



ਪੰਜਾਬ ਟੈਕਨੀਕਲ ਯੂਨੀਵਰਸਿਟੀ ਜਲੰਧਰ

PUNJAB TECHNICAL UNIVERSITY JALANDHAR

Max. Marks: 90

Time: 90 Mins.

Entrance Test for Enrollment in Ph.D. Programme

Important Instructions

- Fill all the information in various columns, in capital letters, with blue/black ball point pen.
- Use of calculators is not allowed.
- All questions are compulsory. No negative marking for wrong answers.
- Each question has only one right answer.
- Questions attempted with two or more options/answers will not be evaluated.

Stream (Engg./Arch./Pharm./Mgmt./App.Sci./Life Sci.)

APPLIED SCIENCES

Discipline / Branch

CHEMISTRY

Name

Father's Name

Roll No.

Date: **19-11-2011**

Signature of Candidate

Signature of Invigilator

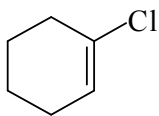
1. Light year is related to
 - (a) Energy
 - (b) Speed
 - (c) Distance
 - (d) Intensity
2. How many Ergs are there in 1 Joule?
 - (a) 10^2
 - (b) 10^4
 - (c) 10^6
 - (d) 10^7
3. The unit of current is
 - (a) Ohm
 - (b) Watt
 - (c) Ampere
 - (d) None of these
4. The intensity of an earthquake is measured with a
 - (a) Barometer
 - (b) Hydrometer
 - (c) Polygraph
 - (d) Seismograph
5. Centigrade & fahrenheit scales give same reading at
 - (a) -40°
 - (b) -32°
 - (c) -273°
 - (d) -100°
6. Alexander Fleming discovered
 - (a) Penicillin
 - (b) X-ray
 - (c) Streptomycin
 - (d) Telephone
7. The credit of inventing the television goes to
 - (a) Faraday
 - (b) Baird
 - (c) Edison
 - (d) Marconi
8. The velocity of light was first measured by
 - (a) Einstein
 - (b) Newton
 - (c) Romer
 - (d) Galileo
9. Mercury is closer to the Sun than Venus. Yet Venus is hotter because it has
 - (a) a dominant CO_2 atmosphere
 - (b) a dominant methane atmosphere
 - (c) sulphuric acid clouds
 - (d) an atmosphere devoid of oxygen
10. If the radius of a circle is diminished by 10%, then its area is diminished by:
 - (a) 10%
 - (b) 19%
 - (c) 20%
 - (d) 36%

11. The two colors seen at the extreme ends of the pH chart are:
- Red and Blue
 - Red and Green
 - Green and Blue
 - Orange and Green
12. Goitre caused by the deficiency of
- Vitamin D
 - Iron
 - Vitamin A
 - Iodine
13. Decibel is the unit for
- Speed of light
 - Radiowave frequency
 - Intensity of sound
 - Intensity of heat
14. Which of the following is used as a moderator in nuclear reactor?
- Thorium
 - Graphite
 - Radium
 - Water
15. Numismatics is the study of
- Coins
 - Numbers
 - Space
 - Stamps
16. Which of these poses the greatest safety risk while being heated in school laboratory...
- A mixture of iron and sulphur
 - Mercury (II) oxide
 - Sodium chloride
 - Copper(II) sulfate hydrate
17. Which of the following is not correctly matched ?
- Galena : Lead Sulphide
 - Green vitriol : Copper sulphate
 - Plaster of Paris : Calcium sulphate
 - Calomel : Mercurous Chloride
18. Which of these values signifies the greatest temperature?
- 1 degree Kelvin
 - 1 degree Rankin
 - 1 degree Fahrenheit
 - 1 degree Celsius
19. A doctor says you need a CBC. What is he talking about?
- An enema
 - A vacation
 - A medication
 - A blood test
20. The gas usually filled in the electric bulb is
- Nitrogen
 - Hydrogen
 - Carbon dioxide
 - Oxygen
21. Which one among the following is the standard for comparing the atomic and molecular masses of elements and compounds ?
- $^{13}_6\text{C}$
 - $^{12}_6\text{C}$
 - $^{14}_6\text{C}$
 - ^1_1H
22. Mass of one a.m.u. in grams is
- 1.66×10^{-24} g
 - 1.99×10^{-23} g
 - 6.02×10^{-23} g
 - 1.008 g
23. Equivalent weight of phosphoric acid is:
- 98.0
 - 49.0
 - 32.7
 - none of these
24. The lowest oxidation state of iron is found in:
- $\text{K}_4[\text{Fe}(\text{CN})_6]$
 - $\text{K}_3[\text{Fe}(\text{CN})_6]$
 - Fe_3O_4
 - $\text{Fe}(\text{CO})_5$
25. What volume of 10 M HCl and 3M HCl should be mixed to get 1 litre of 6M HCl solution ?
- 572 ml (10M), 428 ml (3M)
 - 572 ml (3M), 428 ml (10M)
 - 500 ml (10M), 500 ml (3M)
 - 400 ml (10M), 600 ml (3M)

26. Indicator used in the titration of acidified KMnO_4 with ferrous sulphate is
 (a) phenolphthalein
 (b) methyl orange
 (c) starch
 (d) None of these
27. 120.0 g of NaOH is dissolved in 3 litres of water. The normality of the solution is
 (a) 1.2 N
 (b) 1 N
 (c) 2 N
 (d) 3N
28. Soda extract is used in the qualitative analysis for
 (a) Inorganic cations
 (b) Inorganic anions
 (c) Nitrogen in organic compounds
 (d) None of these
29. Precipitates of silver chloride dissolves in
 (a) Conc. HCl
 (b) Aqua-regia
 (c) NH_4OH
 (d) Water
30. Which of the following is used as primary standard in volumetric titrations
 (a) Sodium hydroxide
 (b) Potassium hydroxide
 (c) Ferrous ammonium sulphate
 (d) Potassium permanganate
31. Which of the following oxo-acids of chlorine have chlorine in the lowest oxidation state.
 (a) HClO_4
 (b) HClO_3
 (c) HClO_2
 (d) HClO
32. Hydrolysis of esters in the presence of a base breaks the ester into an alcohol and a salt of the acid. This reaction is named as
 (a) Hydrolysis
 (b) Redox
 (c) Saponification
 (d) Disproportionation
33. Which of the following compounds will not give iodoform test
 (a) Ethanal
 (b) Ethanol
 (c) Isopropyl alcohol
 (d) Benzyl alcohol
34. How many moles of chlorine can be prepared from 0.75 mole of MnO_2 and 2.0 mole of HCl
 (a) 2.0
 (b) 1.0
 (c) 0.75
 (d) 0.50
35. A commercially available sample of sulphuric acid is 15% H_2SO_4 by weight (density = 1.10 g ml^{-1}). The normality of the solution is
 (a) 1.68
 (b) 3.36
 (c) 1.80
 (d) none of these
36. Zinc metal is present in
 (a) Bronze
 (b) Brass
 (c) Bell metal
 (d) Constantan
37. Formula of sodium cobalinitrite is:
 (a) $\text{Na}_3[\text{Co}(\text{NO}_2)_6]$
 (b) $\text{Na}_2[\text{Co}(\text{NO}_2)_6]$
 (c) $\text{Na}[\text{Co}(\text{NO}_2)_6]$
 (d) None of these
38. The colour of mercury sulphide is
 (a) white
 (b) yellow
 (c) black
 (d) green
39. Amount of calcium and magnesium ion in hard water can be determined by
 (a) Argentometrically
 (b) Complexometrically
 (c) Iodimetrically
 (d) Iodometrically
40. Iodine value of oil and fat is a measure of :
 (a) amount of iodine present in oil or fat itself
 (b) amount of unsaturation in oil or fat
 (c) amount of saturation in oil or fat
 (d) none of these

41. Which of the following has smallest de-Broglie wavelength ?
 (a) electron
 (b) proton
 (c) a molecule of methane
 (d) a molecule of carbon dioxide
42. Which of the following sets of quantum numbers is not allowed
 (a) $n=3, l=2, m = +1, s = +\frac{1}{2}$
 (b) $n=2, l=2, m = -1, s = -\frac{1}{2}$
 (c) $n=4, l=0, m = 0, s = -\frac{1}{2}$
 (d) $n=3, l=2, m = +1, s = -\frac{1}{2}$
43. The maximum number of electrons in an orbit with $n=3$ and $l=2$ is
 (a) 2
 (b) 6
 (c) 10
 (d) 12
44. Which out of the following is correct order of size ?
 (a) $I > I^- > I^+$
 (b) $I > I^+ > I^-$
 (c) $I^+ > I^- > I$
 (d) $I^- > I > I^+$
45. The most electronegative element of the periodic table is
 (a) Nitrogen
 (b) Oxygen
 (c) Chlorine
 (d) Fluorine
46. Name an element in periodic table that forms maximum number of compounds
 (a) Carbon
 (b) Oxygen
 (c) Hydrogen
 (d) Fluorine
47. Which of the following is most covalent ?
 (a) NaF
 (b) MgO
 (c) AlN
 (d) SiC
48. The calculated bond order in O_2^- ion is
 (a) 1.0
 (b) 1.5
 (c) 2.0
 (d) 2.5
49. What type of hybridisation is involved in XeF_2 ?
 (a) sp^2
 (b) sp
 (c) sp^3d^1
 (d) sp^3d^2
50. Which of the following has the highest boiling points?
 (a) water
 (b) hydrogen sulphide
 (c) hydrogen selenide
 (d) hydrogen telluride
51. The radioactivity decay follows:
 (a) zero order
 (b) first order
 (c) second order
 (d) none of these
52. The radioactive isotope of carbon used in radio carbon dating is:
 (a) ${}^{12}_6C$
 (b) ${}^{13}_6C$
 (c) ${}^{14}_6C$
 (d) ${}^{16}_6C$
53. Which of the following coordination compounds is non-conducting ?
 (a) $CoCl_3 \cdot 6 NH_3$
 (b) $CoCl_3 \cdot 5 NH_3$
 (c) $CoCl_3 \cdot 4 NH_3$
 (d) $CoCl_3 \cdot 3 NH_3$
54. IUPAC name of $[Ni(CO)_4]$ is
 (a) tetracarbonylnickel (II)
 (b) tetracarbonylnickel (0)
 (c) tetracarbonylnickelate (II)
 (d) tetracarbonylnickelate (0)
55. An explosive fertilizer is
 (a) calcium ammonium nitrate
 (b) ammonium nitrate
 (c) urea
 (d) superphosphate
56. Tetraethyl lead is used as a :
 (a) fertilizer
 (b) perfume
 (c) disinfectant
 (d) antiknocking agent
57. Which of the following is an organo-metallic compound ?
 (a) C_2H_5ONa
 (b) $(C_2H_5)_4Pb$
 (c) $[Co(NH_3)_6]Cl_3$
 (d) CH_3COONa

58. $[\text{Co}(\text{NH}_3)_5\text{Br}]\text{SO}_4$ and $[\text{Co}(\text{NH}_3)_5\text{SO}_4]\text{Br}$ constitute an example of
- linkage isomerism
 - ionisation isomerism
 - coordination isomerism
 - optical isomerism
59. Plaster of Paris is
- $\text{CaSO}_4 \cdot \text{H}_2\text{O}$
 - $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
 - $(\text{CaSO}_4)_2 \cdot \text{H}_2\text{O}$
 - CaSO_4
60. The effective atomic number of an inert gas is not attained in case of the following:
(atomic no. of Cr=24, Fe=26, Co=27)
- $[\text{Co}(\text{NH}_3)_6]^{3+}$
 - $[\text{Fe}(\text{CO})_5]$
 - $[\text{Fe}(\text{CN})_6]^{4-}$
 - $[\text{Cr}(\text{NH}_3)_6]^{3+}$
61. A dibasic acid, H_2X , dissociates completely in water. Which one of the following is the molarity of an aqueous solution of this acid which has a pH of 3 ?
- 0.001
 - 0.005
 - 0.0005
 - 0.002
62. If C is the number of moles of acid present in one litre of solution and α is the degree of dissociation for the weak acid HA, then the dissociation constant is given by the expression ?
- $\frac{C^2\alpha^2}{(1-\alpha)}$
 - $\frac{C(1-\alpha)}{\alpha^2}$
 - $\frac{C\alpha^2}{(1-\alpha)}$
 - $\frac{C\alpha^2}{(1-\alpha)^2}$
63. Four grams of sodium hydroxide have been dissolved in 10 litre of the solution. The pH of the solution is:
- 9
 - 2
 - 12
 - 13
64. The rate constant of a reaction depends on
- temperature
 - initial concentration of the reactants
 - time of reaction
 - extent of reaction
65. For a reaction of the type $\text{A} + \text{B} \rightarrow \text{Products}$
It is observed that doubling the concentration of A causes the reaction rate to be four times as great but doubling the amount of B produces no apparent effect on the rate. The rate equation is:
- Rate = $k [\text{A}][\text{B}]$
 - Rate = $k [\text{A}]^2$
 - Rate = $k[\text{A}]^2[\text{B}]$
 - Rate = $k[\text{A}]^2[\text{B}]^2$
66. The ratio of the rate constants at 300 and 310 K for a first order reaction, with half life periods of 10 and 5 minutes at above temperatures respectively:
- 0.5
 - 1.0
 - 1.5
 - 2.0
67. Which of the following statements concerning Activation energy is TRUE ?
- The activation energy of a forward reaction can never be smaller than that of a backward reaction.
 - The reaction is fast if the activation energy of a reaction is small
 - Reaction rates increase with temperature because the activation energy decreases at high temperature.
 - The uncatalysed reaction generally has a lower activation energy than the catalysed reaction.
68. The rate constant of a reaction is $1.5 \times 10^{-3} \text{ mol}^{-2} \text{ litre}^2 \text{ s}^{-1}$. The order of the reaction is
- Zero
 - 1
 - 2
 - 3

69. The standard reaction potentials of $\text{Fe}^{3+}/\text{Fe}^{2+}$ and Fe^{2+}/Fe are 0.770 volts and -0.440 volts respectively. The standard potential of the cell, in which the following reaction occurs is
- $$\text{Fe} + 2 \text{Fe}^{3+} \rightarrow 3 \text{Fe}^{2+}$$
- (a) $+0.331\text{V}$
 (b) $+1.210\text{V}$
 (c) -1.210V
 (d) -0.331V
70. The units of cell constant are
 (a) cm^{-1}
 (b) cm
 (c) cm^2
 (d) cm^3
71. The Kohlraush law of independent conductances as a result of independent migration of ions is
 (a) $\Lambda_o = \lambda_+^o + \lambda_-^o$
 (b) $\Lambda_o = \lambda_+^o - \lambda_-^o$
 (c) $\Lambda_o = \lambda_+^o \times \lambda_-^o$
 (d) $\Lambda_o = \lambda_+ + \lambda_-$
72. A 0.01M solution of a substance after passing through a cell of thickness 1 cm , is found to transmit 10% of the incident radiation. The value of the molar extinction coefficient (in $\text{litre mol}^{-1} \text{ cm}^{-1}$) of the substance is
 (a) 10^{-2}
 (b) 10^{-1}
 (c) 10
 (d) 100
73. The reactive intermediate involved in SN^1 reaction is a :
 (a) Carbocation
 (b) Free Radical
 (c) Carbanion
 (d) Methylene
74. The geometry of double bond in the compound
- 
- can be designated as:
 (a) E
 (b) Z
 (c) R
 (d) S
75. Allylic bromination is carried out using:
 (a) $\text{Br}_2/\text{Acetic acid}$
 (b) Br_2/CCl_4
 (c) NBS/CCl_4
 (d) $\text{KBr}/\text{H}_2\text{SO}_4$
76. Which of the following are called mirror image isomers ?
 (a) Diastereomers
 (b) Anomers
 (c) Tautomers
 (d) Enantiomers
77. Amino acids are capable of existing as:
 (a) Ion pairs
 (b) Zwitter ion
 (c) Cationic species
 (d) Polymers
78. D(+)-Glucose exists in anomeric forms capable of :
 (a) Dextro-rotation
 (b) Mutarotation
 (c) Epimerization
 (d) Solvation
79. Which of the following is an electrophile ?
 (a) $\text{C}_2\text{H}_5\text{OH}$
 (b) $\text{C}_2\text{H}_5\text{NH}_2$
 (c) AlCl_3
 (d) CN^-
80. Which is the strongest acid out of the following ?
 (a) $\text{C}_6\text{H}_5\text{COOH}$
 (b) CF_3COOH
 (c) ClCH_2COOH
 (d) CH_3COOH
81. An orthosubstituted dialkyl benzene on oxidation provides:
 (a) Benzene
 (b) Benzoic acid
 (c) Oxalic acid
 (d) Phthalic acid
82. An alkaline solution of phenol undergoes Riemer-Tiemann reaction, using :
 (a) $\text{H}_2\text{C}=\text{O}$
 (b) CO_2
 (c) CH_2Cl_2
 (d) CHCl_3

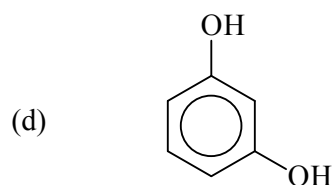
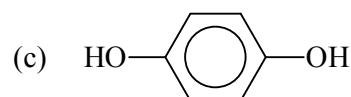
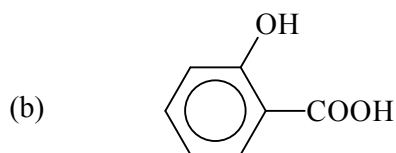
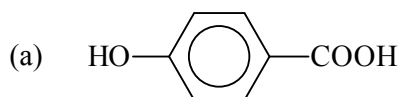
83. Which of the following is not capable of undergoing Cannizzaro's reaction ?

- (a) $(\text{CH}_3)_3\text{CCHO}$
- (b) $\text{C}_6\text{H}_5\text{CHO}$
- (c) $(\text{CH}_3)_2\text{CHCHO}$
- (d) HCHO

84. Which of the following will be optically active ?

- (a) CH_3CHDCI
- (b) CH_3CHCl_2
- (c) $(\text{CH}_3)_2\text{CCl-CH}_2\text{Br}$
- (d) $\text{CH}_2\text{Br-CH}_2\text{OH}$

85. One of the following compounds is used to prepare the analgesic aspirin – which one:



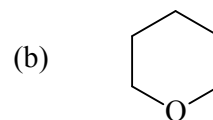
86. Benzonitrile can be prepared from benzenediazonium chloride by reaction with:

- (a) Cu CN
- (b) K CN
- (c) $\text{H}_2\text{NC(O)NH}_2$
- (d) H_2O

87. Which is true ?

- (a) Sucrose is a reducing sugar
- (b) Cellulose is a polymer of acrolein
- (c) Maltose is a polysachharide
- (d) Glucose is a reducing sugar

88. One of the following structures represents tetrahydrofuran:



89. Hofmann degradation of an acid amide produces:

- (a) Secondary amine
- (b) Primary amine
- (c) An acid
- (d) Ammonia

90. The acidity of acetylenic hydrogen is because of:

- (a) sp hybridization of the carbon atom
- (b) High electronegativity of carbon
- (c) Ionic nature of C-H bond
- (d) None of these