

SRI SAI COACHING CENTRE

2/25, Raja Mill Road, Madurai-1

TRB - P.G. Asst. – 2019 - Chemistry - Model – I

Roll No.

Name :

13.09.19

- 1) Identify incorrect statements
- A) The difference between the incident and scattered frequencies in the “Raman Spectra” is called Stoke’s line ($\mu_i = \mu_s$)
- B) The selection rule for transition in rotational energy levels in Raman spectrum is $\Delta J = 0, \pm 2$
- C) The energy of non-rigid rotator is $E_J = BJ(J+1) - D(J+1)^2 \text{ cm}^{-1}$
- D) Spherical top molecules will show rotational Raman spectra. ex: $\text{CH}_4, \text{SF}_6, \text{UF}_6, \text{CCl}_4, \text{SiH}_4$ etc.
- 2) How many number of vibrational modes are possible in the following molecule
- 1) Ne 2) HCHO 3) Acetylene 4) Benzene
- A) 3, 6, 7, 30 B) 0, 7, 6, 30 C) 30, 6, 7, 30 D) 0, 6, 7, 30
- 3) Identify wrong statement
- i. Stereochemically controlled polymers can be made by polymerization process involving cationic mechanism
- ii. Nylon 12 is obtained by polymerization of the monomer is 12-aminododecanoic acid
- iii. Borazine gets slowly hydrolyzed by water to produce boric acid, ammonia and NO_2
- iv. Phosphazene which involves $d\pi - p\pi$ bonding
- A) iii only B) ii, iii, iv C) i, iii D) i, iii, iv
- 4) The Pmr spectrum of ethyl benzene shows
- A) two signals: a sextet and a triplet
- B) three signals : 2 triplets and a quartet
- C) four signals : two sets of triplets
- D) three signals : a singlet, a quartet and a triplet
- 5) Calculate the unpaired electron spin density at α carbon atom of anthracene negative ion using Mc.Connell equation. Given that the hyperfine line coupling constant at α position is 12 mT.
- A) 2.7 B) 0.533 C) 1.05 D) 5.33

6) Match the following:

List – I

1. $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$
2. $\text{K}_3[\text{Fe}(\text{CN})_6]$
3. $[\text{Fe}(\text{CN})_5\text{NO}]^{2+}$
4. SnCl_4

List –II

- P. Observed 2 MB line
- Q. Spin free iron (II)
- R. $\delta = 0$
- S. ligands are Asymmetry

- A) S, Q, R, P B) R, Q, P, S C) Q, P, S, R D) Q, P, R, S

7) Which of the following compound will give a triplet in ^{31}P – NMR spectrum?

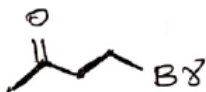
- A) H_3PO_3 B) H_3PO_4 C) H_3PO_2 D) PF_3

8) Propose structures for compounds that fit the following ^1H NMR data of the M.F. is $\text{C}_4\text{H}_7\text{BrO}$ are follows (3H singlet at 2.118, 2H triplet at 3.25 δ , J = 6HZ, 2H triplet at 4.40 δ , J = 6HZ)

A)



B)



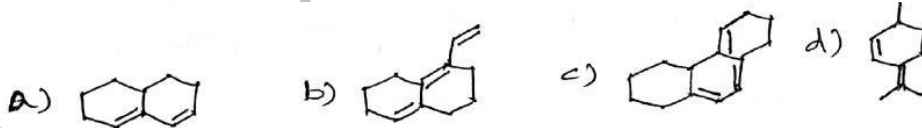
C)



D)



9) The λ_{max} value as predict the following molecules and then arranged the correct increasing order given below chosen



A) $c > b > a > d$

B) $a < d < c < b$

C) $d > a > c > b$

D) $a < d < b < c$

10) Identify following statement is false

- i. Hypochromic shift is a decrease in absorption intensity
- ii. R – band is an forbidden electronic transition
- iii. Vinyl chloride and crotonaldehyde occurs in following transition $n - \pi^*$, $\pi - \pi^*$, $\sigma - \pi^*$, $n - \sigma^*$, $\pi - \sigma^*$
- iv. No of conjugation system increase as well as λ_{max} value increase

A) i, iii

B) ii, iii, iv

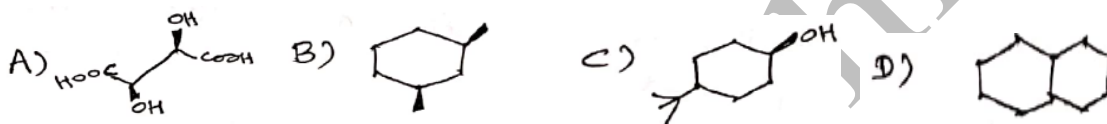
C) i, ii, iii

D) None of these

- 11) Spandex polymer is prepared from
- A) Diols + dicyanater at 50 – 100°C B) Bisphenol A + Carbonyl chloride
 C) Texaphthalic acid + Ethylene glycol D) Bisphenol A + Epichorohydrine

- 12) Identify correct statement
- a) ESR spectrum show as paramagnetic substance, transition metal ions and complexes with unpaired d (or) if electrons free radicals, and also singlet state
 b) There are 196 ESR lines expected in triphenyl methyl radical
 c) HCl, CH₃Cl, CO₂, H₂O, SO₂ molecules are microwave active because of all the molecule has permanent DPM
 d) There two 1H hmy signals observed for cyclopentanone compound
- A) a, b, c B) b, c, d C) a, c, b D) All of these

- 13) Identify the compounds A – D which shows the



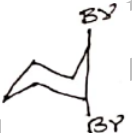
- A) Chiral, achiral, achiral, achiral B) Chiral, chiral, achiral, achiral
 C) achiral, achiral, chiral, chiral D) chiral, achiral, achiral, chiral

- 14) Cyclohexene + Br₂ → Dibromo cyclohexane. The most stable conformation of the product formed is

A)



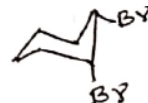
B)



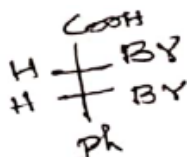
C)



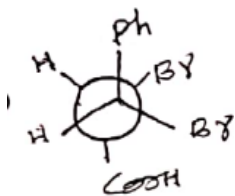
D)



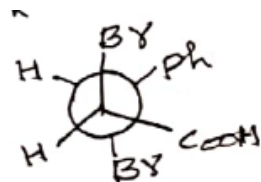
- 15) Which of the following represents the Newman Projection of



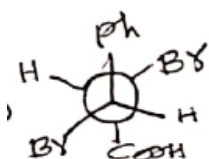
A)



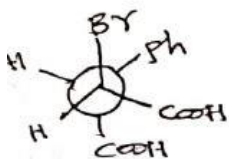
B)



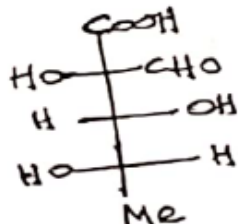
C)



D)



16) The absolute configuration at C₂, C₃ and C₄ are respectively



A) 2R, 3S, 4S

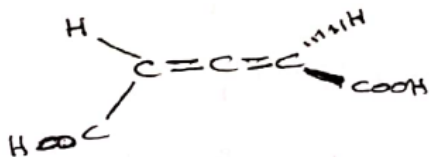
B) 2R, 3S, 4R

C) 2R, 3R, 4S

D) 2S, 3R, 4S

17) Which of the following is not optically active?

A)



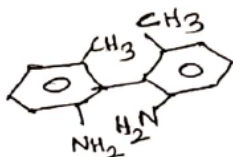
B)



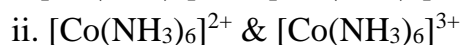
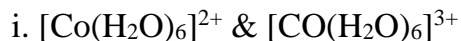
C)



D)



18) Consider the following pairs complexes



H_2O and NH_3 molecules stabilize respectively



19) Identify correct statements

1) Trans decalin shown 2 proton NMR peaks and cis decalin shows 1 peak

2) In trans isomer of decalin the two rings are fused in ee form

3) In cis isomer of decalin the two rings are fused in ea form

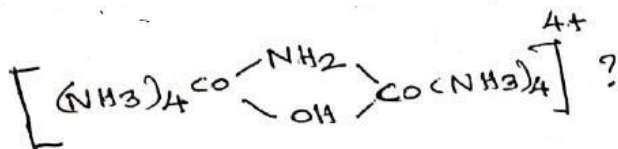
4) trans decalin is a rigid molecule and cannot undergo conformational flipping.

A) 1, 3, 4 B) 1, 2, 3 C) 1, 2, 4 D) All the above

20) Which of the following is the best chelating agent to treat Wilson's disease (accumulation of large amount of copper in the body)?

A) cis-platin B) EDTA C) Penicillamine D) BAL

21) What is the name of the compound



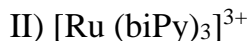
A) μ -amino – hydroxo octaammine dicobalt (III) ion

B) μ -amido μ -hydroxo octaammine dicobalt (III) ion

C) μ -amido μ -hydroxo bis(tetraammine) cobalt (III) ion

D) μ -hydroxo μ -amido bis (tetra ammine cobalt) (III) ion

22) Predict the chiral complexes from the following



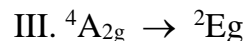
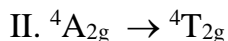
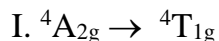
A) only 1

B) I and II

C) I & III

D) II & III

23) Three bands in the electronic spectrum of $[\text{Cr}(\text{NH}_3)_6]^{3+}$ are due to the following transitions.



Identify the correct statements about them

1) Intensity of (I) is lowest

2) Intensity of (III) is lowest

- 3) Intensity of (II) is lowest
 4) (III) absorption band is not appears for this complex
 A) 1, 2, 3, 4 B) 2, 4 C) 3, 4 D) 1, 2, 4
- 24) The MB spectrum of which of the following will give a singlet?
 A) $[\text{Fe}(\text{CO})_5]$ at N^2T B) FeCl_3
 C) $[\text{Fe}(\text{CN})_5 \text{NO}]^-$ D) $[\text{Fe}(\text{CN})_5 \text{NH}_3]^{-2}$
- 25) The ground state term and possible no. of microstates of $[\text{Co}(\text{en})_3]^{3+}$ is and
 A) $^5\text{T}_{1g}$ & 210 B) $^5\text{A}_{2g}$ & 120 C) $^1\text{T}_{1g}$ & 210 D) $^5\text{E}_{2g}$ & 210
- 26) Identify statement is not true
 1) CFSE of high spin Fe^{2+} ion is oh field value is zero +1P
 2) The ground state term symbol of Pr^{3+} is $^3\text{H}_4$
 3) The secondary valency number of copper in $[\text{Cu}(\text{NH}_3)_4]\text{Cl}_2$ complex is 2
 4) The CFT electronic configuration of this $\text{Ca}_2[\text{Fe}(\text{CN})_5\text{O}_2]$ complex is $t_{2g}^5 e_g$
 A) 1, 4 B) 2, 3, 4 C) 1, 3, 4 D) All are incorrect
- 27) Among the following complexes (K – P)
 K) $\text{K}_3[\text{Fe}(\text{CN})_6]$ L) $[\text{CO}(\text{NH}_3)_6]\text{Cl}_3$ N) $[\text{Ni}(\text{CO})_4]$
 M) $[\text{Cu}(\text{CN})_2]^-$ O) $[\text{Co}(\text{H}_2\text{O})_6]\text{SO}_4$ P) $[\text{MnCl}_6]^{4-}$
 Which of the following sets have paramagnetic behaviour?
 A) K, L, O, P B) K, O, P C) K, L, M, O D) K, L, M, N, P
- 28) The EAN value of sets are same for the given following
 A) $\text{Fe}_2(\text{CO})_9$ & $\text{CO}_2(\text{CO})_8$ B) $\text{CO}_4(\text{CO})_{12}$ & $\text{Fe}(\text{CO})_{10}$
 C) $\text{OS}_3(\text{CO})_{12}$ & $\text{Ni}(\text{CO})_8$ D) $\text{Mn}(\text{CO})_5$ & $\text{OS}_2(\text{CO})_9$
- 29) The order of CFSE is wrong in
 A) $[\text{Co}(\text{H}_2\text{O})_6]^{3+} > [\text{Co}(\text{H}_2\text{O})_6]^{2+}$ B) $[\text{Co}(\text{NH}_3)_6]^{3+} > \text{Rh}(\text{NH}_3)_6]^{3+}$
 C) $[\text{Co}(\text{CN})_6]^{3-} > [\text{Co}(\text{NH}_3)_6]^{3+}$ D) $[\text{Co}(\text{NH}_3)_6]^{3+} > [\text{CoF}_6]^{3-}$
- 30) Octahedral complexes having d^7 configuration and weak field ligands can have
 A) one spin allowed transition
 B) two spin allowed transition
 C) three spin allowed transition
 D) four spin allowed transition
- 31) Which of the following statements is not true?
 1) $d^1(\text{oh})$ and $d^8(\text{oct})$ configurations have same Orgel diagram
 2) Jahn-Teller distortion occurs in the ground state configuration of $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$
 3) The $d(x^2-y^2)$ orbital involved in the hybridization of $[\text{PtCl}_4]^{2-}$
 4) $^3\text{T}_{1g} \rightarrow ^1\text{T}_{2g}, ^3\text{T}_{1g} \rightarrow ^3\text{T}_{2g}$ this transition is spin allowed
 A) 1, 2, 3, 4 B) 2, 3 C) 1, 4 D) 1, 3, 4
- 32) $\text{L} \rightarrow \text{M}$ charge transfer will occur in
 A) $\text{Mo}(\text{CO})_6$ B) $[\text{IrBr}_6]^{3-}$ C) $[\text{Fe}(\text{CN})_6]^{3-}$ D) $[\text{Fe}(\text{phen})_3]^{3+}$

- 33) Consider the following statements
 I) Thermodynamically stable complex are labile
 II) Thermodynamically unstable complexes are inert
 III) lability of a complex depends on activation energy

The correct statements are

- A) I, II B) I, III C) II, III D) I, II, III
- 34) The ion which is expected to have Jahn-Teller distortion in oh field is
 A) CO^{+3} (1.S) B) CO^{+3} (H.S) C) Ni^{2+} D) Mn^{2+} (H.S)

- 35) Match the following

	Spectroscopy		Selection		Condition
P	IR	α	$\Delta J = \pm 1$	1	One (or) more than unpaired $e^{\ominus} n$
Q	EPR	β	$\Delta MI = 0$	2	Change in DPM during the vibration
R	Microwave	γ	$\Delta \gamma = \pm 1$	3	Change in the polarizability
S	Vibrational Raman	δ	$\Delta J = 0, \pm 2$	4	Permanent DPM

- Codes: P Q R S
- A) $\alpha-3$ $\gamma-1$ $\delta-2$ $\beta-4$
 B) $\gamma-2$ $\beta-3$ $\alpha-1$ $\delta-4$
 C) $\gamma-2$ $\beta-1$ $\alpha-4$ $\delta-3$
 D) $\alpha-2$ $\gamma-1$ $\delta-4$ $\beta-3$

36. Which one of the following sets of character correct for following symmetry operation. E, C_2, σ_{xz} and i
 A) +3, -1, -1, -3 B) -3, +1, -1, +3 C) +3, 1, 1, -3 D) -3, 1, 1, +3

37. A molecule contains following symmetry operations $E, C_4, 4C_2, i, S_4, \sigma_n, 2\sigma_v, 2\sigma_d$. The no of classes and order of symmetry pt gp. respectively are
 A) 8 & 13 B) 8 & 11 C) 13 & 8 D) 8 & 12

38. Match the following:

Notation		Statement
P. B_{1g}	-	1. Antisymmetric with respect to C_n, σ and i
Q. B_{2u}	-	2. Symmetry write both C_n, σ , and i
R. A_{1g}	-	3. Symmetry write C_n but antisymmetric σ and i
S. A_{2u}	-	4. Antisymmetry write C_n but symmetry σ and i
A) P - 4, Q - 1, R - 3, S - 2		B) P - 4, Q - 3, R - 2, S - 1
C) P - 4, Q - 1, R - 2, S - 3		D) P - 3, Q - 1, R - 2, S - 4

39. Character table of C_{3V} pt. gp. is given below

C_{3V}	E	$2C_3$	$3\sigma_v$
A1	1	1	1
A2	1	1	-1
E	2	-1	0

Consider the R.R 6, 3, 0. Its irreducible representation components are

- A) $E + 2A_1 + 2A_2$ B) $2E + A_1 + A_2$
 C) $3A_1 + A_2$ D) $E_2 + 2A_1$

40. Which one of the following point groups are possible in Trans $C_2H_2Cl_2$?

- A) C_{2V} B) D_{2h} C) D_{3d} D) C_{2h}

41. Choose the delocalization energy for trans 1, 3 – butadiene using Huckel M.O. theory

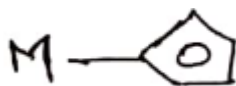
- A) -35 KJmol^{-1} B) 4.472β C) $4\alpha + 4\beta$ D) 4β

42. If the $t_{1/2}$ of a radioactive element is 10d, the number of days required to reduce it to $1/8^{\text{th}}$ of its original value is

- A) 10d B) 20d C) 30d D) 80d

43. Metalloenes are correct statements

1. Ferrocene is a pentahepta complex. Since all the five c-atoms of the ring are attached to the Fe atom
2. ligand atoms involved in double bonds (or) some ligand atoms in a chain (or) ring are bound to the central atom, numerals indicating these ligand atoms are inserted preceding η
- 3.



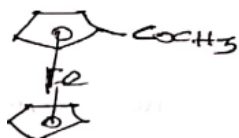
this complex of ligand Hapticity is η^5

4. Ferrocene does not undergo Diels-Alder rxns because of conjugated dienes

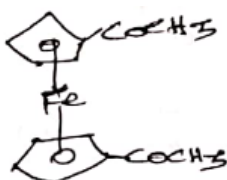
- A) 1, 2, 4 B) 2, 3, 4 C) 1, 2 D) 1, 2, 3

44) Ferrocene + $CH_3COCl \xrightarrow[\text{(excess)}]{\text{Anhydrous } AlCl_3}$?

A)



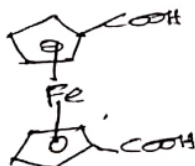
B)



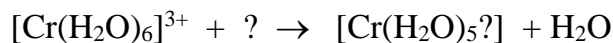
C)



D)



45) The name of the following reaction is



What is the Question Mark

A) Photoaquation, NO_2^-

B) Photosubstitution

C) Photo anation, NO_2^-

D) Photoisomerisation, NCS^-

46) Match the following:

A) Oxo process - CO_2 (CO)₈ (W)

B) Wacker process - $\text{Rh}(\text{Ph}_3)_3\text{Cl}$ (X)

C) Ziegler – Natta catalyst - $\text{PdCl}_2 + \text{CuCl}_2$ (Y)

D) Wilkinson's catalyst - $\text{TiCl}_4 + \text{Al}(\text{C}_2\text{H}_5)_3$ (Z)

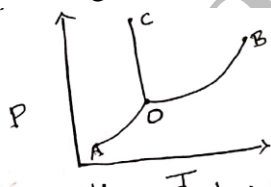
A) W, X, Y, Z

B) Y, X, Z, W

C) Z, W, X, Y

D) W, Y, Z, X

47) The phase diagram for a one component system is shown below



what are the number of degree of freedom at the point OB, OA and OC respectively

A) 1, 1, 0

B) 0, 1, 1

C) 1, 0, 1

D) 1, 1, 1

48) If one component of a mixture travelled 6.6cm from the base line while the solvent had travelled 11.0 cm, then the R_f value for that component is

A) 0.60

B) 1.83

C) 0.83

D) 0.52

49) Which of the following is not correctly matched?

A) Sulphur system = one component, 4-phase system

B) $\text{NH}_4\text{Cl}(\text{S}) \rightleftharpoons \text{NH}_3(\text{g}) + \text{HCl}(\text{g}) = 3$ component, 2 – phase system

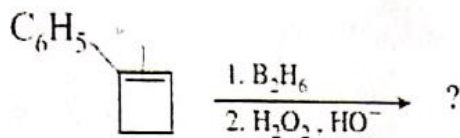
C) A saturated solution of NaCl in $\text{H}_2\text{O} = 2$ component, one phase system

D) $\text{CHCl}_3 + \text{H}_2\text{O} =$ Constitute 2 phases

- 50) Which one of the following statements is not true?
 A) Plain of positive and negative curves obey a one term of Drude equation
 B) Multiple cotton effect curve described in terms of the mathematical expression called the Drude equation
 C) Single cotton effect curve do not obey Drude equation
 D) CD spectrum only exists for achiral species
- 51) How many no of peaks appears in TGA for decomposition of Barium perchlorate?
 A) 2 B) 3 C) 4 D) 1
- 52) Identify the incorrect match?
 A) Radius of the nucleus : $R_o A^{1/3}$
 B) Neptunium series ${}_{93}\text{Np}^{237} \rightarrow {}_{83}\text{Bi}^{209}$: Emitted 7α & 6β
 C) Meson theory : $p \rightarrow n + \pi^+$
 D) Radialysis of water : I^{T3} act as scavenger
- 53) Which one of the following statement is wrong?
 A) O^{18} isotope used as study for ester hydrolysis
 B) ${}^{32}\text{P}$ used in the treatment of leukaemia
 C) Tc^{99} used as Brain Scanning
 D) NAA of Activity equation is $A = N\sigma b \left(1 - e^{-0.693/t_{1/2}}\right)$
- 54) Binding energy per nuclear for an element is 7.14 MeV. If the binding energy of the element is 28.6 MeV calculate the number of nucleons in the nucleus?
 A) 4 B) 8 C) 6 D) 3
- 55) Consider the following reactions and names of reactions and answer using the codes given
- | Reactions | Names of reactions |
|--|--------------------------|
| I) $\text{Cu}^{63} + \text{D} \rightarrow \text{Cu}^{64} + \text{p}$ | a = pickup reaction |
| II) $\text{P}^{15} + \text{p} \rightarrow \text{P}^{14} + \text{D}$ | b = k – electron capture |
| III) $\text{Cu}^{63} + \text{p} \rightarrow \text{Na}^{24} + 9\alpha + 3\text{n} + \text{p}$ | c = stripping reaction |
| IV) $\text{Mn}^{54} + 0.1\text{e} \rightarrow \text{Cr}^{54} + \gamma$ | d = spallation reaction |
- Codes: I II III IV
- A) d b a c
 B) c a d b
 C) a c b d
 D) c d a b
- 56) Which of the following has the lowest first ionization energy?
 A) Be B) B C) C D) N
- 57) Which of the following ions has the smallest ionic radius?
 A) Mg^{2+} B) F^- C) Al^{3+} D) O^{2-}

- 58) Which of the following ionic crystal has highest lattice energy?
 A) KCl B) CsCl C) MgO D) CaCl₂
- 59) The colours of dilute and concentrated alkali metal ammonia solution are
 A) blue and green B) blue and bronze C) green and brown D) green and violet
- 60) Which of the following species is not linear?
 A) OF₂ B) CO₂ C) COS D) N₂O
- 61) Which of the following is an example closo borane?
 A) B₄H₁₀ B) B₅H₉ C) B₆H₆²⁻ D) B₅H₁₁
- 62) Identify the amphi-protic solvent among the following
 A) C₆H₆ B) HF C) CH₃COOH D) CHCl₃
- 63) Ferromagnetism is exhibited by
 A) Fe B) Co C) Ni D) All of these
- 64) What is the arrangement of ions in the ionic crystal A⁺ B⁻? Given that $r_{A^+} = 0.95$ and $r_{B^-} = 1.81$
 A) Tetrahedral B) bcc C) Octahedral D) Trigonal planar
- 65) Which species has three electron pairs on the central atom?
 A) ICl₃ B) XeO₃ C) XeF₄ D) ICl₂⁻
- 66) Which of the following species has the longest O-O bond?
 A) O₂²⁻ B) O₂⁻ C) O₂⁺ D) O₂
- 67) Ga doped Si and Ge are
 A) Intrinsic semiconductors B) n-type semiconductors
 C) p-type semiconductors D) Conductors
- 68) If the alignments of magnetic moments in parallel and antiparallel directions are unequal, the material will show
 A) Ferromagnetism B) Ferrimagnetism
 C) Anti-Ferromagnetism D) Paramagnetism
- 69) Dehydrohalogenation of 2-bromobutane with alcoholic KOH gives
 A) 1- Butene B) 2-Butene C) 2-Methyl propene D) 2-Butanol
- 70) In which of the following reaction intermediate, the carbon atom is sp³ hybridized?
 A) Carbanion B) Carbocation C) Carbene(singlet) D) Carbene (triplet)
- 71) Which sequence of reactions takes place in benzyne mechanism?
 A) addition followed by elimination B) substitution followed by elimination
 C) elimination followed by addition D) elimination followed by substitution
- 72) Which of the following heterocyclic compound is synthesized by Skraup synthesis?
 A) Indole B) Quinoline C) Isoquinoline D) Pyrrole
- 73) The order of reactivity of the following heterocyclic compound is
 I. Pyrrole II. Thiophen III. Furan
 A) I > II > III B) I > III > II C) II > III > I D) III > I > II

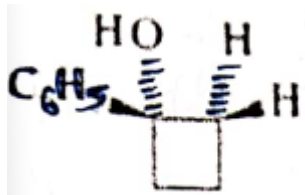
- 74) Arrange the following halides in the descending order of SN1 reactivity
 I. $(\text{CH}_3)_3\text{CBr}$ II. $\text{CH}_3\text{CH}_2\text{Br}$ III. $(\text{C}_6\text{H}_5)_2\text{C}(\text{CH}_3)\text{Br}$ IV. $(\text{CH}_3)_2\text{CHBr}$
 A) III > I > IV > II B) I > III > IV > II C) I > III > II > IV D) II > IV > I > III
- 75) What is the product of the reaction



A)



B)



C)



D)



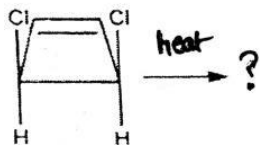
- 76) The heterocyclic compound that undergoes Diels-Alder reaction is
 A) pyrrole B) Furan C) Thiophene D) Pyridine
- 77) Identify the incorrect statement
 A) Diacetylmorphine is called Heroin
 B) Most starches yield 10-20% amylose and 80-90% amylopectin
 C) The triterpene Squalene is the all-cis-stereoisomer
 D) 2-methyl-1, 3- butadiene is called an isoprene unit
- 78) In RNA, adenine pairs upwith
 A) thymine B) uracil C) guanine D) cytosine
- 79) Balmer series falls in the region
 A) UV B) Visible C) IR D) Far IR

- 80) The energy of an electron in the first Bohr orbit for hydrogen is -13.6eV. Which one of the following is a possible excited state for electrons in Bohr orbits of hydrogen?
 A) -3.4eV B) -27.2eV C) -1.7eV D) -54.4eV
- 81) The de Broglie wavelength for a baseball moving with velocity of $2 \times 10^4 \text{ ms}^{-1}$ weighs 25.0g. what will be its de Broglie wavelength?
 A) $1.32 \times 10^{-36} \text{ m/s}$ B) $1.32 \times 10^{-26} \text{ m/s}$ C) $1.32 \times 10^{-32} \text{ m/s}$ D) $1.32 \times 10^{-30} \text{ m/s}$
- 82) The radius of hydrogen atom in the ground state is 0.53 \AA . What is the radius of Li^{2+} in the same state?
 A) 0.53 \AA B) 1.59 \AA C) 0.18 \AA D) 1.06 \AA
- 83) The degeneracy of the energy level $12h^2/8ma^2$ of a particle in a three dimensional cube of length "a" is
 A) 1 B) 3 C) 6 D) 12
- 84) For a vibrational mode to be active the transition dipole moment $\mu_{ij} = \int \Psi_i \mu \Psi_j$ integral should be
 A) negative B) 1 C) zero D) nonzero
- 85) The quantum mechanical operator is Px^2
 A) $-\hbar^2 \partial^2/\partial x^2$ B) $-i\hbar \partial/\partial x$ C) $-\hbar^2 \partial/\partial x$ D) $-\hbar \partial^2/\partial x^2$
- 86) The Hamiltonian given below corresponds to

$$\hat{H} = -\hbar^2/2m\nabla^2 + 1/4\pi\epsilon_0 [-e^2/r_A + -e^2/r_B + e^2/r_{AB}]$$

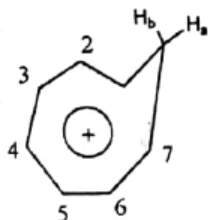
- A) He-atom B) H_2^+ C) H_2 D) Li-atom
- 87) A reaction is not at all spontaneous whatever the temperature when
 A) $\Delta H^\circ < 0$ and $\Delta S^\circ < 0$ B) $\Delta H^\circ < 0$ and $\Delta S^\circ > 0$
 C) $\Delta H^\circ > 0$ and $\Delta S^\circ < 0$ D) $\Delta H^\circ > 0$ and $\Delta S^\circ > 0$
- 88) According to Maxwell's relations $(\partial P/\partial S)_V$ is equal to
 A) $(\partial V/\partial S)_P$ B) $-(\partial T/\partial V)_S$ C) $(\partial S/\partial V)_P$ D) $-(\partial P/\partial V)_S$
- 89) Which of the following is a wrong statement?
 A) at low pressure $f = p$ B) fugacity is the escaping tendency of the substance
 C) $G = G^* + nRT \ln f$ is valid only for ideal gases
 D) fugacity of the gas can be both less than or more than the pressure p
- 90) Which of the following statement is not true?
 A) Partition function is a dimensionless quantity
 B) electron and photons are fermions
 C) The symmetry number of H_2 molecule is 2
 D) Sackur-Tetrode equation is used to calculate entropy of diatomic gases
- 91) Which of the following is not correctly matched?
 A) $(\partial \mu_i/\partial T)_{P,N} = -\overline{S}_i$ B) $\Delta S_{\text{mix}} = -x_i \ln x_i$
 C) Gibbs – Duhem equation : $\sum \mu_i dn_i = 0$ D) Third law : Limit $S = 0$

- 92) For hydrogen gas calculate the most probable velocity at 25°C?
 A) $2.5 \times 10^3 \text{ ms}^{-1}$ B) $1.5 \times 10^3 \text{ m s}^{-1}$
 C) $2.7 \times 10^3 \text{ ms}^{-1}$ D) $1.84 \times 10^3 \text{ m s}^{-1}$
- 93) Which Rearrangement or reaction involves carbon to nitrogen migrations?
 A) Cope rearrangement B) Schmidt rearrangement
 C) Wittig reactions D) Fries rearrangements
- 94) The product of the reaction is



- A) 1(Z) – 3(E) – 1, 4 – dichloro butadiene
 B) 1(E) -3 (E) – 1, 4 – dichloro butadiene
 C) 1(Z) – 3 (Z) – 1, 4- dichloro butadiene
 D) 1(E)-3(Z)-1, 4-dichloro butadiene
- 95) Which of the following is not correctly matched?

A)



Homoaromatic

B)



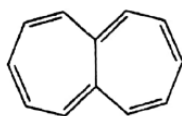
Aromatic

C)



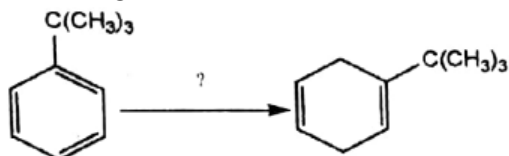
non-aromatic

D)



anti aromatic

96) What is the reagent used for this conversion?

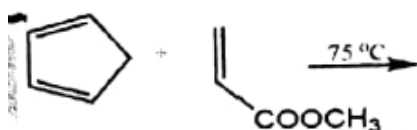


- A) Na/NH₃(l)/EtOH B) AlCl₃
 C) Na/C₆H₅NH₂/EtOH D) Li,CH₃NH₂/H₂O

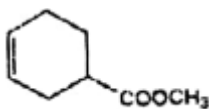
97) In which of the following rearrangement, the reagent is not correct?

Rearrangement	Reagent
A) benzaldehyde → Benzoin	KCN
B) Hydrazobenzene → Benzidine	H ⁺
C) Phenyl acetate → o- and p- hydroxyl phenyl methyl ketone	AlCl ₃
D) Benzil → Benzilic acid	KCl

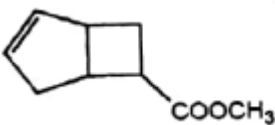
98) Predict the product of the reaction



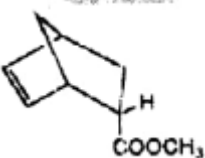
A)



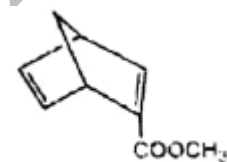
B)



C)



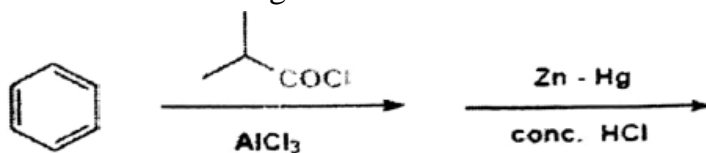
D)



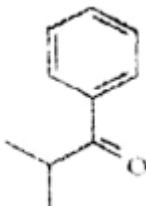
99) Which of the following is the correct form of Hammett equation?

- A) $\log k_0 = \sigma \rho + \log k$ B) $\log K = \sigma \rho + \log K_0$
 C) $\log \sigma \rho = (k/k_0)$ D) $\log \frac{k_Y}{k_0} = \rho * \sigma * + \delta E_S$

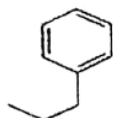
- 100) Predict the product $C_6H_5COCH_3 + MCPBA \rightarrow ?$
 A) $C_6H_5COOCH_3$ B) $C_6H_5OCOCH_3$
 C) C_6H_5COOH D) $C_6H_5CHOHCH_3$
- 101) The product of the following reaction is



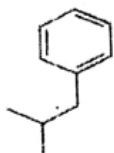
A)



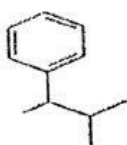
B)



C)



D)



- 102) The voltage for the cell: $Fe/Fe^{2+} (0.001 M) // Cu^{2+} (0.10 M) / Cu$ is 0.807 V at $25^\circ C$.
 What is the value of E° ?
 A) 0.629 V B) 0.689 V C) 0.784 V D) 0.866 V
- 103) What is the ionic strength of 0.15 molal K_2SO_4 ?
 A) 0.45 B) 0.30 C) 0.35 D) 0.25
- 104) A reaction is said to be general base catalysis when it is catalyzed by
 A) H_3O^+ ions B) OH^- ions C) any Bronsted bases D) enzymes
- 105) For the reaction, $4NH_{3(g)} + 5O_{2(g)} + 6H_2O_{(g)}$
 A)

$$+ \frac{1}{6} \frac{\Delta[H_2O]}{dt}$$

B)

$$-\frac{1}{4} \frac{\Delta[\text{NO}]}{dt}$$

C)

$$\frac{1}{5} \frac{\Delta[\text{O}_2]}{dt}$$

D)

$$\frac{1}{4} \frac{d[\text{NH}_3]}{dt}$$

- 106) The time required for 99.9% completion of the reaction is times the time for 50.0% completion
A) 8 B) 10 C) 16 D) 32
- 107) Activation energy E_a = energy difference between and
A) reactants and the activated complex B) products and the “activated complex”
C) activated complex and the transition state
D) threshold energy and the transition state
- 108) The Michaelis-Menten equation is
A) $r = V_{\max} [S] / (k_{-1} + k_2) / k_1[S]$ B) $r = V_{\max} [S] / (k_{-1} + k_2) / k_1 + [S]$
C) $r = V_{\max} [S] + K_m / [S]$ D) $r = r_{\max} [S] K_m / [S]$
109. The sign of ΔH and ΔS for the adsorption process are respectively
A) +ve and -ve B) -ve and +ve C) -ve and -ve D) +ve and +ve
- 110) The reaction given below is an example of



- A) 1, 3- sigmatropic hydrogen shift B) 1, 3-sigmatropic methyl shift
C) 1, 5-sigmatropic hydrogen shift D) 1, 5-sigmatropic methyl shift
111. How many steps involved in Herbatation lesson planning
பாடத்திட்டம் தொடர்புடைய ஹெர்பார்டின் படிநிலைகள் எத்தனை
A) 7 B) 6 C) 8 D) 9
112. Which of the following was established in 1961?
1961-ல் வரைவுபடுத்தப்பட்ட ஒன்று எது?
A) DTERT B) DIET C) NCERT D) NAAC
113. Equality in Education suggested by
A) Sargeant Report B) Kothari Commission
C) Hunter Commission D) UGC
கல்வியில் சமவாய்ப்பு அளித்த கல்விக்குழு
A) சார்ஜண்ட் உடன்படிக்கை B) கோத்தாரி கல்விக்குழு
C) ஹண்டர் குழு D) UGC
114. Sainik School located in the District of
A) Kovai B) Thirupur C) Erode D) Dindugal
சைனிக்பள்ளி அமைந்துள்ள மாவட்டம்
A) கோவை B) திருப்பூர் C) ஈரோடு D) திண்டுக்கல்

115. In which school Widely followed Pestolozzies approach?
 A) Nursery B) Montessori C) Kindergarden D) Anganwadi
 பெஸ்டாலஜியின் அணுகுமுறைகளை பின்பற்றும் பள்ளி எது?
 A) நர்சரி B) மாண்டிசோரி C) கிண்டர்கார்டன் D) அங்கன்வாடி
116. Article 15 (3) mainly insists
 A) Womens Education B) Free Education
 C) Children's Education D) A & C
 அரசியல் சாசன விதி 15(3) கூறுவது
 A) பெண்கல்வி B) இலவச கல்வி
 C) குழந்தைக் கல்வி D) A மற்றும் C
117. Environmental protection Act was passed by the parliament in the year of
 சுற்றுச்சூழல் பாதுகாப்புச் சட்டம் பாராளுமன்றத்தில் நிறைவேற்றப்பட்ட ஆண்டு
 A) 1987 B) 1986 C) 1974 D) 1966
118. A person related to Adult Education
 A) Braille B) Bryson C) Parker D) B & C
 வயது வந்தோர் கல்வியுடன் தொடர்புடையவர்கள்
 A) ப்ரெய்லி B) பிரைசன் C) பர்கர் D) B & C
119. Meaning of Education is
 A) Learning B) Bringout C) Cultivate D) All of these
 கல்வி என்பதன் பொருள்
 A) கற்றல் B) வெளிக் கொணர்தல் C) வளர்ப்பது D) அனைத்தும்
120. Who Invent "Teaching Machine"
 A) Galaxo B) Faulkner C) Glacier D) Sydney pressy
 கற்பித்தல் இயந்திரத்தினை உருவாக்கியவர்
 A) காலக்ஸோ B) பால்க்னர் C) கிளேசியர் D) சிட்னி ப்ரெஸ்ஸி
121. Society Based Educationist
 A) Russell B) Morgan C) Maxwell D) Morne
 சமூகக் கல்வியாளர்
 A) ரஸல் B) மார்கன் C) மாக்ஸ்வெல் D) மார்னே
122. Wastage & stagnation defined by
 A) Kothari Commission B) UGC
 C) Hartog Committee D) Hunter Commission
 கழிவு மற்றும் தேக்கத்தினை வரையறை செய்த கமிட்டி எது?
 A) கோத்தாரி குழு B) UGC
 C) ஹார்டாக் குழு D) ஹண்டர் குழு
123. 'OB' Scheme recommended by
 A) 1965 Policy B) 1991 Policy C) 1986 Policy D) 1979 Policy
 "OB" திட்டத்தினை வெளியிட்ட கல்விக்குழு
 A) 1965 கல்விக்கொள்கை B) 1991 கல்விக்கொள்கை
 C) 1986 கல்விக்கொள்கை D) 1979 கல்விக்கொள்கை
124. Cognitive stages analysed by
 A) Bloom B) Bruner C) Maslow D) Wundt
 அறிவுசார் நிலையினை பகுப்பாய்வு செய்தவர்
 A) புளூம் B) புருனர் C) மாஸ்லோ D) உண்ட்

125. 'Udisha project' means
 A) ICDS training B) NCC C) NRC D) JRC
 “உதிஸ்ஸா திட்டம்” எனப்படுவது
 A) ICDS பயிற்சி திட்டம் B) NCC C) NRC D) JRC
126. IQ Variation 110-119 comes Under
 A) Gifted Persons B) Average Persons C) Genius D) talented Persons
 110—119 நுண்ணறிவு உடையோரின் வகைப்பாடு
 A) மீத்திறன் மிக்கோர் B) சராசரி திறன் படைத்தோர்
 C) மேதைகள் D) திறன் மிக்கோர்
127. Vicerotonia, Cerebrotonia, Somatotonia are of classified by
 A) Sheldon B) Kretchmer C) Carl Jung D) Ogburn
 சுக விருப்பமுள்ள ஆளுமை, சிந்தனை சார் ஆளுமை, செயல்சார் ஆளுமை,
 என வகைப்படுத்தியவர்
 A) ஷெல்டன் B) கிரெட்சுமர் C) காரல்யூங் D) ஆக்பர்ன்
128. “Schizo phrenia” is a kind of defence mechanism
 A) Identification B) Retionalization C) Regression D) Scapogotism
 “ஷிஷோப்ரினியா” என்ன வகையான நடத்தை
 A) ஒன்றுதல் B) காரணம் கற்பித்தல்
 C) பின்னோக்கம் D) பலிகடா ஆக்கப்படுதல்
129. Branch of Psychology is mainly focused Adolescence
 A) Educational Psychology B) General Psychology
 C) Child Psychology D) Growth Psychology
 குமரப்பருவம் பற்றி படிக்கும் உளவியலின் பிரிவு?
 A) கல்வி உளவியல் B) பொது உளவியல்
 C) குழந்தை உளவியல் D) வளர்ச்சி உளவியல்
130. Who told that “Psychology is a Behavior Science”
 A) Mc Doug all B) Watson C) Skinner D) Titchner
 உளவியல் நேர்மறை நடத்தை அறிவியல் என்று கூறியவர்
 A) மக்டூகல் B) வாட்சன் C) ஸ்கினர் D) டிட்சனர்
131. Who Introduced Individual Psychology?
 A) Sigmen Freud B) Jung C) Adler D) Williamson
 தனிநபர் உளவியலை தோற்றுவித்தவர்
 A) சிக்மண்ட் ப்ராய்டு B) யூங் C) ஆடலர் D) வில்லியம் சன்
132. Attention theory formulated by
 A) Ditchner B) Wundt C) Watson D) Hebb
 கவன கோட்பாடு
 A) டிட்சனர் B) உண்ட் C) வாட்சன் D) ஹெப்
133. How many Chromosomes are present in a female germ cell?
 பெண் இனச்செல்லில் காணப்படும் குரோமோசோமின் எண்ணிக்கை
 A) 46 B) 23 C) 23 + 23 D) 46 + 23
134. Physical Growth factor determinate by
 A) Heredity B) Environment
 C) Heredity & Environment D) None of these
 உடல் வளர்ச்சியை தீர்மானிப்பது
 A) மரபு B) சூழ்நிலை C) மரபும், சூழ்நிலையும் D) எதுவுமில்லை

135. How many chromosomes are present in the cells released by meiosis cell division?
 A) 23 Pairs of Chromosome B) 23 Chromosome
 C) 46 Chromosome D) 46 Pairs of Chromosome
 மியாஸிஸ் பகுப்பினால் செல்களில் காணப்படும் குரோமோசோம்களின் எண்ணிக்கை
 A) 23 ஜோடி குரோமோசோம் B) 23 குரோமோசோம்
 C) 46 குரோமோசோம் D) 46 ஜோடி குரோமோசோம்
136. Who had done Kalli kock test
 A) Goddard B) Calvin C) Amala & Kamala D) Cyrillburt & Shankar
 காலிகாக் சோதனை யாரால் செய்யப்பட்டது?
 A) கொட்டர்டு B) கால்வின்
 C) அமலா & கமலா D) சிரில்பர்ட் மற்றும் சங்கர்
137. Moral relativism is Connected to which one of the following developmental stage?
 A) Adolescence B) Old Age C) Childhood D) Pre child hood
 ஒழுக்கம் பற்றிய சார்பு நோக்கம் எப்பருவத்துடன் தொடர்புடையது ?
 A) குமர்ப்பருவம் B) முதிர் பருவம்
 C) குழந்தை பருவம் D) முன் குழந்தைப்பருவம்
138. Inferiority Complex arise from which stage
 A) Adolescence B) 2nd year C) 6th year D) 0-2 years
 தாழ்வுணர்வு நிலை தோன்றுவது
 A) குமர்ப்பருவம் B) 2ம் ஆண்டு
 C) 6 ஆம்ஆண்டு D) 0-2 வயது வரை
139. J.B. Watson proposed type of Emotions
 J.B. வாட்சன் குறிப்பிடுகின்ற மனவெழுச்சிகள்
 A) 2 B) 4 C) 3 D) 5
140. Co operation under which development?
 A) Physical B) Moral C) Social D) Emotional
 ஒத்துழைப்பு எவ்வகை வளர்ச்சி?
 A) உடல்நீதியான B) ஒழுக்க C) சமூக D) மனவெழுச்சி
141. Who is called as father of modern computer
 A. Bill Gakes B. Michael Faraday C. Alexander Fleming D. Charles Babbage
 நவீன கணினியின் தந்தை என அழைக்கப்படுபவர்?
 A) பில் கேட்ஸ் B) மைக்கேல் பாரடே
 C) அலெக்ஸ்சான்டர் பிளமிங் D) சார்லஜ் பாபேஜ்
142. Which of following stacks were created in 1987?
 A. Goa only B. Goa and Arunachal Pradesh
 C. Arunachal Pradesh only D. None of these
 1987-ல் உருவாக்கப்பட்ட மாநிலம்
 A) கோவா மட்டும் B) கோவா மற்றும் அருணாசல பிரதேசம்
 C) அருணாசல பிரதேசம் D) எதுவுமில்லை
143. Which of the following articles makes the super court a court of record?
 கீழ்க்கண்ட எந்த விதி உச்சநீதிமன்றத்தின் பதிவுகளைப் பற்றி கூறுகிறது
 A. 125 B. 127 C. 129 D. 131

144. In which year planning commission was established in India?
திட்டக்கமிஷன் இந்தியாவில் அமைக்கப்பட்ட ஆண்டு
- A. 1950 B. 1952 C. 1951 D. 1949
145. Wimbledon is place associated with of the following sports?
விம்பிள்டன் என்ற இடம் கீழ்க்கண்ட விளையாட்டுக்காக அமைக்கப்பட்டுள்ளது
- A) பேட்மிட்டன் B) கிரிக்கெட் C) டென்னிஸ் D) ஹாக்கி
146. Largest National Park in North east in India is Located at?
வடகிழக்கு இந்தியாவில் உள்ள மிகப் பெரிய தேசிய நூங்கா அமைந்துள்ள மாநிலம்
- A) அஸ்ஸாம் B) மிசோரம் C) அருணாசலப்பிரதேசம் D) நாகலாந்து
147. Where was the First Tamil Sangam held?
முதல் தமிழ்ச் சங்கம் நடைபெற்ற இடம்
- A) தென்மதுரை B) கபாடபுரம் C) காவேரிப்பட்டினம் D) நெல்லை
148. Bhutan does not share its border with which Indian state?
பூடான் நாடு எந்த இந்திய மாநிலத்தின் எல்லையை பகிர்ந்து கொள்ளவில்லை?
- A) மேற்கு வங்காளம் B) அருணாச்சலப்பிரதேசம் C) மேகாலயா D) சிக்கிம்
149. Which of the following is the full form of U.S.S.R?
U.S.S.R—ன் விவரிவாக்கம்?
- A. Union of Soviet Socialist Republics B. Union of Soviet secular Republics
C. Union of secular Soviet Republics D. Union of secular socialist republics
150. What does OS stand for?
OS —ன் விரிவாக்கம்
- A. Operating software B. Operating System
C. Operating status D. Operating supplier

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1	A	26	C	51	A	76	B	101	C	126	D
2	D	27	B	52	D	77	C	102	C	127	A
3	C	28	A	53	D	78	B	103	A	128	C
4	D	29	A	54	A	79	B	104	C	129	C
5	B	30	C	55	B	80	A	105	A	130	B
6	C	31	C	56	B	81	A	106	B	131	C
7	C	32	B	57	C	82	C	107	A	132	D
8	B	33	D	58	C	83	A	108	B	133	B
9	D	34	B	59	B	84	D	109	C	134	A
10	D	35	C	60	A	85	A	110	C	135	B
11	A	36	A	61	C	86	B	111	B	136	A
12	B	37	A	62	C	87	C	112	A	137	A
13	A	38	C	63	D	88	B	113	B	138	C
14	C	39	A	64	C	89	C	114	B	139	C
15	C	40	D	65	D	90	D	115	C	140	C
16	C	41	A	66	A	91	C	116	D	141	D
17	C	42	C	67	C	92	B	117	B	142	B
18	A	43	C	68	B	93	B	118	D	143	C
19	D	44	B	69	B	94	A, D	119	D	144	A
20	C	45	C	70	A	95	C	120	D	145	C
21	B	46	D	71	C	96	A	121	A	146	C
22	B	47	D	72	B	97	D	122	A	147	A
23	C	48	A	73	B	98	C	123	C	148	C
24	B	49	C	74	A	99	B	124	A	149	A
25	D	50	D	75	A	100	B	125	A	150	B