rh(CO)212]
- IV. Wacker process
- 4. ZSM 5

5

5. [PdCl₄]2-

I II III IV

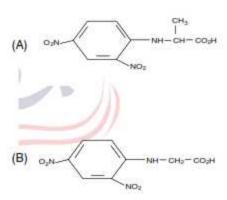
- 1 2
- U.
- (A) 2
- 3
- (B)
- 1
 - 5
- (C) 3

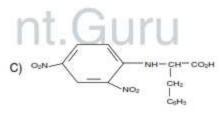
3

- (D) 4
- 1
- 5

42. In the reaction

the major product [X] is





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43. Match the following

List-I

List-II

- I. Identify operation
- of doing nothing
- 1. C_n
- n-fold rotation
- 1
- III. Reflection in a
- 3. i
- mirror plane
- IV. Inversion
- 4. σ
- through a centre of symmetry
- oi symmetry
- 5. S_n

4

5

- (A) 1
- III
- (B) 2
- 4 3
- (C) 1
- 7 3
- (0)
- 4
- (D) 5
- 2
- 44. For the following reactions

2

$$N_2(g) + 3H_2(g) K_{P_1} 2NH_3(g)$$

$$\frac{1}{2}N_2(g) + \frac{3}{2}H_2(g) \xrightarrow{K_{P_2}} NH_3(g)$$

the equilibrium constants K_{P_1} and K_{P_2} are related as

- (A) $K_{p_1} = 2K_{p_2}$
- (B) $K_{P_1} = \frac{1}{2}K_{P_2}$
- (C) Kp, = K2p
- (D) $K_{P_1} = (K_{P_2})^{V_2}$

45. Match the following:

List - I	List - II		
(lon)	(Number of		

- I. Fe²⁺
- 1. 0

unpaired electrons)

II. Cr3+

2. 2

- III. Cu+
- 3. 3

IV. Ni2+

- 4. 4
- 5. 6
- ent.Guru
 - (A) 5 4 2 1
- (B) 4 3 2 1
- (C) 4 3 1 2
- (D) 5 3 1 2

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	ш		ш		100 100	
-	ш			ш		
-	ш		 			

- Anti inflammatory activity is exhibited by
 - (A) ibuprofen
 - (B) chloroequin
 - (C) isoniazid
 - (D) metronidazole
- The conversion of toluene to benzoic acid is faster in presence of
 - (A) Thermal energy
 - (B) Sonication
 - (C) Cooling
 - (D) MW irradiation
- 48. Salbutamol is useful in the treatment of
 - (A) hypertension
 - (B) amoebiasis
 - (C) tuberculosis
 - (D) bronchial asthama

- 49. Which of the following statements is wrong?
 - (A) Nanomaterials show the same properties as those exhibited by bulk materials
 - (B) Nanomaterials are prepared by either
 top down or bottom up approaches
 - (C) Texture of nanomaterials is studied by

SEM/TEM

(D) Phase identification of nanomaterials
 is done by XRD

- The pollutant responsible for Bhopal disaster in 1984 is
 - (A) Phosgene
 - (B) Methylamine
 - (C) Methyl isocyanate
 - (D) Carbon monoxide

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Space for Rough Work



II.3 A-02-02



Space for Rough Work



II 16 A-02-02