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(MPH/PHD/URS-EE-2017)

Sr. No. 10021

Subject : CHEMISTRY

Code

A

Time : 1½ Hours

Max. Marks : 100

Total Questions : 100

Roll No. _____ (in figure) _____ (in words)

Name : _____ Father's Name : _____

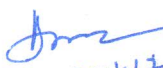
Mother's Name : _____ Date of Examination : _____

(Signature of the candidate)

(Signature of the Invigilator)

CANDIDATES MUST READ THE FOLLOWING INFORMATION/ INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

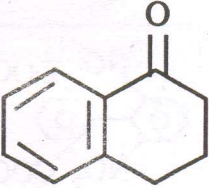
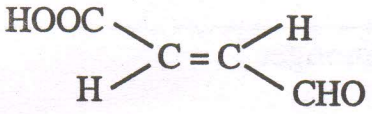
1. All questions are compulsory.
2. The candidates must return the Question book-let as well as OMR answer-sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / mis-behaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3. In case there is any discrepancy in any question(s) in the Question Booklet, the same may be brought to the notice of the Controller of Examinations in writing within two hours after the test is over. No such complaint(s) will be entertained thereafter.
4. The candidate **MUST NOT** do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question book-let itself. Answers **MUST NOT** be ticked in the Question book-let.
5. There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.
6. Use only Black or Blue **BALL POINT PEN** of good quality in the OMR Answer-Sheet.
7. BEFORE ANSWERING THE QUESTIONS, THE CANDIDATES SHOULD ENSURE THAT THEY HAVE BEEN SUPPLIED CORRECT AND COMPLETE BOOK-LETS. COMPLAINTS, IF ANY, REGARDING MISPRINTING ETC. WILL NOT BE ENTERTAINED 30 MINUTES AFTER STARTING OF THE EXAMINATION.

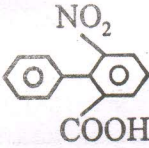
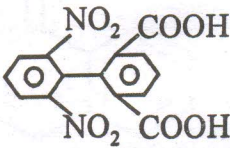
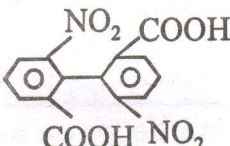
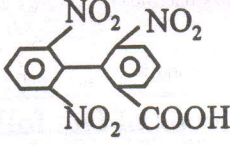



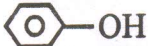
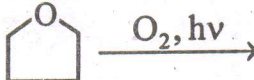
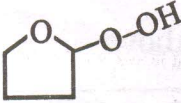

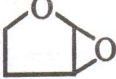

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
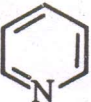
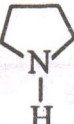
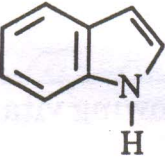


Question No.	Questions
1.	<p>A NMR transition is shifted from the reference in a 400 MHz spectrometer by 529 Hz. The chemical shift is</p> <p>(1) 1.32 (2) 5.29 (3) 7.56 (4) 1.76</p>
2.	<p>Dry ice is used in fire extinguishers. It is stored in the cylinder in solid form. When sprayed on a fire, it quickly changes into gas known as CO₂. The change of state is called</p> <p>(1) Evaporation (2) Sublimation (3) Condensation (4) Distillation</p>
3.	<p>The use of solar power is covered within Green chemistry principle # 6, which is</p> <p>(1) Atom Economy (2) Design benign chemicals (3) Design for Energy Efficiency (4) None of these</p>
4.	<p>Milk is a/an</p> <p>(1) Suspension (2) Pure solution (3) Gel (4) Emulsion</p>
5.	<p>Dipole moment is shown by</p> <p>(1) 2, 2-Dimethyl propane (2) Trans-2-pentene (3) Trans-1,2-dichloroethene (4) 2,2,3,3-tetrabromobutane</p>
6.	<p>Which of the following statements about tetramethylsilane is incorrect ?</p> <p>(1) It produces a single peak at $\delta = 10$ (2) It is inert (3) It is volatile and can be easily distilled off and used again (4) It is used to provide a reference against which other peaks are measured</p>

Question No.	Questions
7.	The proton nmr of 2-bromo-2-methyl propane will consist of (1) Three quartets and a singlet (2) Two doublets and a singlet (3) One singlet (4) Two singlets
8.	Which compound has a molecular ion at $m/z = 58$, an Infrared absorption at 1650 cm^{-1} and just one singlet in its nmr spectrum ? (1) Butane (2) 2-methyl propane (3) $\text{CH}_3\text{CH}_2\text{CHO}$ (4) CH_3COCH_3
9.	Which electromagnetic radiation has maximum frequency ? (1) Cosmic rays (2) X-rays (3) Infra red Rays (4) Ultraviolet rays
10.	The IUPAC name of the compound $\begin{array}{cccc} \text{CH}_3\text{CO} & - & \text{CH} & - & \text{CH} & - & \text{COOH} \\ & & & & & & \\ & & \text{Cl} & & \text{OCH}_3 & & \end{array}$ is (1) 3-chloro-2-methoxy-4-oxo-pentanoic acid (2) 3-chloro-2 methoxy-4-keto-pentanoic acid (3) 4-carboxy-3-chloro-4-methoxy-2-butanone (4) 1-carboxy-2-methoxy-3-chloro-ethyl methyl ketone
11.	Which of the following pairs is epimers : (1) D (+) Glucose and D (-) Fructose (2) D (-) Glucose and D (-) Ribose (3) D (+) Glucose and D (+) Mannose (4) (+) Maltose and (+) Sucrose

Question No.	Questions
12.	The reactivity of thiophene, furan and pyrrole follows the sequence (1) Furan < Thiophene < Pyrrole (2) Thiophene < Furan < Pyrrole (3) Pyrrole < Furan < Thiophene (4) Thiophene < Pyrrole < Furan
13.	In UV, λ_{\max} for the following compound will be at <div style="text-align: center; margin: 10px 0;">  </div> (1) 280 nm (2) 259 nm (3) 237 nm (4) 317 nm
14.	Enantiotropic faces of the following compound can be given as <div style="text-align: center; margin: 10px 0;">  </div> (1) Re - Re (2) Si - Re (3) Si - Si (4) Re - Si
15.	In benzilic acid rearrangement (1) Benzaldehyde is converted in to Benzoin (2) Benzil is converted in to Benzilic acid (3) Benzilic acid is converted in to Benzoin (4) None of the above
16.	How many normal modes of vibration are possible for benzene molecule ? (1) 6 (2) 12 (3) 30 (4) 24

Question No.	Questions
17.	Which is not an anticancer drug ? (1) Vincristine (2) Cyclophosphamide (3) Dexorubicin (4) Gabapentin
18.	Which of the following compounds can be resolved <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>(1) </p> </div> <div style="text-align: center;"> <p>(2) </p> </div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 20px;"> <div style="text-align: center;"> <p>(3) </p> </div> <div style="text-align: center;"> <p>(4) </p> </div> </div>
19.	Which is the weakest acid amongst ? <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>(1) </p> </div> <div style="text-align: center;"> <p>(2) </p> </div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 20px;"> <div style="text-align: center;"> <p>(3) </p> </div> <div style="text-align: center;"> <p>(4) </p> </div> </div>
20.	<div style="text-align: center; margin-bottom: 20px;">  </div> Product formed in the reaction is <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>(1) HOCH₂CH₂CH₂CH₂OH</p> </div> <div style="text-align: center;"> <p>(2) </p> </div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 20px;"> <div style="text-align: center;"> <p>(3) </p> </div> <div style="text-align: center;"> <p>(4) </p> </div> </div>

Question No.	Questions
26.	Which of the following interaction contributes most in protein folding ? (1) Hydrophobic interaction (2) Covalent bond (3) van der Waals interaction (4) Ionic bond
27.	Which of the following reactions convert a 1, 5-diene to an isomeric 1,5-diene ? (1) Cope rearrangement (2) Claisen rearrangement (3) Photochemical (2 + 2) reaction (4) Diels-Alder reaction
28.	Which is most reactive towards an electrophile ? (1)  (2)  (3)  (4) 
29.	Natural lipids are readily soluble in (1) Oil (2) Mercury (3) Water (4) None of these
30.	A disadvantage of fats is (1) Reduction in rate of heat loss (2) Solvent for vitamins (3) Efficient source of energy (4) Effective insulative material

Question No.	Questions
31.	<p>A fatty acid with 14 carbon atoms will undergo how many cycles of beta oxidation ?</p> <p>(1) 7 (2) 4 (3) 6 (4) 5</p>
32.	<p>Which of the following compounds show a sharp IR absorption band at 1700 cm^{-1} and a broad band at 3300 cm^{-1} ?</p> <p>(1) Ethanol (2) Ethanoic acid (3) Propanone (4) diethyl ether</p>
33.	<p>The product in the following reaction is</p> $\text{CH}_3-\text{C}-\text{N} \xrightarrow[\text{(ii) H}_2\text{O}]{\text{(i) CH}_3\text{MgBr}} ?$ <p>(1) $\begin{array}{c} \text{CH}_3 \\ \\ \text{H}_3\text{C}-\text{C}-\text{OH} \\ \\ \text{CH}_3 \end{array}$ (2) $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{NH}_2$ (3) $\begin{array}{c} \text{OH} \\ \\ \text{H}_3\text{C}-\text{CH}-\text{CH}_3 \end{array}$ (4) CH_3COCH_3</p>
34.	<p>Number of Orientations with respect to applied magnetic field for deuterium is</p> <p>(1) 3 (2) 4 (3) 2 (4) 1</p>

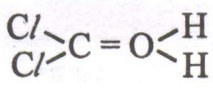
Question No.	Questions
35.	<p>When EDTA solution is added to Mg^{2+} ion, then which of the following statements is not true ?</p> <ol style="list-style-type: none">(1) Four coordinate sites of Mg^{2+} ions are occupied by EDTA and remaining two sites are occupied by water molecules(2) pH of the solution is decreased(3) Colorless $[Mg - EDTA]^{2-}$ chelate is formed(4) All six coordinates of Mg^{2+} ions are occupied by EDTA
36.	<p>When applying VSEPR theory to predict the molecular shape, which of the following we need not take in to account ?</p> <ol style="list-style-type: none">(1) Valence electrons occupying sigma bonding orbitals(2) Valence electrons occupying π-bonding orbitals(3) Valence electrons occupying non-bonding orbitals(4) None of these
37.	<p>Which statement about ferrocene is incorrect ?</p> <ol style="list-style-type: none">(1) The Fe centre in ferrocene can be protonated by treatment with conc. H_2SO_4(2) In the gas phase, the C_6H_6 rings in ferrocene are eclipsed(3) The ligands in ferrocene undergo electrophilic substitution with $RCOCl$ in the presence of a Lewis acid(4) I_2 oxidises ferrocene to give a diamagnetic cation
38.	<p>Chlorophyll converts light energy in to</p> <ol style="list-style-type: none">(1) Heat energy(2) Potential energy(3) Chemical energy(4) Electrical energy

Question No.	Questions
39.	The tyrosinase, is activated by (1) Copper ion (2) Iron ion (3) Potassium ion (4) Calcium ion
40.	Which of the following terms best describes a drug inhibits the enzyme, but binds to a binding site other than active site ? (1) Allosteric inhibitor (2) Reversible inhibitor (3) Irreversible Inhibitor (4) Suicide substrate
41.	Which statement is incorrect about zeolites ? (1) Zeolites are aluminosilicates (2) Each zeolite contains channels of a specific size (3) A zeolite functions as an acid catalyst (4) No zeolites occur naturally
42.	Chalogenides are the compounds of (1) Sulfur and phosphorus (2) Sulfur and halogens (3) Sulfur, selenium and tellurium (4) Nitrogen and sulfur
43.	Spin-Orbit coupling is found maximum in (1) Third transition series metal complexes (2) First transition series metal complexes (3) Second transition series metal complexes (4) p-block elements

Question No.	Questions
44.	Which one of the polymers is a conductive polymer (1) Polyethylene (2) Polyacetylene (3) Polyvinylene (4) Poly vinyl Chloride
45.	The difference in crystal field stabilization energy between low spin d^6 octahedral complex and d^9 octahedral with tetragonal elongation complex, assuming the ligands are strong field ligands, will be (1) $-2.13 \Delta_0$ (2) $-2.40 \Delta_0$ (3) $-2.00 \Delta_0$ (4) None of these
46.	Natural oxygen carrier other than Hemoglobin is (1) Hem erythrin (2) Hemocyanins (3) Tyrosinase (4) Ferredoxins
47.	Among the following ligands, the trans effect is maximum for (1) NO_2^- (2) Cl^- (3) CN^- (4) OH^-
48.	Which change is not detected by DTA ? (1) Sublimation (2) Desorption (3) Polymer softening (4) Loss of moisture
49.	Which nuclear model can best explain that all elements with atomic number greater than 92 are radioactive ? (1) Shell Model (2) Liquid Drop Model (3) Pion Cloud only (4) All of these

Question No.	Questions
50.	Spotting electrolyte is used to eliminate (1) Condenser current (2) Diffusion current (3) Limiting current (4) Migration current
51.	The range of fluorine chemical shift in NMR is (1) 12 ppm (2) 56 ppm (3) 300 ppm (4) 542 ppm
52.	Borazine, $B_3N_3H_6$ has a (1) Regular hexagonal structure like benzene (2) Tetragonal structure (3) Triangular capped structure (4) Hexagonal prism structure
53.	In ligand to metal charge spectra (LMCT) of MnO_4^- ion, the transition responsible for purple color is (1) 29500 cm^{-1} (2) 17700 cm^{-1} (3) 44400 cm^{-1} (4) 30300 cm^{-1}
54.	When an auxochrome is attached to a carbon-carbon double bond, then λ_{max} in UV spectrum undergoes (1) Hypsochromic shift (2) Bathochromic shift (3) Hyperchromic shift (4) Hypochromic shift
55.	The number of α and β particles emitted in the nuclear reaction ${}_{92}U^{238} \rightarrow {}_{82}Pb^{206}$ is (1) $7\alpha, 5\beta$ (2) $6\alpha, 4\beta$ (3) $4\alpha, 3\beta$ (4) $8\alpha, 6\beta$

Question No.	Questions
56.	Among the hydroxides of alkaline earth metals, the least soluble in water is (1) $Mg(OH)_2$ (2) $Ca(OH)_2$ (3) $Be(OH)_2$ (4) $Ba(OH)_2$
57.	Which of the following isotope is not a fission fuel ? (1) U-238 (2) U-233 (3) U-235 (4) U-239
58.	Most common oxidation state of tellurium is (1) -2 (2) +4 (3) +6 (4) +2
59.	The correct order of acidic strength is (1) $HClO > HIO > HBrO$ (2) $HIO > HBrO > HClO$ (3) $HBrO > HClO > HIO$ (4) $HClO > HBrO > HIO$
60.	Which of the following is not a hard base ? (1) NH_3 (2) H_2O (3) CN^- (4) Cl^-
61.	The number of geometrical and optical isomers for the complex $[Rh(en)_2Cl_2]^+$ ion (1) Three (2) Two (3) Four (4) Six

Question No.	Questions
62.	<p>The electrons which contribute to isomer shift in Mössbauer spectroscopy are</p> <p>(1) p-electrons (2) d-electrons</p> <p>(3) f-electrons (4) s-electrons</p>
63.	<p>Which of the following is a border line acid ?</p> <p>(1) Pd²⁺ (2) Co²⁺</p> <p>(3) Co³⁺ (4) Al³⁺</p>
64.	<p>The absorption peaks in IR spectrum are broad, as they possess information related to</p> <p>(1) Rotational energy (2) Bond energy</p> <p>(3) Inner electron changes (4) Outer electron changes</p>
65.	<p>Wurtzite structure has crystal lattice type</p> <p>(1) bcc (2) hcp</p> <p>(3) fcc (4) None of these</p>
66.	<p>The spectroscopic state for d³ system is</p> <p>(1) $4F_{3/2}$ (2) $4F_2$</p> <p>(3) $3F_{3/2}$ (4) $4D_{3/2}$</p>
67.	<p>The point group for</p> <p style="text-align: center;">  $\begin{array}{c} \text{Cl} \diagup \\ \text{C} = \text{O} \\ \text{Cl} \diagdown \end{array} \begin{array}{c} \text{H} \\ \diagdown \\ \text{O} \\ \diagup \\ \text{H} \end{array}$ </p> <p>is</p> <p>(1) C₂h (2) C₂v</p> <p>(3) C₂v (4) T_d</p>

Question No.	Questions
68.	<p>The number of atoms contained within the unit cell for the diamond lattice are</p> <p>(1) 2 (2) 1 (3) 4 (4) 8</p>
69.	<p>The Miller indices of crystal planes which cut through the crystal axes at (2a, 3b, c) are</p> <p>(1) (362) (2) (263) (3) (326) (4) None of these</p>
70.	<p>The Efficacy of Al³⁺, Mg²⁺ and Na⁺ ions to cause coagulation vary in the order</p> <p>(1) Al³⁺ ≈ Mg²⁺ ≈ Na⁺ (2) Na⁺ > Mg²⁺ > Al³⁺ (3) Na⁺ ≈ Mg²⁺ > Al³⁺ (4) Al³⁺ > Mg²⁺ > Na⁺</p>
71.	<p>Polymers having regular alternation of d- and l-configurations in the molecular chain are called</p> <p>(1) Syndiotactic polymers (2) Isotactic polymers (3) Block copolymers (4) Copolymers</p>
72.	<p>The effective nuclear charge for 35 electron in sulphur is</p> <p>(1) 4.30 (2) 5.45 (3) 3.40 (4) 54.5</p>
73.	<p>The correct form of Butler-Volmer equation is</p> <p>(1) $i = i_0 e^{-\alpha n F / RT}$ (2) $i = i_0 \{e^{(1-\alpha) n F / RT} - e^{\alpha n F / RT}\}$ (3) $i = i_0 \{e^{(1-\alpha) n F / RT} - e^{-\alpha n F / RT}\}$ (4) $i = i_0 \cdot e^{(1-\alpha) n F / RT}$</p> <p>where all the terms have usual meanings</p>

Question No.	Questions
74.	<p>The temperature at which the Joule-Thomson coefficient changes sign is known as</p> <p>(1) Critical temperature (2) Boyle temperature</p> <p>(3) Inversion temperature (4) None of these</p>
75.	<p>The heat of vaporisation of water at 100°C is 2259.4 Jg⁻¹. The entropy increase in the evaporation of one mole of water at 100°C will be</p> <p>(1) 10.903 Jk⁻¹ mol⁻¹ (2) 1090.3 Jk⁻¹ mol⁻¹</p> <p>(3) 10903 Jk⁻¹ mol⁻¹ (4) 109.03 Jk⁻¹ mol⁻¹</p>
76.	<p>The relation between Entropy and thermodynamic probability is expressed as</p> <p>(1) $S = \ln W$ (2) $S = k \ln W$</p> <p>(3) $S = R \ln W$ (4) $S = \frac{1}{\ln w}$</p>
77.	<p>Which out of the following is correct relation?</p> <p>(1) $\text{pH} = \frac{1}{2} \text{pk}_w + \frac{1}{2} \text{pk}_a - \frac{1}{2} \text{pk}_b$ (2) $\text{pH} = \frac{1}{2} \text{pk}_w - \frac{1}{2} \text{pk}_a + \frac{1}{2} \text{pk}_b$</p> <p>(3) $\text{pH} = \frac{1}{2} \text{pk}_a - \frac{1}{2} \text{pk}_w + \frac{1}{2} \text{pk}_b$ (4) $\text{pH} = \frac{1}{2} \text{pk}_w + \frac{1}{2} \text{pk}_a + \frac{1}{2} \text{pk}_b$</p>
78.	<p>Which of the following is an irreversible cell ?</p> <p>(1) $\text{Zn} / \text{Zn}^{2+} \parallel \text{AgCl} / \text{Ag}$ (2) $\text{Zn} / \text{Zn}^{2+} \parallel \text{Cd}^{2+} / \text{Cd}$</p> <p>(3) $\text{Cd} / \text{Cd}^{2+} \parallel \text{KCl}, \text{Hg}_2\text{Cl}_2(\text{s}) / \text{Hg}$ (4) $\text{Zn} / \text{H}_2\text{SO}_4 / \text{Ag}$</p>

Question No.	Questions
79.	<p>Which of the following partially miscible liquids have both upper and lower critical solution temperature ?</p> <p>(1) Water and aniline (2) Water and diethyl amine (3) Water and β-picoline (4) Methanal and cyclohexane</p>
80.	<p>For an isentropic change of state</p> <p>(1) $dH = 0$ (2) $dT = 0$ (3) $dS = 0$ (4) $dS = 1$</p>
81.	<p>The number of microstates for a three different atom possessing three quanta of energy are</p> <p>(1) 3 (2) 10 (3) 6 (4) 4</p>
82.	<p>Step down ladder operator lowers the eigen value of wave function by</p> <p>(1) 1 (2) 2 (3) 3 (4) None of these</p>
83.	<p>The translational partition function 'q_{trans}' is Expressed by</p> <p>(1) $q_{trans} = \frac{(2\pi kT)^{3/2} V}{RT}$ (2) $q_{trans} = \frac{(2\pi m kT)^{3/2} V}{RT}$ (3) $q_{trans} = \frac{(2\pi m kT)^{1/2} V}{RT}$ (4) $q_{trans} = \frac{(2\pi m kT)^{3/2} V}{T}$</p> <p>Where all the symbols have their usual meaning</p>

Question No.	Questions
84.	Isotonic solutions have same (1) Viscosity (2) Surface tension (3) Dipole moment (4) Osmotic pressure
85.	Which one of the following statements is correct ? (1) Change in zero point energy, E_0 , increases the value of Entropy of system by E_0 (2) Change in zero point Energy, E_0 , decreases the value of Entropy of the system by E_0 (3) Change in zero point Energy, E_0 , doesn't alter the Entropy of the system (4) Change in zero point Energy, E_0 , increases work function by E_0
86.	The Onsager's reciprocal relation is (1) $L_{11} = L_{22}$ (2) $L_{11} = L_{12}$ (3) $L_{22} = L_{21}$ (4) $L_{12} = L_{21}$ Where L_{11} , L_{22} and L_{12} , L_{21} are like and unlike phenomological coefficients respectively
87.	Colloidal sols are purified by (1) Dialysis (2) Peptization (3) Coagulation (4) Flocculation

Question No.	Questions
93.	A copolymer can be obtained by (1) Polymerizing two identical polymer (2) Mixing two identical polymer (3) Polymerizing two different monomer (4) Mixing two different polymer
94.	If $(\partial P/\partial T)_V = \alpha/\beta$ then according to Maxwell's relation (1) $(\partial S/\partial V)_T = \beta/\alpha$ (2) $(\frac{\partial S}{\partial V})_T = \alpha\beta$ (3) $(\frac{\partial S}{\partial V})_T = -\frac{\alpha}{\beta}$ (4) $(\frac{\partial S}{\partial V})_T = \frac{\alpha}{\beta}$
95.	The Debroglie wave length of an electron with kinetic energy of 1.00 eV is (1) 1.23 nm (2) 12.3 nm (3) 28.7 pm (4) None of these
96.	Cooking time of food is reduced in a pressure cooker because (1) The boiling point of water is lowred (2) The boiling point of water is raised (3) There is uniform distribution of heat (4) Higher pressure softens the food

Question No.	Questions
97.	Which of the following is a Boson ? (1) Proton (2) Electron (3) ${}^4\text{He}_2$ (4) D^2
98.	The rotational spectrum of a rigid diatomic rotator consists of equally spaced lines with spacing equal to (1) $2B$ (2) B (3) $1.5B$ (4) $0.5B$
99.	What is the percentage strength of "15 volume" H_2O_2 (1) 6.09 % (2) 4.55 % (3) 3.03 % (4) 1.50 %
100.	For a particle possessing rotational motion (1) $C_p - C_v = R$ (2) $C_p - C_v = 2R$ (3) $C_p - C_v = 0$ (4) None of these

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(MPH/PHD/URS-EE-2017)

Sr. No. 10010

Subject : CHEMISTRY

Code

B

Time : 1½ Hours

Max. Marks : 100

Total Questions : 100

Roll No. _____ (in figure) _____ (in words)

Name : _____ Father's Name : _____

Mother's Name : _____ Date of Examination : _____

(Signature of the candidate)

(Signature of the Invigilator)

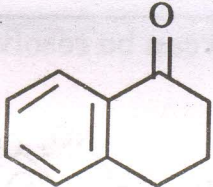
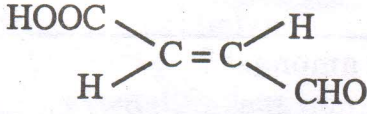
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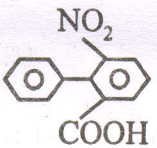
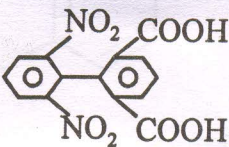
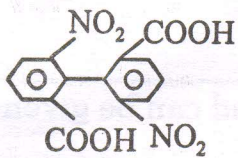
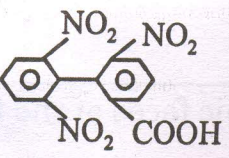




1. All questions are compulsory.
2. The candidates must return the Question book-let as well as OMR answer-sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / mis-behaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3. In case there is any discrepancy in any question(s) in the Question Booklet, the same may be brought to the notice of the Controller of Examinations in writing within two hours after the test is over. No such complaint(s) will be entertained thereafter.
4. The candidate MUST NOT do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question book-let itself. Answers MUST NOT be ticked in the Question book-let.
5. There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.
6. Use only Black or Blue **BALL POINT PEN** of good quality in the OMR Answer-Sheet.
7. BEFORE ANSWERING THE QUESTIONS, THE CANDIDATES SHOULD ENSURE THAT THEY HAVE BEEN SUPPLIED CORRECT AND COMPLETE BOOK-LETS. COMPLAINTS, IF ANY, REGARDING MISPRINTING ETC. WILL NOT BE ENTERTAINED 30 MINUTES AFTER STARTING OF THE EXAMINATION.

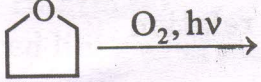
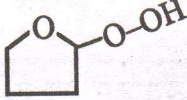

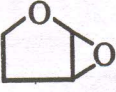
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20/11/17
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Deptt. of Chemistry,
R. U. University, Ra

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Question No.	Questions
1.	<p>Which of the following pairs is epimers :</p> <p>(1) D (+) Glucose and D (-) Fructose</p> <p>(2) D (-) Glucose and D (-) Ribose</p> <p>(3) D (+) Glucose and D (+) Mannose</p> <p>(4) (+) Maltose and (+) Sucrose</p>
2.	<p>The reactivity of thiophene, furan and pyrrole follows the sequence</p> <p>(1) Furan < Thiophene < Pyrrole (2) Thiophene < Furan < Pyrrole</p> <p>(3) Pyrrole < Furan < Thiophene (4) Thiophene < Pyrrole < Furan</p>
3.	<p>In UV, λ_{\max} for the following compound will be at</p> <div style="text-align: center;">  </div> <p>(1) 280 nm (2) 259 nm</p> <p>(3) 237 nm (4) 317 nm</p>
4.	<p>Enantiotropic faces of the following compound can be given as</p> <div style="text-align: center;">  </div> <p>(1) Re - Re (2) Si - Re</p> <p>(3) Si - Si (4) Re - Si</p>

Question No.	Questions
5.	In benzilic acid rearrangement (1) Benzaldehyde is converted in to Benzoin (2) Benzil is converted in to Benzilic acid (3) Benzilic acid is converted in to Benzoin (4) None of the above
6.	How many normal modes of vibration are possible for benzene molecule ? (1) 6 (2) 12 (3) 30 (4) 24
7.	Which is not an anticancer drug ? (1) Vincristine (2) Cyclophosphamide (3) Dexorubicin (4) Gabapentin
8.	Which of the following compounds can be resolved <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>(1) </p> </div> <div style="text-align: center;"> <p>(2) </p> </div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 20px;"> <div style="text-align: center;"> <p>(3) </p> </div> <div style="text-align: center;"> <p>(4) </p> </div> </div>
9.	Which is the weakest acid amongst ? <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>(1) </p> </div> <div style="text-align: center;"> <p>(2) </p> </div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 20px;"> <div style="text-align: center;"> <p>(3) </p> </div> <div style="text-align: center;"> <p>(4) </p> </div> </div>

Question No.	Questions
10.	<p style="text-align: center;">  </p> <p>Product formed in the reaction is</p> <p>(1) HOCH₂CH₂CH₂CH₂OH (2) </p> <p>(3)  (4) </p>
11.	<p>A fuel which can not be classed as a renewable source of energy is</p> <p>(1) Methanol (2) Hydrogen</p> <p>(3) Methane (4) Ethanol</p>
12.	<p>50 ml of 0.1 NaOH is added to 49 ml of 0.1 M HCl. The resulting solution has pH</p> <p>(1) 12 (2) 11</p> <p>(3) 9 (4) 10</p>
13.	<p>A copolymer can be obtained by</p> <p>(1) Polymerizing two identical polymer</p> <p>(2) Mixing two identical polymer</p> <p>(3) Polymerizing two different monomer</p> <p>(4) Mixing two different polymer</p>

Question No.	Questions
14.	<p>If $\left(\frac{\partial P}{\partial T}\right)_V \propto \frac{\alpha}{\beta}$ then according to Maxwell's relation</p> <p>(1) $\left(\frac{\partial S}{\partial V}\right)_T = \frac{\beta}{\alpha}$ (2) $\left(\frac{\partial S}{\partial V}\right)_T = \alpha\beta$</p> <p>(3) $\left(\frac{\partial S}{\partial V}\right)_T = -\frac{\alpha}{\beta}$ (4) $\left(\frac{\partial S}{\partial V}\right)_T = \frac{\alpha}{\beta}$</p>
15.	<p>The Debroglie wave length of an electron with kinetic energy of 1.00 eV is</p> <p>(1) 1.23 nm (2) 12.3 nm</p> <p>(3) 28.7 pm (4) None of these</p>
16.	<p>Cooking time of food is reduced in a pressure cooker because</p> <p>(1) The boiling point of water is lowred</p> <p>(2) The boiling point of water is raised</p> <p>(3) There is uniform distribution of heat</p> <p>(4) Higher pressure softens the food</p>
17.	<p>Which of the following is a Boson ?</p> <p>(1) Proton (2) Electron</p> <p>(3) ${}^4\text{He}_2$ (4) D^2</p>

Question No.	Questions
18.	<p>The rotational spectrum of a rigid diatomic rotator consists of equally spaced lines with spacing equal to</p> <p>(1) $2B$ (2) B</p> <p>(3) $1.5 B$ (4) $0.5 B$</p>
19.	<p>What is the percentage strength of "15 volume" H_2O_2</p> <p>(1) 6.09 % (2) 4.55 %</p> <p>(3) 3.03 % (4) 1.50 %</p>
20.	<p>For a particle possessing rotational motion</p> <p>(1) $C_p - C_v = R$ (2) $C_p - C_v = 2R$</p> <p>(3) $C_p - C_v = 0$ (4) None of these</p>
21.	<p>Polymers having regular alternation of <i>d</i>- and <i>l</i>-configurations in the molecular chain are called</p> <p>(1) Syndiotactic polymers (2) Isotactic polymers</p> <p>(3) Block copolymers (4) Copolymers</p>
22.	<p>The effective nuclear charge for 35 electron in sulphur is</p> <p>(1) 4.30 (2) 5.45</p> <p>(3) 3.40 (4) 54.5</p>
23.	<p>The correct form of Butler-Volmer equation is</p> <p>(1) $i = i_0 e^{-anF/RT}$ (2) $i = i_0 \{e^{(1-\alpha)nF/RT} - e^{anF/RT}\}$</p> <p>(3) $i = i_0 \{e^{(1-\alpha)nF/RT} + e^{-anF/RT}\}$ (4) $i = i_0 \cdot e^{(1-\alpha)nF/RT}$</p> <p>where all the terms have usual meanings</p>

Question No.	Questions
24.	<p>The temperature at which the Joule-Thomson coefficient changes sign is known as</p> <p>(1) Critical temperature (2) Boyle temperature</p> <p>(3) Inversion temperature (4) None of these</p>
25.	<p>The heat of vaporisation of water at 100°C is 2259.4 Jg⁻¹. The entropy increase in the evaporation of one mole of water at 100°C will be</p> <p>(1) 10.903 Jk⁻¹ mol⁻¹ (2) 1090.3 Jk⁻¹ mol⁻¹</p> <p>(3) 10903 Jk⁻¹ mol⁻¹ (4) 109.03 Jk⁻¹ mol⁻¹</p>
26.	<p>The relation between Entropy and thermodynamic probability is expressed as</p> <p>(1) $S = \ln W$ (2) $S = k \ln W$</p> <p>(3) $S = R \ln W$ (4) $S = \frac{1}{\ln w}$</p>
27.	<p>Which out of the following is correct relation?</p> <p>(1) $\text{pH} = \frac{1}{2} \text{pk}_w + \frac{1}{2} \text{pk}_a - \frac{1}{2} \text{pk}_b$ (2) $\text{pH} = \frac{1}{2} \text{pk}_w - \frac{1}{2} \text{pk}_a + \frac{1}{2} \text{pk}_b$</p> <p>(3) $\text{pH} = \frac{1}{2} \text{pk}_a - \frac{1}{2} \text{pk}_w + \frac{1}{2} \text{pk}_b$ (4) $\text{pH} = \frac{1}{2} \text{pk}_w + \frac{1}{2} \text{pk}_a + \frac{1}{2} \text{pk}_b$</p>
28.	<p>Which of the following is an irreversible cell ?</p> <p>(1) $\text{Zn} / \text{Zn}^{2+} \parallel \text{AgCl} / \text{Ag}$ (2) $\text{Zn} / \text{Zn}^{2+} \parallel \text{Cd}^{2+} / \text{Cd}$</p> <p>(3) $\text{Cd} / \text{Cd}^{2+} \parallel \text{KCl}, \text{Hg}_2\text{Cl}_2(\text{s}) / \text{Hg}$ (4) $\text{Zn} / \text{H}_2\text{SO}_4 / \text{Ag}$</p>


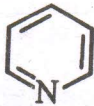

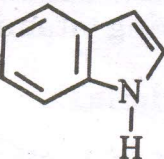
Question No.	Questions
29.	<p>Which of the following partially miscible liquids have both upper and lower critical solution temperature ?</p> <p>(1) Water and aniline (2) Water and diethyl amine (3) Water and β-picoline (4) Methanal and cyclohexane</p>
30.	<p>For an isentropic change of state</p> <p>(1) $dH = 0$ (2) $dT = 0$ (3) $dS = 0$ (4) $dS = 1$</p>
31.	<p>The range of fluorine chemical shift in NMR is</p> <p>(1) 12 ppm (2) 56 ppm (3) 300 ppm (4) 542 ppm</p>
32.	<p>Borazine, $B_3N_3H_6$ has a</p> <p>(1) Regular hexagonal structure like benzene (2) Tetragonal structure (3) Triangular capped structure (4) Hexagonal prism structure</p>
33.	<p>In ligand to metal charge spectra (LMCT) of MnO_4^- ion, the transition responsible for purple color is</p> <p>(1) 29500 cm^{-1} (2) 17700 cm^{-1} (3) 44400 cm^{-1} (4) 30300 cm^{-1}</p>
34.	<p>When an auxochrome is attached to a carbon-carbon double bond, then λ_{max} in UV spectrum undergoes</p> <p>(1) Hypsochromic shift (2) Bathochromic shift (3) Hyperchromic shift (4) Hypochromic shift</p>

Question No.	Questions
35.	<p>The number of α and β particles emitted in the nuclear reaction ${}_{92}\text{U}^{238} \rightarrow {}_{82}\text{Pb}^{206}$ is</p> <p>(1) $7\alpha, 5\beta$ (2) $6\alpha, 4\beta$ (3) $4\alpha, 3\beta$ (4) $8\alpha, 6\beta$</p>
36.	<p>Among the hydroxides of alkaline earth metals, the least soluble in water is</p> <p>(1) $\text{Mg}(\text{OH})_2$ (2) $\text{Ca}(\text{OH})_2$ (3) $\text{Be}(\text{OH})_2$ (4) $\text{Ba}(\text{OH})_2$</p>
37.	<p>Which of the following isotope is not a fission fuel ?</p> <p>(1) U-238 (2) U-233 (3) U-235 (4) U-239</p>
38.	<p>Most common oxidation state of tellurium is</p> <p>(1) -2 (2) +4 (3) +6 (4) +2</p>
39.	<p>The correct order of acidic strength is</p> <p>(1) $\text{HClO} > \text{HIO} > \text{HBrO}$ (2) $\text{HIO} > \text{HBrO} > \text{HClO}$ (3) $\text{HBrO} > \text{HClO} > \text{HIO}$ (4) $\text{HClO} > \text{HBrO} > \text{HIO}$</p>
40.	<p>Which of the following is not a hard base ?</p> <p>(1) NH_3 (2) H_2O (3) CN^- (4) Cl^-</p>

Question No.	Questions
41.	<p>A fatty acid with 14 carbon atoms will undergo how many cycles of beta oxidation ?</p> <p>(1) 7 (2) 4 (3) 6 (4) 5</p>
42.	<p>Which of the following compounds show a sharp IR absorption band at 1700 cm^{-1} and a broad band at 3300 cm^{-1} ?</p> <p>(1) Ethanol (2) Ethanoic acid (3) Propanone (4) diethyl ether</p>
43.	<p>The product in the following reaction is</p> $\text{CH}_3-\text{C}-\text{N} \xrightarrow[\text{(ii) H}_2\text{O}]{\text{(i) CH}_3\text{MgBr}} ?$ <p>(1) $\text{H}_3\text{C}-\overset{\text{CH}_3}{\underset{\text{CH}_3}{\text{C}}}-\text{OH}$ (2) $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{NH}_2$ (3) $\text{H}_3\text{C}-\overset{\text{OH}}{\text{CH}}-\text{CH}_3$ (4) CH_3COCH_3</p>
44.	<p>Number of Orientations with respect to applied magnetic field for deuterium is</p> <p>(1) 3 (2) 4 (3) 2 (4) 1</p>

Question No.	Questions				
45.	<p>When EDTA solution is added to Mg^{2+} ion, then which of the following statements is not true ?</p> <ol style="list-style-type: none">(1) Four coordinate sites of Mg^{2+} ions are occupied by EDTA and remaining two sites are occupied by water molecules(2) pH of the solution is decreased(3) Colorless $[Mg - EDTA]^{2-}$ chelate is formed(4) All six coordinates of Mg^{2+} ions are occupied by EDTA				
46.	<p>When applying VSEPR theory to predict the molecular shape, which of the following we need not take in to account ?</p> <ol style="list-style-type: none">(1) Valence electrons occupying sigma bonding orbitals(2) Valence electrons occupying π-bonding orbitals(3) Valence electrons occupying non-bonding orbitals(4) None of these				
47.	<p>Which statement about ferrocene is incorrect ?</p> <ol style="list-style-type: none">(1) The Fe centre in ferrocene can be protonated by treatment with conc. H_2SO_4(2) In the gas phase, the C_5H_5 rings in ferrocene are eclipsed(3) The ligands in ferrocene undergo electrophilic substitution with $RCOCl$ in the presence of a Lewis acid(4) I_2 oxidises ferrocene to give a diamagnetic cation				
48.	<p>Chlorophyll converts light energy in to</p> <table border="0" style="width: 100%;"><tr><td style="width: 50%;">(1) Heat energy</td><td style="width: 50%;">(2) Potential energy</td></tr><tr><td>(3) Chemical energy</td><td>(4) Electrical energy</td></tr></table>	(1) Heat energy	(2) Potential energy	(3) Chemical energy	(4) Electrical energy
(1) Heat energy	(2) Potential energy				
(3) Chemical energy	(4) Electrical energy				

Question No.	Questions
49.	The tyrosinase, is activated by (1) Copper ion (2) Iron ion (3) Potassium ion (4) Calcium ion
50.	Which of the following terms best describes a drug inhibits the enzyme, but binds to a binding site other than active site ? (1) Allosteric inhibitor (2) Reversible inhibitor (3) Irreversible Inhibitor (4) Suicide substrate
51.	Stability of $(\text{CH}_3)_3\text{C}^\oplus$ can be explained by (1) Inductive Effect (2) Hyper conjugation (3) Mesomeric Effect (4) Both by Inductive Effect and hyperconjugation
52.	Absolute configuration of $\begin{array}{c} \text{COOH} \\ \\ \text{H}-\text{C}-\text{OH} \\ \\ \text{H}-\text{C}-\text{OH} \\ \\ \text{COOH} \end{array}$ is (1) (2R, 3S) (2) (2R, 3R) (3) (2S, 3S) (4) (2S, 3R)
53.	Which of the following vitamins has steroidal structure ? (1) Vitamin E (2) Vitamin K (3) Vitamin D (4) Vitamin C

Question No.	Questions
54.	<p>The Co-enzyme involved in biosynthesis of fats is</p> <p>(1) FMN (2) Co - I</p> <p>(3) Co - II (4) Co - A</p>
55.	<p>How many small peptides are formed upon cleavage by trypsin if a protein has five lysine residues ?</p> <p>(1) 4 (2) 5</p> <p>(3) 6 (4) 7</p>
56.	<p>Which of the following interaction contributes most in protein folding ?</p> <p>(1) Hydrophobic interaction (2) Covalent bond</p> <p>(3) van der Walls interaction (4) Ionic bond</p>
57.	<p>Which of the following reactions convert a 1, 5-diene to an isomeric 1,5-diene ?</p> <p>(1) Cope rearrangement</p> <p>(2) Claisen rearrangement</p> <p>(3) Photochemical (2 + 2) reaction</p> <p>(4) Diels-Alder reaction</p>
58.	<p>Which is most reactive towards an eletrophile ?</p> <p>(1) </p> <p>(2) </p> <p>(3) </p> <p>(4) </p>

Question No.	Questions
59.	Natural lipids are readily soluble in (1) Oil (2) Mercury (3) Water (4) None of these
60.	A disadvantage of fats is (1) Reduction in rate of heat loss (2) Solvent for vitamins (3) Efficient source of energy (4) Effective insulative material
61.	Which statement is incorrect about zeolites ? (1) Zeolites are aluminosilicates (2) Each zeolite contains channels of a specific size (3) A zeolite functions as an acid catalyst (4) No zeolites occur naturally
62.	Chalogenides are the compounds of (1) Sulfur and phosphorus (2) Sulfur and halogens (3) Sulfur, selenium and tellurium (4) Nitrogen and sulfur
63.	Spin-Orbit coupling is found maximum in (1) Third transition series metal complexes (2) First transition series metal complexes (3) Second transition series metal complexes (4) p-block elements

Question No.	Questions
64.	Which one of the polymers is a conductive polymer (1) Polyethylene (2) Polyacetylene (3) Polyvinylene (4) Poly vinyl Chloride
65.	The difference in crystal field stabilization energy between low spin d^6 octahedral complex and d^9 octahedral with tetragonal elongation complex, assuming the ligands are strong field ligands, will be (1) $-2.13 \Delta_0$ (2) $-2.40 \Delta_0$ (3) $-2.00 \Delta_0$ (4) None of these
66.	Natural oxygen carrier other than Hemoglobin is (1) Hem erythrin (2) Hemocyanins (3) Tyrosinase (4) Ferredoxins
67.	Among the following ligands, the trans effect is maximum for (1) NO_2^- (2) Cl^- (3) CN^- (4) OH^-
68.	Which change is not detected by DTA ? (1) Sublimation (2) Desorption (3) Polymer softening (4) Loss of moisture
69.	Which nuclear model can best explain that all elements with atomic number greater than 92 are radioactive ? (1) Shell Model (2) Liquid Drop Model (3) Pion Cloud only (4) All of these

Question No.	Questions
70.	Spotting electrolyte is used to eliminate (1) Condenser current (2) Diffusion current (3) Limiting current (4) Migration current
71.	The number of geometrical and optical isomers for the complex $[\text{Rh}(\text{en})_2\text{Cl}_2]^+$ ion (1) Three (2) Two (3) Four (4) Six
72.	The electrons which contribute to isomer shift in Mössbauer spectroscopy are (1) p-electrons (2) d-electrons (3) f-electrons (4) s-electrons
73.	Which of the following is a border line acid ? (1) Pd^{2+} (2) Co^{2+} (3) Co^{3+} (4) Al^{3+}
74.	The absorption peaks in IR spectrum are broad, as they possess information related to (1) Rotational energy (2) Bond energy (3) Inner electron changes (4) Outer electron changes
75.	Wurtzite structure has crystal lattice type (1) bcc (2) hcp (3) fccp (4) None of these

Question No.	Questions
76.	<p>The spectroscopic state for d^3 system is</p> <p>(1) $^4F_{3/2}$ (2) 4F_2</p> <p>(3) $^3F_{3/2}$ (4) $^4D_{3/2}$</p>
77.	<p>The point group for</p> $\begin{array}{c} \text{Cl} \\ \diagdown \\ \text{C} \\ \diagup \\ \text{Cl} \end{array} = \text{O} \begin{array}{c} \diagup \\ \text{H} \\ \diagdown \\ \text{H} \end{array}$ <p>is</p> <p>(1) C_{2h} (2) C_{2v}</p> <p>(3) C_{2v} (4) T_d</p>
78.	<p>The number of atoms contained within the unit cell for the diamond lattice are</p> <p>(1) 2 (2) 1</p> <p>(3) 4 (4) 8</p>
79.	<p>The Miller indices of crystal planes which cut through the crystal axes at (2a, 3b, c) are</p> <p>(1) (362) (2) (263)</p> <p>(3) (326) (4) None of these</p>
80.	<p>The Efficacy of Al^{+3}, Mg^{2+} and Na^+ ions to cause coagulation vary in the order</p> <p>(1) $Al^{+3} \approx Mg^{2+} \approx Na^+$ (2) $Na^+ > Mg^{2+} > Al^{3+}$</p> <p>(3) $Na^+ \approx Mg^{+2} > Al^{3+}$ (4) $Al^{3+} > Mg^{2+} > Na^+$</p>

Question No.	Questions
87.	<p>The proton nmr of 2-bromo-2-methyl propane will consist of</p> <p>(1) Three quartets and a singlet (2) Two doublets and a singlet</p> <p>(3) One singlet (4) Two singlets</p>
88.	<p>Which compound has a molecular ion at $m/z = 58$, an Infrared absorption at 1650 cm^{-1} and just one singlet in its nmr spectrum ?</p> <p>(1) Butane (2) 2-methyl propane</p> <p>(3) $\text{CH}_3\text{CH}_2\text{CHO}$ (4) CH_3COCH_3</p>
89.	<p>Which electromagnetic radiation has maximum frequency ?</p> <p>(1) Cosmic rays (2) X-rays</p> <p>(3) Infra red Rays (4) Ultraviolet rays</p>
90.	<p>The IUPAC name of the compound</p> $\begin{array}{ccccccc} \text{CH}_3\text{CO} & - & \text{CH} & - & \text{CH} & - & \text{COOH} \\ & & & & & & \\ & & \text{Cl} & & \text{OCH}_3 & & \end{array}$ <p>is</p> <p>(1) 3-chloro-2-methoxy-4-oxo-pentanoic acid</p> <p>(2) 3-chloro-2-methoxy-4-keto-pentanoic acid</p> <p>(3) 4-carboxy-3-chloro-4-methoxy-2-butanone</p> <p>(4) 1-carboxy-2-methoxy-3-chloro-ethyl methyl ketone</p>
91.	<p>The number of microstates for a three different atom possessing three quanta of energy are</p> <p>(1) 3 (2) 10</p> <p>(3) 6 (4) 4</p>

Question No.	Questions
92.	Step down ladder operator lowers the eigen value of wave function by (1) 1 (2) 2 (3) 3 (4) None of these
93.	The translational partition function ' q_{trans} ' is Expressed by (1) $q_{\text{trans}} = \frac{(2\pi kT)^{3/2} V}{RT}$ (2) $q_{\text{trans}} = \frac{(2\pi m kT)^{3/2} V}{RT}$ (3) $q_{\text{trans}} = \frac{(2\pi m kT)^{1/2} V}{RT}$ (4) $q_{\text{trans}} = \frac{(2\pi m kT)^{3/2} V}{T}$ Where all the symbols have their usual meaning
94.	Isotonic solutions have same (1) Viscosity (2) Surface tension (3) Dipole moment (4) Osmotic pressure
95.	Which one of the following statements is correct ? (1) Change in zero point energy, E_0 , increases the value of Entropy of system by E_0 (2) Change in zero point Energy, E_0 , decreases the value of Entropy of the system by E_0 (3) Change in zero point Energy, E_0 , doesn't alter the Entropy of the system (4) Change in zero point Energy, E_0 , increases work function by E_0

Question No.	Questions
96.	<p>The Onsager's reciprocal relation is</p> <p>(1) $L_{11} = L_{22}$ (2) $L_{11} = L_{12}$ (3) $L_{22} = L_{21}$ (4) $L_{12} = L_{21}$</p> <p>Where L_{11}, L_{22} and L_{12}, L_{21} are like and unlike phenomenological coefficients respectively</p>
97.	<p>Colloidal sols are purified by</p> <p>(1) Dialysis (2) Peptization (3) Coagulation (4) Flocculation</p>
98.	<p>There cannot be a quadrupole point on the phase diagram for one component system, because the degree of freedom is</p> <p>(1) 3 (2) 4 (3) -1 (4) zero</p>
99.	<p>The average position of a particle, $\langle x \rangle$ can be estimated quantum mechanically using relation</p> <p>(1) $\langle x \rangle = \frac{\int x \Psi \Psi^* dt}{\int \Psi \Psi^* dt}$ (2) $\langle x \rangle = \frac{\int \Psi x \Psi^* dt}{\int \Psi \Psi^* dt}$ (3) $\langle x \rangle = \frac{\int x^2 \Psi \Psi^* dt}{\int \Psi \Psi^* dt}$ (4) $\langle x \rangle = \frac{\int \Psi x^2 \Psi^* dt}{\int \Psi \Psi^* dt}$</p>
100.	<p>The term "steady state" deals with</p> <p>(1) Statistical mechanics (2) quantum mechanics (3) Thermodynamics (4) Irreversible thermodynamics</p>

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(MPH/PHD/URS-EE-2017)

Sr. No. 10031

Subject : CHEMISTRY

Code

C

Time : 1¼ Hours

Max. Marks : 100

Total Questions : 100

Roll No. _____ (in figure) _____ (in words)

Name : _____ Father's Name : _____

Mother's Name : _____ Date of Examination : _____

(Signature of the candidate)

(Signature of the Invigilator)

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1. All questions are compulsory.
2. The candidates must return the Question book-let as well as OMR answer-sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / mis-behaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3. In case there is any discrepancy in any question(s) in the Question Booklet, the same may be brought to the notice of the Controller of Examinations in writing within two hours after the test is over. No such complaint(s) will be entertained thereafter.
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

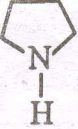
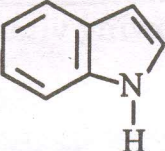
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20.1.17
Professor & Head,
Deptt. of Chemistry
M.D. University, R

Sam
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Question No.	Questions
1.	Which statement is incorrect about zeolites ? (1) Zeolites are aluminosilicates (2) Each zeolite contains channels of a specific size (3) A zeolite functions as an acid catalyst (4) No zeolites occur naturally
2.	Chalcogenides are the compounds of (1) Sulfur and phosphorus (2) Sulfur and halogens (3) Sulfur, selenium and tellurium (4) Nitrogen and sulfur
3.	Spin-Orbit coupling is found maximum in (1) Third transition series metal complexes (2) First transition series metal complexes (3) Second transition series metal complexes (4) p-block elements
4.	Which one of the polymers is a conductive polymer (1) Polyethylene (2) Polyacetylene (3) Polyvinylene (4) Poly vinyl Chloride
5.	The difference in crystal field stabilization energy between low spin d^6 octahedral complex and d^9 octahedral with tetragonal elongation complex, assuming the ligands are strong field ligands, will be (1) $-2.13 \Delta_0$ (2) $-2.40 \Delta_0$ (3) $-2.00 \Delta_0$ (4) None of these

Question No.	Questions
6.	Natural oxygen carrier other than Hemoglobin is (1) Hem erythrin (2) Hemocyanins (3) Tyrosinase (4) Ferredoxins
7.	Among the following ligands, the trans effect is maximum for (1) NO_2^- (2) Cl^- (3) CN^- (4) OH^-
8.	Which change is not detected by DTA ? (1) Sublimation (2) Desorption (3) Polymer softening (4) Loss of moisture
9.	Which nuclear model can best explain that all elements with atomic number greater than 92 are radioactive ? (1) Shell Model (2) Liquid Drop Model (3) Pion Cloud only (4) All of these
10.	Spotting electrolyte is used to eliminate (1) Condenser current (2) Diffusion current (3) Limiting current (4) Migration current
11.	Stability of $(\text{CH}_3)_3\text{C}^\oplus$ can be explained by (1) Inductive Effect (2) Hyper conjugation (3) Mesomeric Effect (4) Both by Inductive Effect and hyperconjugation

Question No.	Questions
12.	<p data-bbox="300 347 722 392">Absolute configuration of</p> <div style="text-align: center; margin: 10px 0;"> $\begin{array}{c} \text{COOH} \\ \\ \text{H}-\text{C}-\text{OH} \\ \\ \text{H}-\text{C}-\text{OH} \\ \\ \text{COOH} \end{array}$ </div> <p data-bbox="300 683 341 728">is</p> <div style="display: flex; justify-content: space-between;"> <div data-bbox="300 750 511 884"> <p>(1) (2R, 3S)</p> <p>(3) (2S, 3S)</p> </div> <div data-bbox="812 750 1031 884"> <p>(2) (2R, 3R)</p> <p>(4) (2S, 3R)</p> </div> </div>
13.	<p data-bbox="300 918 1209 963">Which of the following vitamins has steroidal structure ?</p> <div style="display: flex; justify-content: space-between;"> <div data-bbox="300 985 544 1108"> <p>(1) Vitamin E</p> <p>(3) Vitamin D</p> </div> <div data-bbox="812 985 1063 1108"> <p>(2) Vitamin K</p> <p>(4) Vitamin C</p> </div> </div>
14.	<p data-bbox="300 1142 1079 1187">The Co-enzyme involved in biosynthesis of fats is</p> <div style="display: flex; justify-content: space-between;"> <div data-bbox="300 1209 487 1332"> <p>(1) FMN</p> <p>(3) Co - II</p> </div> <div data-bbox="812 1209 998 1332"> <p>(2) Co - I</p> <p>(4) Co - A</p> </div> </div>
15.	<p data-bbox="300 1366 1453 1456">How many small peptides are formed upon cleavage by trypsin if a protein has five lysine residues ?</p> <div style="display: flex; justify-content: space-between;"> <div data-bbox="300 1478 397 1601"> <p>(1) 4</p> <p>(3) 6</p> </div> <div data-bbox="812 1478 909 1601"> <p>(2) 5</p> <p>(4) 7</p> </div> </div>
16.	<p data-bbox="300 1635 1421 1691">Which of the following interaction contributes most in protein folding ?</p> <div style="display: flex; justify-content: space-between;"> <div data-bbox="300 1713 771 1836"> <p>(1) Hydrophobic interaction</p> <p>(3) van der Walls interaction</p> </div> <div data-bbox="812 1713 1112 1836"> <p>(2) Covalent bond</p> <p>(4) Ionic bond</p> </div> </div>

Question No.	Questions
17.	<p>Which of the following reactions convert a 1, 5-diene to an isomeric 1,5-diene ?</p> <p>(1) Cope rearrangement (2) Claisen rearrangement (3) Photochemical (2 + 2) reaction (4) Diels-Alder reaction</p>
18.	<p>Which is most reactive towards an electrophile ?</p> <p>(1)  (2) </p> <p>(3)  (4) </p>
19.	<p>Natural lipids are readily soluble in</p> <p>(1) Oil (2) Mercury (3) Water (4) None of these</p>
20.	<p>A disadvantage of fats is</p> <p>(1) Reduction in rate of heat loss (2) Solvent for vitamins (3) Efficient source of energy (4) Effective insulative material</p>
21.	<p>A NMR transition is shifted from the reference in a 400 MHz spectrometer by 529 Hz. The chemical shift is</p> <p>(1) 1.32 (2) 5.29 (3) 7.56 (4) 1.76</p>

Question No.	Questions
22.	Dry ice is used in fire extinguishers. It is stored in the cylinder in solid form. When sprayed on a fire, it quickly changes into gas known as CO_2 . The change of state is called (1) Evaporation (2) Sublimation (3) Condensation (4) Distillation
23.	The use of solar power is covered within Green chemistry principle # 6, which is (1) Atom Economy (2) Design benign chemicals (3) Design for Energy Efficiency (4) None of these
24.	Milk is a/an (1) Suspension (2) Pure solution (3) Gel (4) Emulsion
25.	Dipole moment is shown by (1) 2, 2-Dimethyl propane (2) Trans-2-pentene (3) Trans-1,2-dichloroethene (4) 2,2,3,3-tetrabromobutane
26.	Which of the following statements about tetramethylsilane is incorrect ? (1) It produces a single peak at $\delta = 10$ (2) It is inert (3) It is volatile and can be easily distilled off and used again (4) It is used to provide a reference against which other peaks are measured
27.	The proton nmr of 2-bromo-2-methyl propane will consist of (1) Three quartets and a singlet (2) Two doublets and a singlet (3) One singlet (4) Two singlets

Question No.	Questions
28.	Which compound has a molecular ion at $m/z = 58$, an Infrared absorption at 1650 cm^{-1} and just one singlet in its nmr spectrum ? (1) Butane (2) 2-methyl propane (3) $\text{CH}_3\text{CH}_2\text{CHO}$ (4) CH_3COCH_3
29.	Which electromagnetic radiation has maximum frequency ? (1) Cosmic rays (2) X-rays (3) Infra red Rays (4) Ultraviolet rays
30.	The IUPAC name of the compound $\begin{array}{ccccccc} \text{CH}_3\text{CO} & - & \text{CH} & - & \text{CH} & - & \text{COOH} \\ & & & & & & \\ & & \text{Cl} & & \text{OCH}_3 & & \end{array}$ is (1) 3-chloro-2-methoxy-4-oxo-pentanoic acid (2) 3-chloro-2 methoxy-4-keto-pentanoic acid (3) 4-carboxy-3-chloro-4-methoxy-2-butanone (4) 1-carboxy-2-methoxy-3-chloro-ethyl methyl ketone
31.	A fuel which can not be classed as a renewable source of energy is (1) Methanol (2) Hydrogen (3) Methane (4) Ethanol
32.	50 ml of 0.1 NaOH is added to 49 ml of 0.1 M HCl. The resulting solution has pH (1) 12 (2) 11 (3) 9 (4) 10

Question No.	Questions
33.	<p>A copolymer can be obtained by</p> <ol style="list-style-type: none"> (1) Polymerizing two identical polymer (2) Mixing two identical polymer (3) Polymerizing two different monomer (4) Mixing two different polymer
34.	<p>If $(\partial P / \partial T)_V = \alpha / \beta$ then according to Maxwell's relation</p> <ol style="list-style-type: none"> (1) $(\partial S / \partial V)_T = \beta / \alpha$ (2) $(\frac{\partial S}{\partial V})_T = \alpha \beta$ (3) $(\frac{\partial S}{\partial V})_T = -\frac{\alpha}{\beta}$ (4) $(\frac{\partial S}{\partial V})_T = \frac{\alpha}{\beta}$
35.	<p>The DeBroglie wave length of an electron with kinetic energy of 1.00 eV is</p> <ol style="list-style-type: none"> (1) 1.23 nm (2) 12.3 nm (3) 28.7 pm (4) None of these
36.	<p>Cooking time of food is reduced in a pressure cooker because</p> <ol style="list-style-type: none"> (1) The boiling point of water is lowered (2) The boiling point of water is raised (3) There is uniform distribution of heat (4) Higher pressure softens the food

Question No.	Questions
37.	Which of the following is a Boson ? (1) Proton (2) Electron (3) ${}^4\text{He}_2$ (4) D^2
38.	The rotational spectrum of a rigid diatomic rotator consists of equally spaced lines with spacing equal to (1) $2B$ (2) B (3) $1.5 B$ (4) $0.5 B$
39.	What is the percentage strength of "15 volume" H_2O_2 (1) 6.09 % (2) 4.55 % (3) 3.03 % (4) 1.50 %
40.	For a particle possessing rotational motion (1) $C_p - C_v = R$ (2) $C_p - C_v = 2R$ (3) $C_p - C_v = 0$ (4) None of these
41.	The number of geometrical and optical isomers for the complex $[\text{Rh}(\text{en})_2\text{Cl}_2]^+$ ion (1) Three (2) Two (3) Four (4) Six
42.	The electrons which contribute to isomer shift in Mössbauer spectroscopy are (1) p-electrons (2) d-electrons (3) f-electrons (4) s-electrons
43.	Which of the following is a border line acid ? (1) Pd^{2+} (2) Co^{2+} (3) Co^{3+} (4) Al^{3+}

Question No.	Questions
44.	The absorption peaks in IR spectrum are broad, as they possess information related to (1) Rotational energy (2) Bond energy (3) Inner electron changes (4) Outer electron changes
45.	Wurtzite structure has crystal lattice type (1) bcc (2) hcp (3) fccp (4) None of these
46.	The spectroscopic state for d^3 system is (1) ${}^4F_{3/2}$ (2) 4F_2 (3) ${}^3F_{3/2}$ (4) ${}^4D_{3/2}$
47.	The point group for $\begin{array}{c} \text{Cl} \diagup \text{C} = \text{O} \diagleft \text{H} \\ \text{Cl} \diagdown \text{C} = \text{O} \diagright \text{H} \end{array}$ is (1) C_{2h} (2) C_{2v} (3) C_{2v} (4) T_d
48.	The number of atoms contained within the unit cell for the diamond lattice are (1) 2 (2) 1 (3) 4 (4) 8
49.	The Miller indices of crystal planes which cut through the crystal axes at $(2a, 3b, c)$ are (1) (362) (2) (263) (3) (326) (4) None of these

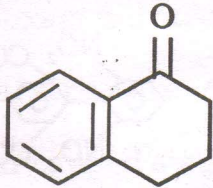
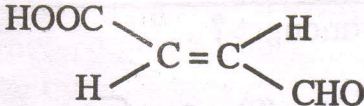
Question No.	Questions
54.	Number of Orientations with respect to applied magnetic field for deuterium is (1) 3 (2) 4 (3) 2 (4) 1
55.	When EDTA solution is added to Mg^{2+} ion, then which of the following statements is not true ? (1) Four coordinate sites of Mg^{2+} ions are occupied by EDTA and remaining two sites are occupied by water molecules (2) pH of the solution is decreased (3) Colorless $[Mg - EDTA]^{2-}$ chelate is formed (4) All six coordinates of Mg^{2+} ions are occupied by EDTA
56.	When applying VSEPR theory to predict the molecular shape, which of the following we need not take in to account ? (1) Valence electrons occupying sigma bonding orbitals (2) Valence electrons occupying π -bonding orbitals (3) Valence electrons occupying non-bonding orbitals (4) None of these
57.	Which statement about ferrocene is incorrect ? (1) The Fe centre in ferrocene can be protonated by treatment with conc. H_2SO_4 (2) In the gas phase, the C_5H_5 rings in ferrocene are eclipsed (3) The ligands in ferrocene undergo electrophilic substitution with $RCOCl$ in the presence of a Lewis acid (4) I_2 oxidises ferrocene to give a diamagnetic cation

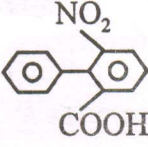
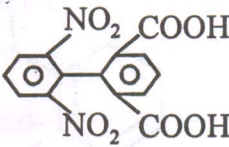
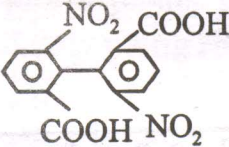
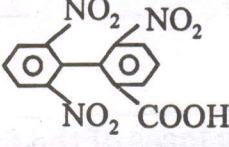



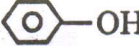

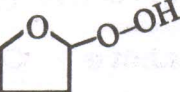

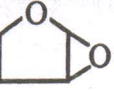
Question No.	Questions
58.	Chlorophyll converts light energy in to (1) Heat energy (2) Potential energy (3) Chemical energy (4) Electrical energy
59.	The tyrosinase, is activated by (1) Copper ion (2) Iron ion (3) Potassium ion (4) Calcium ion
60.	Which of the following terms best describes a drug inhibits the enzyme, but binds to a binding site other than active site ? (1) Allosteric inhibitor (2) Reversible inhibitor (3) Irreversible Inhibitor (4) Suicide substrate
61.	Polymers having regular alternation of <i>d</i> - and <i>l</i> -configurations in the molecular chain are called (1) Syndiotactic polymers (2) Isotactic polymers (3) Block copolymers (4) Copolymers
62.	The effective nuclear charge for 35 electron in sulphur is (1) 4.30 (2) 5.45 (3) 3.40 (4) 54.5
63.	The correct form of Butler-Volmer equation is (1) $i = i_0 e^{-\alpha nF/RT}$ (2) $i = i_0 \{e^{(1-\alpha) nF/RT} - e^{\alpha nF/RT}\}$ (3) $i = i_0 \{e^{(1-\alpha) nF/RT} - e^{-\alpha nF/RT}\}$ (4) $i = i_0 \cdot e^{(1-\alpha) nF/RT}$ where all the terms have usual meanings

Question No.	Questions
64.	<p>The temperature at which the Joule-Thomson coefficient changes sign is known as</p> <p>(1) Critical temperature (2) Boyle temperature (3) Inversion temperature (4) None of these</p>
65.	<p>The heat of vaporisation of water at 100°C is 2259.4 Jg⁻¹. The entropy increase in the evaporation of one mole of water at 100°C will be</p> <p>(1) 10.903 Jk⁻¹ mol⁻¹ (2) 1090.3 Jk⁻¹ mol⁻¹ (3) 10903 Jk⁻¹ mol⁻¹ (4) 109.03 Jk⁻¹ mol⁻¹</p>
66.	<p>The relation between Entropy and thermodynamic probability is expressed as</p> <p>(1) $S = \ln W$ (2) $S = k \ln W$ (3) $S = R \ln W$ (4) $S = \frac{1}{\ln W}$</p>
67.	<p>Which out of the following is correct relation?</p> <p>(1) $\text{pH} = \frac{1}{2} \text{pk}_w + \frac{1}{2} \text{pk}_a - \frac{1}{2} \text{pk}_b$ (2) $\text{pH} = \frac{1}{2} \text{pk}_w - \frac{1}{2} \text{pk}_a + \frac{1}{2} \text{pk}_b$ (3) $\text{pH} = \frac{1}{2} \text{pk}_a - \frac{1}{2} \text{pk}_w + \frac{1}{2} \text{pk}_b$ (4) $\text{pH} = \frac{1}{2} \text{pk}_w + \frac{1}{2} \text{pk}_a + \frac{1}{2} \text{pk}_b$</p>
68.	<p>Which of the following is an irreversible cell ?</p> <p>(1) $\text{Zn} / \text{Zn}^{2+} \parallel \text{AgCl} / \text{Ag}$ (2) $\text{Zn} / \text{Zn}^{2+} \parallel \text{Cd}^{2+} / \text{Cd}$ (3) $\text{Cd} / \text{Cd}^{2+} \parallel \text{KCl}, \text{Hg}_2\text{Cl}_2(\text{s}) / \text{Hg}$ (4) $\text{Zn} / \text{H}_2\text{SO}_4 / \text{Ag}$</p>

Question No.	Questions
69.	<p>Which of the following partially miscible liquids have both upper and lower critical solution temperature ?</p> <p>(1) Water and aniline (2) Water and diethyl amine (3) Water and β-picoline (4) Methanal and cyclohexane</p>
70.	<p>For an isentropic change of state</p> <p>(1) $dH = 0$ (2) $dT = 0$ (3) $dS = 0$ (4) $dS = 1$</p>
71.	<p>The number of microstates for a three different atom possessing three quanta of energy are</p> <p>(1) 3 (2) 10 (3) 6 (4) 4</p>
72.	<p>Step down ladder operator lowers the eigen value of wave function by</p> <p>(1) 1 (2) 2 (3) 3 (4) None of these</p>
73.	<p>The translational partition function 'q_{trans}' is Expressed by</p> <p>(1) $q_{trans} = \frac{(2\pi kT)^{3/2} V}{RT}$ (2) $q_{trans} = \frac{(2\pi m kT)^{3/2} V}{RT}$ (3) $q_{trans} = \frac{(2\pi m kT)^{1/2} V}{RT}$ (4) $q_{trans} = \frac{(2\pi m kT)^{3/2} V}{T}$</p> <p>Where all the symbols have their usual meaning</p>

Question No.	Questions
74.	Isotonic solutions have same (1) Viscosity (2) Surface tension (3) Dipole moment (4) Osmotic pressure
75.	Which one of the following statements is correct ? (1) Change in zero point energy, E_0 , increases the value of Entropy of system by E_0 (2) Change in zero point Energy, E_0 , decreases the value of Entropy of the system by E_0 (3) Change in zero point Energy, E_0 , doesn't alter the Entropy of the system (4) Change in zero point Energy, E_0 , increases work function by E_0
76.	The Onsager's reciprocal relation is (1) $L_{11} = L_{22}$ (2) $L_{11} = L_{12}$ (3) $L_{22} = L_{21}$ (4) $L_{12} = L_{21}$ Where L_{11} , L_{22} and L_{12} , L_{21} are like and unlike phenomological coefficients respectively
77.	Colloidal sols are purified by (1) Dialysis (2) Peptization (3) Coagulation (4) Flocculation

Question No.	Questions
83.	<p>In UV, λ_{\max} for the following compound will be at</p>  <p>(1) 280 nm (2) 259 nm (3) 237 nm (4) 317 nm</p>
84.	<p>Enantiotropic faces of the following compound can be given as</p>  <p>(1) Re - Re (2) Si - Re (3) Si - Si (4) Re - Si</p>
85.	<p>In benzilic acid rearrangement</p> <p>(1) Benzaldehyde is converted in to Benzoin (2) Benzil is converted in to Benzilic acid (3) Benzilic acid is converted in to Benzoin (4) None of the above</p>
86.	<p>How many normal modes of vibration are possible for benzene molecule ?</p> <p>(1) 6 (2) 12 (3) 30 (4) 24</p>
87.	<p>Which is not an anticancer drug ?</p> <p>(1) Vincristine (2) Cyclophosphamide (3) Dexorubicin (4) Gabapentin</p>

Question No.	Questions
88.	<p>Which of the following compounds can be resolved</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>(1) </p> </div> <div style="text-align: center;"> <p>(2) </p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: center;"> <p>(3) </p> </div> <div style="text-align: center;"> <p>(4) </p> </div> </div>
89.	<p>Which is the weakest acid amongst ?</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>(1) </p> </div> <div style="text-align: center;"> <p>(2) </p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: center;"> <p>(3) </p> </div> <div style="text-align: center;"> <p>(4) </p> </div> </div>
90.	<p> $\xrightarrow{O_2, h\nu}$</p> <p>Product formed in the reaction is</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>(1) $HOCH_2CH_2CH_2CH_2OH$</p> </div> <div style="text-align: center;"> <p>(2) </p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: center;"> <p>(3) </p> </div> <div style="text-align: center;"> <p>(4) </p> </div> </div>
91.	<p>The range of fluorine chemical shift in NMR is</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>(1) 12 ppm</p> </div> <div style="text-align: center;"> <p>(2) 56 ppm</p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: center;"> <p>(3) 300 ppm</p> </div> <div style="text-align: center;"> <p>(4) 542 ppm</p> </div> </div>

Question No.	Questions
92.	Borazine, $B_3N_3H_6$ has a (1) Regular hexagonal structure like benzene (2) Tetragonal structure (3) Triangular capped structure (4) Hexagonal prism structure
93.	In ligand to metal charge spectra (LMCT) of MnO_4^- ion, the transition responsible for purple color is (1) 29500 cm^{-1} (2) 17700 cm^{-1} (3) 44400 cm^{-1} (4) 30300 cm^{-1}
94.	When an auxochrome is attached to a carbon-carbon double bond, then λ_{max} in UV spectrum undergoes (1) Hypsochromic shift (2) Bathochromic shift (3) Hyperchromic shift (4) Hypochromic shift
95.	The number of α and β particles emitted in the nuclear reaction ${}_{92}U^{238} \rightarrow {}_{82}Pb^{206}$ is (1) $7\alpha, 5\beta$ (2) $6\alpha, 4\beta$ (3) $4\alpha, 3\beta$ (4) $8\alpha, 6\beta$
96.	Among the hydroxides of alkaline earth metals, the least soluble in water is (1) $Mg(OH)_2$ (2) $Ca(OH)_2$ (3) $Be(OH)_2$ (4) $Ba(OH)_2$

Question No.	Questions
97.	Which of the following isotope is not a fission fuel ? (1) U-238 (2) U-233 (3) U-235 (4) U-239
98.	Most common oxidation state of tellurium is (1) -2 (2) +4 (3) +6 (4) +2
99.	The correct order of acidic strength is (1) $\text{HClO} > \text{HIO} > \text{HBrO}$ (2) $\text{HIO} > \text{HBrO} > \text{HClO}$ (3) $\text{HBrO} > \text{HClO} > \text{HIO}$ (4) $\text{HClO} > \text{HBrO} > \text{HIO}$
100.	Which of the following is not a hard base ? (1) NH_3 (2) H_2O (3) CN^- (4) Cl^-

opened for evaluation on 20/1/17 @ 10.00 AM

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO)

(MPH/PHD/URS-EE-2017)

Sr. No. 10032

Subject : CHEMISTRY

Code

D

Time : 1½ Hours

Max. Marks : 100

Total Questions : 100

Roll No. _____ (in figure) _____ (in words)

Name : _____ Father's Name : _____

Mother's Name : _____ Date of Examination : _____

(Signature of the candidate)

(Signature of the Invigilator)

CANDIDATES MUST READ THE FOLLOWING INFORMATION/ INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

1. All questions are compulsory.
2. The candidates must return the Question book-let as well as OMR answer-sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / mis-behaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3. In case there is any discrepancy in any question(s) in the Question Booklet, the same may be brought to the notice of the Controller of Examinations in writing within two hours after the test is over. No such complaint(s) will be entertained thereafter.
4. The candidate **MUST NOT** do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question book-let itself. Answers **MUST NOT** be ticked in the Question book-let.
5. There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.
6. Use only Black or Blue **BALL POINT PEN** of good quality in the OMR Answer-Sheet.
7. BEFORE ANSWERING THE QUESTIONS, THE CANDIDATES SHOULD ENSURE THAT THEY HAVE BEEN SUPPLIED CORRECT AND COMPLETE BOOK-LETS. COMPLAINTS, IF ANY, REGARDING MISPRINTING ETC. WILL NOT BE ENTERTAINED 30 MINUTES AFTER STARTING OF THE EXAMINATION.



Jms
20.1.17
Professor & Head,
Deptt. of Chemist
A.D. University,

Jms
AP

Question No.	Questions
1.	<p>Polymers having regular alternation of <i>d</i>- and <i>l</i>-configurations in the molecular chain are called</p> <p>(1) Syndiotactic polymers (2) Isotactic polymers (3) Block copolymers (4) Copolymers</p>
2.	<p>The effective nuclear charge for 35 electron in sulphur is</p> <p>(1) 4.30 (2) 5.45 (3) 3.40 (4) 54.5</p>
3.	<p>The correct form of Butler-Volmer equation is</p> <p>(1) $i = i_0 e^{-\alpha n F/RT}$ (2) $i = i_0 \{e^{(1-\alpha) n F/RT} - e^{\alpha n F/RT}\}$ (3) $i = i_0 \{e^{(1-\alpha) n F/RT} - e^{-\alpha n F/RT}\}$ (4) $i = i_0 \cdot e^{(1-\alpha) n F/RT}$</p> <p>where all the terms have usual meanings</p>
4.	<p>The temperature at which the Joule-Thomson coefficient changes sign is known as</p> <p>(1) Critical temperature (2) Boyle temperature (3) Inversion temperature (4) None of these</p>
5.	<p>The heat of vaporisation of water at 100°C is 2259.4 Jg⁻¹. The entropy increase in the evaporation of one mole of water at 100°C will be</p> <p>(1) 10.903 Jk⁻¹ mol⁻¹ (2) 1090.3 Jk⁻¹ mol⁻¹ (3) 10903 Jk⁻¹ mol⁻¹ (4) 109.03 Jk⁻¹ mol⁻¹</p>
6.	<p>The relation between Entropy and thermodynamic probability is expressed as</p> <p>(1) $S = \ln W$ (2) $S = k \ln W$ (3) $S = R \ln W$ (4) $S = \frac{1}{\ln w}$</p>

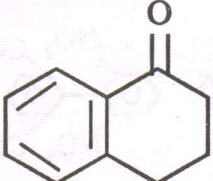
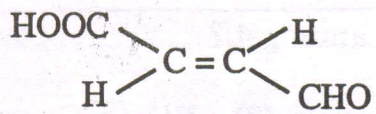
Question No.	Questions
7.	Which out of the following is correct relation? (1) $\text{pH} = \frac{1}{2} \text{pk}_w + \frac{1}{2} \text{pk}_a - \frac{1}{2} \text{pk}_b$ (2) $\text{pH} = \frac{1}{2} \text{pk}_w - \frac{1}{2} \text{pk}_a + \frac{1}{2} \text{pk}_b$ (3) $\text{pH} = \frac{1}{2} \text{pk}_a - \frac{1}{2} \text{pk}_w + \frac{1}{2} \text{pk}_b$ (4) $\text{pH} = \frac{1}{2} \text{pk}_w + \frac{1}{2} \text{pk}_a + \frac{1}{2} \text{pk}_b$
8.	Which of the following is an irreversible cell ? (1) $\text{Zn} / \text{Zn}^{+2} \parallel \text{AgCl} / \text{Ag}$ (2) $\text{Zn} / \text{Zn}^{2+} \parallel \text{Cd}^{2+} / \text{Cd}$ (3) $\text{Cd} / \text{Cd}^{2+} \parallel \text{KCl}, \text{Hg}_2\text{Cl}_2(\text{s}) / \text{Hg}$ (4) $\text{Zn} / \text{H}_2\text{SO}_4 / \text{Ag}$
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11.	The range of fluorine chemical shift in NMR is (1) 12 ppm (2) 56 ppm (3) 300 ppm (4) 542 ppm
12.	Borazine, $\text{B}_3\text{N}_3\text{H}_6$ has a (1) Regular hexagonal structure like benzene (2) Tetragonal structure (3) Triangular capped structure (4) Hexagonal prism structure

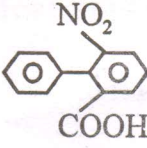
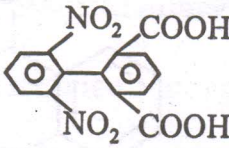
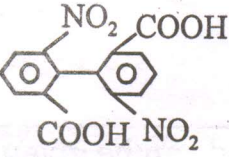
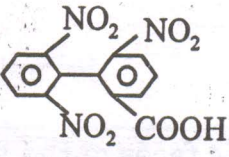

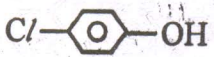

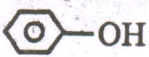
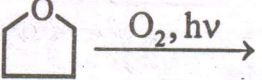
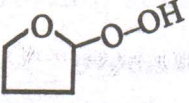

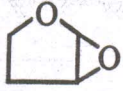
Question No.	Questions
13.	In ligand to metal charge spectra (LMCT) of MnO_4^- ion, the transition responsible for purple color is (1) 29500 cm^{-1} (2) 17700 cm^{-1} (3) 44400 cm^{-1} (4) 30300 cm^{-1}
14.	When an auxochrome is attached to a carbon-carbon double bond, then λ_{max} in UV spectrum undergoes (1) Hypsochromic shift (2) Bathochromic shift (3) Hyperchromic shift (4) Hypochromic shift
15.	The number of α and β particles emitted in the nuclear reaction ${}_{92}\text{U}^{238} \rightarrow {}_{82}\text{Pb}^{206}$ is (1) $7\alpha, 5\beta$ (2) $6\alpha, 4\beta$ (3) $4\alpha, 3\beta$ (4) $8\alpha, 6\beta$
16.	Among the hydroxides of alkaline earth metals, the least soluble in water is (1) $\text{Mg}(\text{OH})_2$ (2) $\text{Ca}(\text{OH})_2$ (3) $\text{Be}(\text{OH})_2$ (4) $\text{Ba}(\text{OH})_2$
17.	Which of the following isotope is not a fission fuel ? (1) U-238 (2) U-233 (3) U-235 (4) U-239
18.	Most common oxidation state of tellurium is (1) -2 (2) +4 (3) +6 (4) +2

Question No.	Questions
19.	The correct order of acidic strength is (1) $\text{HClO} > \text{HIO} > \text{HBrO}$ (2) $\text{HIO} > \text{HBrO} > \text{HClO}$ (3) $\text{HBrO} > \text{HClO} > \text{HIO}$ (4) $\text{HClO} > \text{HBrO} > \text{HIO}$
20.	Which of the following is not a hard base ? (1) NH_3 (2) H_2O (3) CN^- (4) Cl^-
21.	A fatty acid with 14 carbon atoms will undergo how many cycles of beta oxidation ? (1) 7 (2) 4 (3) 6 (4) 5
22.	Which of the following compounds show a sharp IR absorption band at 1700 cm^{-1} and a broad band at 3300 cm^{-1} ? (1) Ethanol (2) Ethanoic acid (3) Propanone (4) diethyl ether
23.	The product in the following reaction is $\text{CH}_3-\text{C}-\text{N} \xrightarrow[\text{(ii) H}_2\text{O}]{\text{(i) CH}_3\text{Mg Br}} ?$ <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>(1) $\begin{array}{c} \text{CH}_3 \\ \\ \text{H}_3\text{C}-\text{C}-\text{OH} \\ \\ \text{CH}_3 \end{array}$</p> <p>(3) $\begin{array}{c} \text{OH} \\ \\ \text{H}_3\text{C}-\text{CH}-\text{CH}_3 \end{array}$</p> </div> <div style="text-align: center;"> <p>(2) $\begin{array}{c} \text{O} \\ \\ \text{CH}_3-\text{C}-\text{NH}_2 \end{array}$</p> <p>(4) CH_3COCH_3</p> </div> </div>

Question No.	Questions
24.	Number of Orientations with respect to applied magnetic field for deuterium is (1) 3 (2) 4 (3) 2 (4) 1
25.	When EDTA solution is added to Mg^{2+} ion, then which of the following statements is not true ? (1) Four coordinate sites of Mg^{2+} ions are occupied by EDTA and remaining two sites are occupied by water molecules (2) pH of the solution is decreased (3) Colorless $[Mg - EDTA]^{2-}$ chelate is formed (4) All six coordinates of Mg^{2+} ions are occupied by EDTA
26.	When applying VSEPR theory to predict the molecular shape, which of the following we need not take in to account ? (1) Valence electrons occupying sigma bonding orbitals (2) Valence electrons occupying π -bonding orbitals (3) Valence electrons occupying non-bonding orbitals (4) None of these
27.	Which statement about ferrocene is incorrect ? (1) The Fe centre in ferrocene can be protonated by treatment with conc. H_2SO_4 (2) In the gas phase, the C_6H_6 rings in ferrocene are eclipsed (3) The ligands in ferrocene undergo electrophilic substitution with $ROCl$ in the presence of a Lewis acid (4) I_2 oxidises ferrocene to give a diamagnetic cation

Question No.	Questions
28.	Chlorophyll converts light energy in to (1) Heat energy (2) Potential energy (3) Chemical energy (4) Electrical energy
29.	The tyrosinase, is activated by (1) Copper ion (2) Iron ion (3) Potassium ion (4) Calcium ion
30.	Which of the following terms best describes a drug inhibits the enzyme, but binds to a binding site other than active site ? (1) Allosteric inhibitor (2) Reversible inhibitor (3) Irreversible Inhibitor (4) Suicide substrate
31.	Which of the following pairs is epimers : (1) D (+) Glucose and D (-) Fructose (2) D (-) Glucose and D (-) Ribose (3) D (+) Glucose and D (+) Mannose (4) (+) Maltose and (+) Sucrose
32.	The reactivity of thiophene, furan and pyrrole follows the sequence (1) Furan < Thiophene < Pyrrole (2) Thiophene < Furan < Pyrrole (3) Pyrrole < Furan < Thiophene (4) Thiophene < Pyrrole < Furan

Question No.	Questions
33.	In UV, λ_{max} for the following compound will be at <div style="text-align: center;">  </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> (1) 280 nm (3) 237 nm </div> <div style="text-align: center;"> (2) 259 nm (4) 317 nm </div> </div>
34.	Enantiotropic faces of the following compound can be given as <div style="text-align: center; margin: 10px 0;">  </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> (1) Re - Re (3) Si - Si </div> <div style="text-align: center;"> (2) Si - Re (4) Re - Si </div> </div>
35.	In benzilic acid rearrangement (1) Benzaldehyde is converted in to Benzoin (2) Benzil is converted in to Benzilic acid (3) Benzilic acid is converted in to Benzoin (4) None of the above
36.	How many normal modes of vibration are possible for benzene molecule ? (1) 6 (2) 12 (3) 30 (4) 24
37.	Which is not an anticancer drug ? (1) Vincristine (2) Cyclophosphamide (3) Dexorubicin (4) Gabapentin

Question No.	Questions
38.	<p>Which of the following compounds can be resolved</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>(1) </p> </div> <div style="text-align: center;"> <p>(2) </p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: center;"> <p>(3) </p> </div> <div style="text-align: center;"> <p>(4) </p> </div> </div>
39.	<p>Which is the weakest acid amongst ?</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>(1) </p> </div> <div style="text-align: center;"> <p>(2) </p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: center;"> <p>(3) </p> </div> <div style="text-align: center;"> <p>(4) </p> </div> </div>
40.	<p></p> <p>Product formed in the reaction is</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>(1) HOCH₂CH₂CH₂CH₂OH</p> </div> <div style="text-align: center;"> <p>(2) </p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: center;"> <p>(3) </p> </div> <div style="text-align: center;"> <p>(4) </p> </div> </div>
41.	<p>A fuel which can not be classed as a renewable source of energy is</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>(1) Methanol</p> </div> <div style="text-align: center;"> <p>(2) Hydrogen</p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: center;"> <p>(3) Methane</p> </div> <div style="text-align: center;"> <p>(4) Ethanol</p> </div> </div>

Question No.	Questions
42.	50 ml of 0.1 NaOH is added to 49 ml of 0.1 M HCl. The resulting solution has pH (1) 12 (2) 11 (3) 9 (4) 10
43.	A copolymer can be obtained by (1) Polymerizing two identical polymer (2) Mixing two identical polymer (3) Polymerizing two different monomer (4) Mixing two different polymer
44.	If $(\partial P / \partial T)_V = \alpha / \beta$ then according to Maxwell's relation (1) $(\partial S / \partial V)_T = \beta / \alpha$ (2) $(\partial S / \partial V)_T = \alpha \beta$ (3) $(\partial S / \partial V)_T = -\frac{\alpha}{\beta}$ (4) $(\partial S / \partial V)_T = \frac{\alpha}{\beta}$
45.	The Debroglie wave length of an electron with kinetic energy of 1.00 eV is (1) 1.23 nm (2) 12.3 nm (3) 28.7 pm (4) None of these


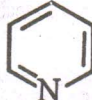
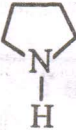
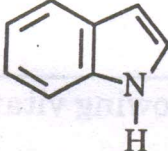
Question No.	Questions
46.	Cooking time of food is reduced in a pressure cooker because (1) The boiling point of water is lowred (2) The boiling point of water is raised (3) There is uniform distribution of heat (4) Higher pressure softens the food
47.	Which of the following is a Boson ? (1) Proton (2) Electron (3) ${}^4\text{He}_2$ (4) D^2
48.	The rotational spectrum of a rigid diatomic rotator consists of equally spaced lines with spacing equal to (1) $2B$ (2) B (3) $1.5 B$ (4) $0.5 B$
49.	What is the percentage strength of "15 volume" H_2O_2 (1) 6.09 % (2) 4.55 % (3) 3.03 % (4) 1.50 %
50.	For a particle possessing rotational motion (1) $C_p - C_v = R$ (2) $C_p - C_v = 2R$ (3) $C_p - C_v = 0$ (4) None of these

Question No.	Questions
51.	The number of geometrical and optical isomers for the complex $[\text{Rh}(\text{en})_2\text{Cl}_2]^+$ ion (1) Three (2) Two (3) Four (4) Six
52.	The electrons which contribute to isomer shift in Mössbauer spectroscopy are (1) p-electrons (2) d-electrons (3) f-electrons (4) s-electrons
53.	Which of the following is a border line acid ? (1) Pd^{2+} (2) Co^{2+} (3) Co^{3+} (4) Al^{3+}
54.	The absorption peaks in IR spectrum are broad, as they possess information related to (1) Rotational energy (2) Bond energy (3) Inner electron changes (4) Outer electron changes
55.	Wurtzite structure has crystal lattice type (1) bcc (2) hcp (3) fccp (4) None of these
56.	The spectroscopic state for d^3 system is (1) ${}^4F_{3/2}$ (2) 4F_2 (3) ${}^3F_{3/2}$ (4) ${}^4D_{3/2}$

Question No.	Questions
57.	<p>The point group for</p> $\begin{array}{c} \text{Cl} > \text{C} = \text{O} < \text{H} \\ \text{Cl} < & & & \text{H} \end{array}$ <p>is</p> <p>(1) C_{2h} (2) C_{2v} (3) C_{2v} (4) T_d</p>
58.	<p>The number of atoms contained within the unit cell for the diamond lattice are</p> <p>(1) 2 (2) 1 (3) 4 (4) 8</p>
59.	<p>The Miller indices of crystal planes which cut through the crystal axes at (2a, 3b, c) are</p> <p>(1) (362) (2) (263) (3) (326) (4) None of these</p>
60.	<p>The Efficacy of Al^{+3}, Mg^{2+} and Na^+ ions to cause coagulation vary in the order</p> <p>(1) $Al^{+3} \approx Mg^{2+} \approx Na^+$ (2) $Na^+ > Mg^{2+} > Al^{3+}$ (3) $Na^+ \approx Mg^{+2} > Al^{3+}$ (4) $Al^{3+} > Mg^{2+} > Na^+$</p>
61.	<p>The number of microstates for a three different atom possessing three quanta of energy are</p> <p>(1) 3 (2) 10 (3) 6 (4) 4</p>


Question No.	Questions
70.	<p>The term "steady state" deals with</p> <p>(1) Statistical mechanics (2) quantum mechanics</p> <p>(3) Thermodynamics (4) Irreversible thermodynamics</p>
71.	<p>Which statement is incorrect about zeolites ?</p> <p>(1) Zeolites are aluminosilicates</p> <p>(2) Each zeolite contains channels of a specific size</p> <p>(3) A zeolite functions as an acid catalyst</p> <p>(4) No zeolites occur naturally</p>
72.	<p>Chalogenides are the compounds of</p> <p>(1) Sulfur and phosphorus</p> <p>(2) Sulfur and halogens</p> <p>(3) Sulfur, selenium and tellurium</p> <p>(4) Nitrogen and sulfur</p>
73.	<p>Spin-Orbit coupling is found maximum in</p> <p>(1) Third transition series metal complexes</p> <p>(2) First transition series metal complexes</p> <p>(3) Second transition series metal complexes</p> <p>(4) p-block elements</p>
74.	<p>Which one of the polymers is a conductive polymer</p> <p>(1) Polyethylene (2) Polyacetylene</p> <p>(3) Polyvinylene (4) Poly vinyl Chloride</p>

Question No.	Questions
75.	<p>The difference in crystal field stabilization energy between low spin d^6 octahedral complex and d^9 octahedral with tetragonal elongation complex, assuming the ligands are strong field ligands, will be</p> <p>(1) $-2.13 \Delta_0$ (2) $-2.40 \Delta_0$ (3) $-2.00 \Delta_0$ (4) None of these</p>
76.	<p>Natural oxygen carrier other than Hemoglobin is</p> <p>(1) Hem erythrin (2) Hemocyanins (3) Tyrosinase (4) Ferredoxins</p>
77.	<p>Among the following ligands, the trans effect is maximum for</p> <p>(1) NO_2^- (2) Cl^- (3) CN^- (4) OH^-</p>
78.	<p>Which change is not detected by DTA ?</p> <p>(1) Sublimation (2) Desorption (3) Polymer softening (4) Loss of moisture</p>
79.	<p>Which nuclear model can best explain that all elements with atomic number greater than 92 are radioactive ?</p> <p>(1) Shell Model (2) Liquid Drop Model (3) Pion Cloud only (4) All of these</p>
80.	<p>Spotting electrolyte is used to eliminate</p> <p>(1) Condenser current (2) Diffusion current (3) Limiting current (4) Migration current</p>

Question No.	Questions
86.	Which of the following interaction contributes most in protein folding ? (1) Hydrophobic interaction (2) Covalent bond (3) van der Walls interaction (4) Ionic bond
87.	Which of the following reactions convert a 1, 5-diene to an isomeric 1,5-diene ? (1) Cope rearrangement (2) Claisen rearrangement (3) Photochemical (2 + 2) reaction (4) Diels-Alder reaction
88.	Which is most reactive towards an eletrophile ? (1)  (2)  (3)  (4) 
89.	Natural lipids are readily soluble in (1) Oil (2) Mercury (3) Water (4) None of these
90.	A disadvantage of fats is (1) Reduction in rate of heat loss (2) Solvent for vitamins (3) Efficient source of energy (4) Effective insulative material


Question No.	Questions
97.	The proton nmr of 2-bromo-2-methyl propane will consist of (1) Three quartets and a singlet (2) Two doublets and a singlet (3) One singlet (4) Two singlets
98.	Which compound has a molecular ion at $m/z = 58$, an Infrared absorption at 1650 cm^{-1} and just one singlet in its nmr spectrum ? (1) Butane (2) 2-methyl propane (3) $\text{CH}_3\text{CH}_2\text{CHO}$ (4) CH_3COCH_3
99.	Which electromagnetic radiation has maximum frequency ? (1) Cosmic rays (2) X-rays (3) Infra red Rays (4) Ultraviolet rays
100.	The IUPAC name of the compound $\begin{array}{ccccccc} \text{CH}_3\text{CO} & - & \text{CH} & - & \text{CH} & - & \text{COOH} \\ & & & & & & \\ & & \text{Cl} & & \text{OCH}_3 & & \end{array}$ is (1) 3-chloro-2-methoxy-4-oxo-pentanoic acid (2) 3-chloro-2-methoxy-4-keto-pentanoic acid (3) 4-carboxy-3-chloro-4-methoxy-2-butanone (4) 1-carboxy-2-methoxy-3-chloro-ethyl methyl ketone

1. 1	16. 3	31. 3	46. 4	61. 1	76. 2	91. 1
2. 2	17. 4	32. 2	47. 3	62. 4	77. 1	92. 2
3. 3	18. 3	33. 4	48. 3	63. 2	78. 4	93. 3
4. 4	19. 1	34. 1	49. 2	64. 2	79. 3	94. 4
5. 2	20. 2	35. 1	50. 3	65. 3	80. 3	95. 1
6. 1	21. 4	36. 2	51. 4	66. 1	81. 2	96. 4
7. 3	22. 1	37. 4	52. 1	67. 2	82. 1	97. 3
8. 4	23. 3	38. 3	53. 2	68. 4	83. 2	98. 1
9. 1	24. 1	39. 1	54. 2	69. 3	84. 4	99. 2
10. 1	25. 3	40. 2	55. 4	70. 4	85. 3	100. 3
11. 3	26. 1	41. 4	56. 3	71. 1	86. 4	
12. 2	27. 2	42. 3	57. 1	72. 2	87. 1	
13. 4	28. 3	43. 1	58. 2	73. 3	88. 3	
14. 1	29. 4	44. 2	59. 4	74. 3	89. 2	
15. 2	30. 1	45. 1	60. 3	75. 4	90. 4	




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