



PART–A

1. Fill one appropriate article in the following:

It was _____ honour for people to be the part of the freedom Movement.

- A) an B) on C) the D) a

2. A Compound word is

- A) two words joined together B) two words separate from each other
C) two words contrary in meaning D) two words similar in meaning

3. A symbol is

- A) an object that stands for other than itself
B) that stands for itself
C) that stands for nothing
D) that stands for everything

4. Choose correct expression from the following

- A) My mother was very young when my father marry her
B) My mother was very young when my father married her
C) My mother was very young when my father did marry her
D) My mother was very young when my father got married her

5. Which of the given spellings is correct ?

- A) Mississippi B) Misissippi
C) Missisippi D) Mississipi

6. What is meant by 'to do away' ?

- A) to send away B) to abolish
C) to cut off D) to make up

7. The play Tuglaq was written by

- A) Mahesh Dattani B) Anita Desai
C) Chaman Nahal D) Girish Karnad

8. The heroine in R.K. Narayan's Guide is a

- A) Musician B) Painter C) Dancer D) Teacher

9. Who authored the novel A Salt Doll ?

- A) A.K. Ramanujan B) Kamala Das
C) Molly Ramanujan D) Nayantara Sehgal



10. The epical poem Savitri was written by
A) Gorakshnath
B) Dayanand Saraswati
C) Aurobindo Ghosh
D) Swami Vivekananda
11. The playground of baseball is known as
A) court
B) diamond
C) ring
D) pitch
12. The Indian to beat the computers in mathematical wizardry is
A) Ramanujam
B) Ran Panigrahi
C) Raja Ramanna
D) Shakunthala Devi
13. Which of the following temple was built by the Cholas ?
A) Shore Temple, Mahabalipuram
B) Brihadeeswara Temple, Tanjavur
C) Sun Temple, Konark
D) Meenakshi Temple, Madurai
14. The Export Import (EXIM) Bank was set up in
A) 1980
B) 1982
C) 1981
D) 1989
15. The Chairman of Bank Board Bureau is
A) Shri Vinod Dua
B) Shri Vinod Khanna
C) Shri Vinod Rai
D) Shri Vinod Shastri
16. If a,b,c are integers; $a^2 + b^2 = 45$ and $b^2 + c^2 = 40$, then the values of a,b and c respectively are
A) 2,6,3
B) 3,6,2
C) 5,4,3
D) None of these
17. A student secures 90%, 60% and 54% marks in test papers with 100,150 and 200 respectively as maximum marks. The percentage of his aggregate is
A) 64
B) 68
C) 70
D) 72
18. A sum was put at simple interest at a certain rate for 3 years. Had it been put at 2% higher rate, it would have fetched Rs. 360 more. Find the sum.
A) Rs. 8,000
B) Rs. 7,000
C) Rs. 6,000
D) Rs. 5,000



19. In a maternity centre, 5% of all the childbirth cases result in twins. What is the approximate percentage of twin out of total children born?
A) 55 B) 7.6% C) 9.5% D) 10.4%
20. 2 men and 3 boys can do a piece of work in 10 days while 3 men and 2 boys can do the same work in 8 days. In how many days can 2 men and 1 boy do the work?
A) 10 days B) 10 ½ days
C) 12 ½ days D) 12 days
21. Complete the series:
ADA, CFD, EHH, GJM, ...
A) IJM B) HLM C) ILS D) ILR
22. If “pink” means “blue”, “blue” means “white”, “white” means “black”, “black” means “red” and “red” means “green”, then what is the colour of “Blood”?
A) red B) green C) blue D) black
23. If A is brother of K, R is the brother of Q and K is the sister of Q, then how R is related to A ?
A) Brother B) Sister
C) Either brother or sister D) None of these
24. Statements:
I. The car manufacturing companies have recently increased the prices of mid-sized cars.
II. The Government recently increased the duty on mid-sized cars.
A) Statement I is the cause and statement II is its effect
B) Statement II is the cause and statement I is its effect
C) Both the statements I and II are independent causes
D) Both the statements I and II are effects of independent causes
25. Concert is related to Theatre in the same way as Banquet is related to
A) Hotel B) Party C) Feast D) Supper



PART – B

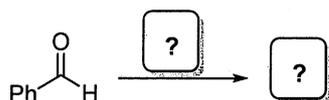
26. Which of the following metal is present in chlorophyll ?
A) Cobalt B) Chromium C) Iron D) Magnesium
27. Xenon, a noble gas forms XeO_4 . The oxidation state of Xe in xenon tetroxide is
A) 0 B) +4 C) +2 D) +8
28. Based on Werner's theory, the primary valance on $[\text{Ni}(\text{CO})_4]$ is
A) +1 B) 0 C) +4 D) -4
29. The ionization isomer of $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}(\text{NO}_2)]\text{Cl}$ is
A) $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}(\text{ONO})]\text{Cl}$ B) $[\text{Cr}(\text{H}_2\text{O})_4(\text{NO}_2)]\text{Cl}_2$
C) $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2(\text{NO}_2)]\text{H}_2\text{O}$ D) $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2](\text{NO}_2)$
30. Metals occupy higher position in electrochemical series have _____ reduction potentials and are _____ reactive in displacing other metals in solutions.
A) higher and more B) lower and less
C) lower and more D) higher and less
31. Which of the following has high hydration energy ?
A) MgCl_2 B) CaCl_2 C) SrCl_2 D) BaCl_2
32. In $[\text{VO}(\text{acac})_2]$, the oxidation state of Vanadium is (acac = acetylacetonato)
A) +4 B) +5 C) +6 D) +3
33. What is the ground state term symbol for Cr is (Atomic number: 24) ?
A) ${}^7\text{S}_1$ B) ${}^7\text{S}_3$ C) ${}^5\text{D}_0$ D) ${}^1\text{S}_0$
34. The two metals involved in the enzyme nitrogenase are
A) Iron and Magnesium B) Iron and Manganese
C) Iron and Nickel D) Iron and Molybdenum
35. The crystal field stabilisation energy for an octahedral complex of low spin d^7 complex is
A) $+9/5 \Delta_o$ B) $+5/9 \Delta_o$ C) $-9/5 \Delta_o$ D) $-5/9 \Delta_o$
36. The organometallic compound that does NOT obey 18-electron rule is
A) $[\text{Fe}(\eta^5 - \text{C}_5\text{H}_5)_2]$ B) $[\text{V}(\text{CO})_6]$
C) $[\text{Co}(\eta^5 - \text{C}_5\text{H}_5)_2]^+$ D) $[\text{Mn}(\text{CO})_5(\text{CH}_3)]$
37. The 'd-d' transition in an octahedral $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ complex are
A) Laporte allowed and spin forbidden B) Laporte allowed and spin allowed
C) Laporte forbidden and spin forbidden D) Laporte forbidden but spin allowed



38. The compound having an S-S single bond is
 A) $\text{H}_2\text{S}_2\text{O}_8$ B) $\text{H}_2\text{S}_2\text{O}_7$ C) $\text{H}_2\text{S}_2\text{O}_4$ D) $\text{H}_2\text{S}_2\text{O}_3$
39. The number of carbonyl bridges present in $\text{Fe}_3(\text{CO})_{12}$ are
 A) five B) three C) four D) two
40. Along the period, the atomic radii of third transition series
 A) gradually increases B) gradually decreases
 C) first increases and then decreases D) first decreases and then increases
41. Coordination number of cerium in ceric ammonium nitrate is
 A) 4 B) 6 C) 2 D) 12
42. Buckminster fullerene C_{60} , contains the following number of pentagons and hexagons respectively
 A) 12, 20 B) 30, 30 C) 20, 12 D) 15, 15
43. Oxidation number of carbon in graphite is
 A) +1 B) +2 C) +4 D) 0
44. Water gas is mixture of
 A) steam and methane B) hydrogen and methane
 C) hydrogen and carbon-monoxide D) steam and ethane
45. The complex ion which has no d-electron in the central atom is
 A) $[\text{MnO}_4]^-$ B) $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$ C) $[\text{Fe}(\text{CN})_6]^{3-}$ D) $[\text{Co}(\text{NH}_3)_6]^{3+}$
46. The outer electron configuration of Gd (Atomic number : 64) is
 A) $4f^8 5d^0 6s^2$ B) $4f^3 5d^5 6s^2$ C) $4f^4 5d^4 6s^2$ D) $4f^7 5d^1 6s^2$
47. The energy of an electron in first Bohr orbit of H-atom is -13.6 eV. The possible energy value of electron in the excited state of Li^{2+} is
 A) -122.4 eV B) 30.6 eV C) -30.6 eV D) 13.6 eV
48. Borazine is isostructural and isoelectronic to benzene. Which of the following is true ?
 A) N-H bond length is greater than B-H B) B-H bond length is greater than N-H
 C) N-H and B-H bonds are of equal length D) There are no B-H bonds in borazine
49. According to Fajan's rule, covalent bonding is favoured between
 A) large cation and large anion B) large cation and small anion
 C) small cation and large anion D) small cation and small anion
50. For complexes $[\text{Ni}(\text{CO})_4]$, $[\text{Ni}(\text{CN})_4]^{2-}$ and $[\text{NiCl}_4]^{2-}$, choose the correct statement
 A) $[\text{Ni}(\text{CO})_4]$ and $[\text{NiCl}_4]^{2-}$ are diamagnetic; $[\text{Ni}(\text{CN})_4]^{2-}$ is paramagnetic
 B) $[\text{NiCl}_4]^{2-}$ and $[\text{Ni}(\text{CN})_4]^{2-}$ are diamagnetic; $[\text{Ni}(\text{CO})_4]$ is paramagnetic
 C) $[\text{Ni}(\text{CO})_4]$ and $[\text{Ni}(\text{CN})_4]^{2-}$ are diamagnetic; $[\text{NiCl}_4]^{2-}$ is paramagnetic
 D) $[\text{Ni}(\text{CO})_4]$ is diamagnetic and $[\text{NiCl}_4]^{2-}$; $[\text{Ni}(\text{CN})_4]^{2-}$ are paramagnetic

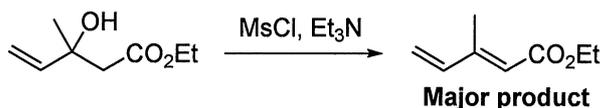


51. The correct order of acidity is represented by
A) phenol > acetic acid > *tert*-butanol B) *tert*-butanol > phenol > acetic acid
C) acetic acid > phenol > *tert*-butanol D) phenol > *tert*-butanol > acetic acid
52. The correct combination of reagent and product respectively in the transformation shown below is



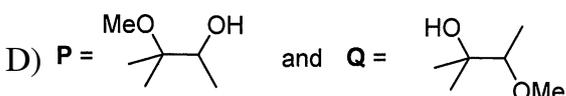
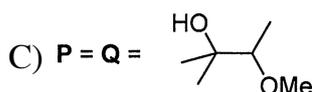
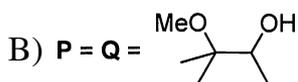
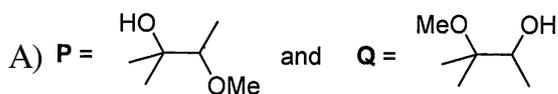
- A) NaBH₄ and Ph-CH₂-CH₃ B) MeMgBr and Ph-C(=O)-Me
C) KCN and Ph-CH(OH)-C(=O)-Ph D) HO⁻ and Ph-OH

53. The reaction shown below is an example of



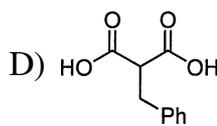
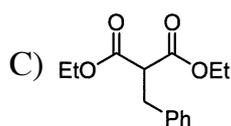
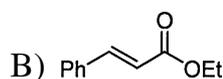
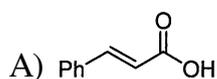
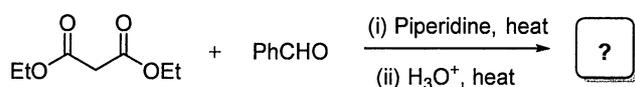
- A) E1 elimination B) partially E1 and partially E2 elimination
C) E2 elimination D) E1cB elimination
54. As compared to amino acids with neutral side chains, the isoelectric point for amino acids with acidic and basic side chains will be
A) at a higher pH and lower pH respectively B) at a lower pH and higher pH respectively
C) at a higher pH for both D) at a lower pH for both

55. In the reaction scheme given below, identify P and Q

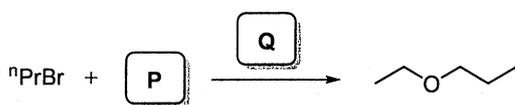




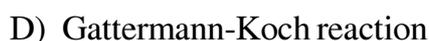
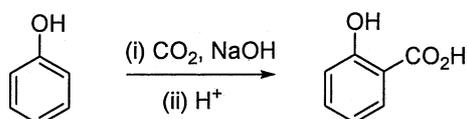
56. Which of the following **DOES NOT** give a positive test with Fehling's solution ?
- A) Galactose
B) Sucrose
C) Fructose
D) Maltose
57. When β -D-glucopyranose is dissolved in water, the specific rotation of the solution changes slowly to an equilibrium value due to the phenomenon of
- A) Anomeric effect
B) Mutarotation
C) Conformational inversion
D) Desymmetrisation
58. The major product in the transformation shown below is



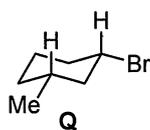
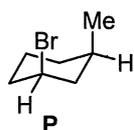
59. The correct combination of **P** and **Q** in the reaction shown below would be



60. The reaction shown below is known as

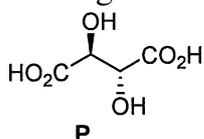
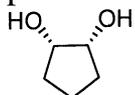


61. The compounds **P** and **Q** shown below are





62. Among the two compounds shown below, choose the correct statement

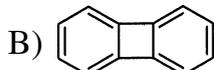
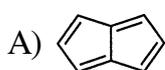
**P****Q**

- A) **P** is *meso* and **Q** is optically active B) **Q** is *meso* and **P** is optically active
C) Both **P** and **Q** are *meso* D) Both **P** and **Q** are optically active

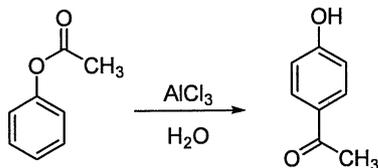
63. The only cyclic amino acid among the following is

- A) Arginine B) Aspartic acid C) Glycine D) Proline

64. Which of the following compounds **DOES NOT** display antiaromatic character ?

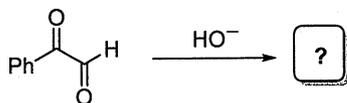


65. The transformation shown below is an example of



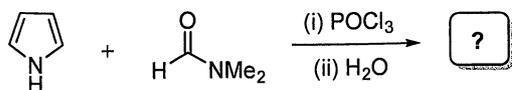
- A) Baeyer-Villiger rearrangement B) Claisen rearrangement
C) Wagner-Meerwein rearrangement D) Fries rearrangement

66. The major product of the reaction shown below would be



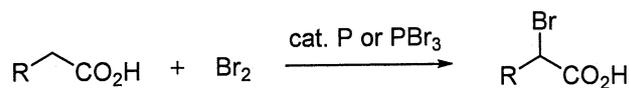
- A)
- B)
- C)
- D)

67. The major product in the transformation shown below is



- A)
- B)
- C)
- D)

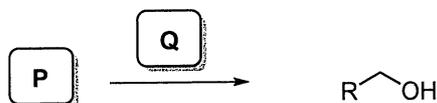
68. The reaction shown below is known as



- A) Haloform reaction B) Meerwin-Pondorf-Verley reaction
C) Hell-Volhard-Zelinsky reaction D) Reformatsky reaction



69. The correct combination of **P** and **Q** in the transformation shown below is

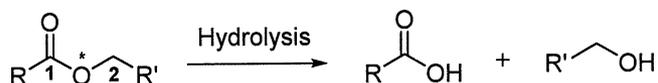


- A) RCHO and $\text{NH}_2\text{NH}_2/\text{KOH}/\text{heat}$ B) RCO_2Et and NaBH_4
 C) RCO_2Et and Na/EtOH D) RCHO and ammoniacal AgNO_3

70. 2-Methyl-2-butene upon ozonolysis followed by an oxidative work-up gives

- A) acetaldehyde and acetic acid B) acetone and acetaldehyde
 C) acetic acid and acetaldehyde D) acetone and acetic acid

71. Given below is a model ester hydrolysis followed by two statements. Choose the correct answer with regards to the given statements



Statement 1 : The hydrolysis may be either acid catalysed or base catalysed

Statement 2 : The hydrolysis may involve cleavage of either the acyl carbon-oxygen

bond (between C^1 and O^*) or the alkyl carbon-oxygen bond (between C^2 and O^*)

- A) both statements are incorrect
 B) both statements are correct
 C) ‘Statement 1’ is correct and ‘Statement 2’ is incorrect
 D) ‘Statement 1’ is incorrect and ‘Statement 2’ is correct

72. The major product of the reaction shown below is



- A) B) C) D)

73. The Hinsberg test is a characteristic test that is used to distinguish between

- A) Aldehydes and ketones B) Primary, secondary and tertiary amines
 C) Phenols and carboxylic acids D) Primary, secondary and tertiary alcohols

74. In mass spectroscopy, three peaks in the molecular ion at “M”, “M+2” and “M+4” (differing by 2 m/z units each) in the ratio 1:2:1 (respectively) indicates that the compound contains

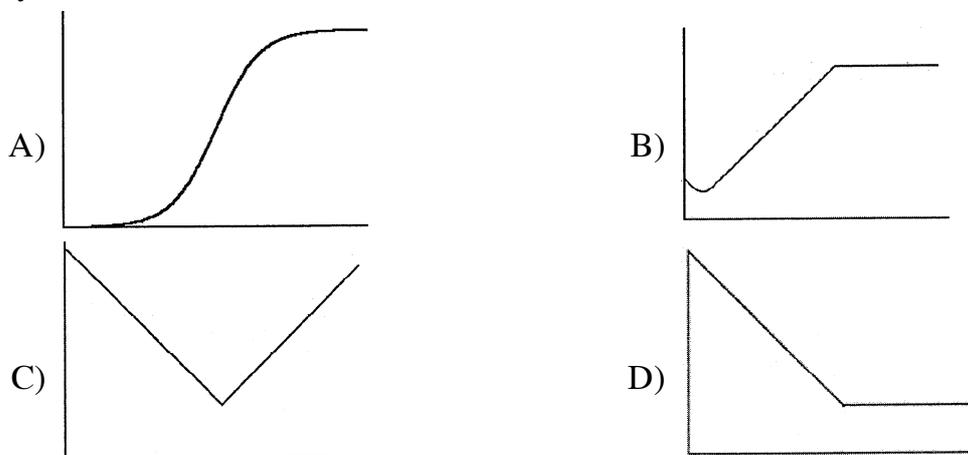
- A) 1 bromine atom B) 1 bromine atom and 1 chlorine atom
 C) 2 bromine atoms D) 2 chlorine atoms



84. How many grams of copper will be deposited from a solution of CuSO_4 by 0.5 Faraday of electricity ? (Atomic weight of Cu = 64 u)
- A) 16 B) 32 C) 48 D) 64
85. In a solid lattice, the cation has left a lattice site and is located in an interstitial position. The lattice defect is known as
- A) Interstitial defect B) Vacancy defect
C) Frenkel defect D) Schottky defect
86. Vapour pressures of liquids A and B at a particular temperature are 120 mm and 180 mm of Hg respectively. If 2 moles of A and 3 moles of B are mixed to form an ideal solution, vapour pressure of the solution would be
- A) 156 mm of Hg B) 108 mm of Hg C) 48 mm of Hg D) 150 mm of Hg
87. The boiling point of a solution of 3.00 g Urea (NH_2CONH_2 , MW = 60.0 gmol^{-1}) dissolved in 10.0 g of pure water at 1.00 atm ($K_b = 0.512 \text{ C (molal)}^{-1}$) is
- A) 0.26°C B) 100.25°C C) -26°C D) -100.26°C
88. In the reaction $\text{N}_2\text{O}_{4(g)} \rightleftharpoons 2\text{NO}_{2(g)}$, an increase in pressure would make the reaction
- A) favours forward reaction B) insufficient information to predict
C) reduces the rate of the reaction D) favours backward reaction
89. The best indicator for the detection of end point in a titration of a weak acid & a strong base is
- A) methyl orange (pH 3 – 4) B) methyl red (pH 5 – 6)
C) bromothymol blue (pH 6 – 7.5) D) phenolphalein (pH 8 – 9.6)
90. When 150.0 mL of a 0.05 M KF solution is added to 350.0 mL of a 0.01 M solution of $\text{Ba}(\text{NO}_3)_2$, the first trace of a precipitate of BaF_2 is seen. The K_{sp} of BaF_2 is
- A) $1.575 \times 10^{-6} \text{ M}^3$ B) $0.735 \times 10^{-6} \text{ M}^3$
C) $1.050 \times 10^{-4} \text{ M}^3$ D) $0.735 \times 10^{-4} \text{ M}^3$
91. How many Faraday of electricity need to be passed in an electrolyte solution containing aluminium to deposit 9 gm of aluminium (at. wt. 27) ?
- A) 1 Faraday B) 3 Faraday C) 1.5 Faraday D) 4.5 Faraday
92. What is the unit cell having dimension $a \neq b \neq c$ and $\alpha \neq \beta \neq \gamma$?
- A) orthorhombic B) monoclinic C) triclinic D) rhombohedral
93. In vibrational Raman spectra, $\Delta J = 0$ transitions are associated with
- A) P branch B) Q branch C) R branch D) S branch



94. If sulphuric acid is titrated with dilute ammonia then the variation of conductance (y-axis) with addition of dilute ammonia (x-axis) will be



95. $E^\circ = \text{Ni}^{2+}/\text{Ni} = -0.25 \text{ V}$; $E^\circ = \text{Au}^{3+}/\text{Au} = +1.50 \text{ V}$. The value of E°_{cell} for the electrochemical cell represented as $\text{Ni} | \text{Ni}^{2+} (1\text{M}) || \text{Au}^{3+} (1\text{M}) | \text{Au}$ is
A) +1.75 V B) -1.75 V C) +1.25 V D) -1.25 V
96. For the reaction $\text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g}) \rightleftharpoons \text{PCl}_5(\text{g})$, the value of K_C at 300 K is $25 \text{ mol}^{-1}/\text{litre}$. The value of K_P at this temperature is (given $R = 0.0821 \text{ L atm mol}^{-1} \text{ K}^{-1}$)
A) 1.01 atm^{-1} B) 82.1 atm^{-1} C) 615.75 atm^{-1} D) 8.21 atm^{-1}
97. For a reaction $\text{A} + \text{B} \rightarrow \text{products}$, it is observed that
i) On doubling the initial concentrations of **A** only, the rate of reaction is also doubled.
ii) On doubling the initial concentrations of **A** and **B** there is a change by a factor of 8 in the rate of reaction.
The rate of this reaction is given by
A) $\text{Rate} = k [\text{A}] [\text{B}]^2$ B) $\text{Rate} = k [\text{A}]^2 [\text{B}]^2$
C) $\text{Rate} = k [\text{A}] [\text{B}]$ D) $\text{Rate} = k [\text{A}]^2 [\text{B}]$
98. The potential of a hydrogen electrode in an aqueous solution is 0.591 V at 25 °C. The pH of the solution is
A) 10 B) 1 C) 5.91 D) 4
99. In fluorescence spectroscopy, which of the following statement is true ?
A) emission energy is greater than excitation energy
B) emission energy is lower than excitation energy
C) emission λ_{max} is lower than excitation λ_{max}
D) emission λ_{max} is same as excitation λ_{max}
100. What is the overall order of the reaction given by the rate equation, $\text{rate} = k [\text{A}]^{3/2} [\text{B}]^{3/2}$?
A) 1.5 B) 3 C) 2 D) 2.5



SPACE FOR ROUGH WORK