



Paper Code : 19  
CHEMISTRY [Paper-III]

Sr. No. ....

Signature and Name of Invigilator

- (Signature) \_\_\_\_\_  
(Name) \_\_\_\_\_
- (Signature) \_\_\_\_\_  
(Name) \_\_\_\_\_

OMR Sheet No. : .....  
(To be filled by the candidate)

Roll No. 

--	--	--	--	--	--	--	--	--	--

  
(In Figures as per admission card)

Roll No. \_\_\_\_\_  
(In words)

Time : 2½ Hours]

[Maximum Marks : 150

Number of Pages in this Booklet : 16

Number of Questions in this Booklet : 75

**Instructions for the Candidates**

- Write your roll number in the space provided on the top of this page.
- This paper consists of seventy five multiple-choice type of questions.
- At the commencement of examination, the question booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and compulsorily examine it as below :
  - Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Fault booklets due to pages/questions missing or duplicate or not in serial order or any other discrepancy should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given.
  - After this verification is over, the OMR Sheet Number should be entered on this Test Booklet.
- Each item has four alternative responses marked (A), (B), (C) and (D). You have to darken the oval as indicated below on the correct response against each item.  
Example : 

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

  
where (C) is the correct response.
- Your responses to the items are to be indicated in the Answer Sheet given inside the Paper I Booklet only. If you mark at any place other than in the ovals in the Answer Sheet, it will not be evaluated.
- Read instructions given inside carefully.
- Rough Work is to be done in the end of this booklet.
- If you write your name or put any mark on any part of the test booklet, except for the space allotted for the relevant entries, which may disclose your identity, you will render yourself liable to disqualification.
- You have to return the test question booklet and OMR Answer sheet to the invigilators at the end of the examination compulsorily and must not carry it with you outside the Examination Hall.
- Students can take home carbon copy of this OMR answer sheet.
- Use only Blue/Black Ball point pen.
- Use of any calculator or log table etc., is prohibited.
- There is no negative marks for incorrect answers.

**परीक्षार्थियों के लिए निर्देश**

- पहले पृष्ठ के ऊपर नियत स्थान पर अपना रोल नम्बर लिखिए।
- इस प्रश्न-पत्र में पच्चीस बहुविकल्पीय प्रश्न हैं।
- परीक्षा प्रारम्भ होने पर, प्रश्न-पुस्तिका आपको दे दी जायेगी। पहले पाँच मिनट आपको प्रश्न-पुस्तिका खोलने तथा उसकी निम्नलिखित जाँच के लिए दिये जायेंगे, जिसकी जाँच आपको अवश्य करनी है :
  - कवर पृष्ठ पर छपे निर्देशानुसार प्रश्न-पुस्तिका के पृष्ठ तथा प्रश्नों की संख्या की अच्छी तरह जाँच कर लें कि ये पूरे हैं। दोषपूर्ण पुस्तिका जिनमें पृष्ठ/प्रश्न कम हों या दुबारा आ गये हों या सीरियल में न हों अर्थात् किसी भी प्रकार की त्रुटिपूर्ण पुस्तिका स्वीकार न करें तथा उसी समय उसे लौटाकर उसके स्थान पर दूसरी सही प्रश्न-पुस्तिका ले लें। इसके लिए आपको पाँच मिनट दिये जायेंगे। उसके बाद न तो आपको प्रश्न-पुस्तिका वापस ली जायेगी और न ही आपको अतिरिक्त समय दिया जायेगा।
  - इस जाँच के बाद OMR पत्रक की क्रम संख्या इस प्रश्न-पुस्तिका पर अंकित कर दें।
- प्रत्येक प्रश्न के लिए चार उत्तर पत्रक विकल्प (A), (B), (C) तथा (D) दिये गये हैं। आपको सही उत्तर के दीर्घवृत्त को पेन से भरकर काला करना है जैसा कि नीचे दिखाया गया है।  
उदाहरण : 

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

  
जबकि (C) सही उत्तर है।
- प्रश्नों के उत्तर केवल प्रश्न पत्र में अन्दर दिये गये उत्तर-पत्रक पर ही अंकित करने हैं। यदि आप उत्तर पत्रक पर दिये गये दीर्घवृत्त के अलावा किसी अन्य स्थान पर उत्तर चिह्नित करते हैं, तो उसका मूल्यांकन नहीं होगा।
- अन्दर दिये गये निर्देशों को ध्यानपूर्वक पढ़ें।
- कच्चा काम (Rough Work) इस पुस्तिका के अन्तिम पृष्ठ पर करें।
- यदि आप उत्तर-पुस्तिका पर अपना नाम या ऐसा कोई भी निशान करते हैं तो परीक्षा के लिये अयोग्य घोषित कर दिये जायेंगे।
- आपको परीक्षा समाप्त होने पर प्रश्न-पुस्तिका एवं OMR उत्तर-पत्रक निरीक्षक महोदय को लौटाना आवश्यक है और परीक्षा समाप्ति के बाद उसे अपने साथ परीक्षा भवन से बाहर न लेकर जायें।
- परीक्षा समाप्ति पर परीक्षार्थी OMR उत्तर-पत्रक की कार्यन कापी अपने साथ ले जा सकते हैं।
- केवल नीले/काले बाल प्वाइंट पेन का ही इस्तेमाल करें।
- किसी भी प्रकार का संगणक (कैलकुलेटर) या लाग टेबल आदि का प्रयोग वर्जित है।
- गलत उत्तरों के लिए कोई अंक काटे नहीं जायेंगे।

Paper Code : [ 19 ]  
Paper-III [CHEMISTRY]

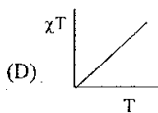
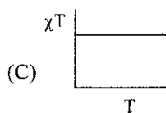
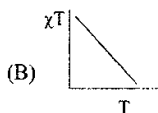
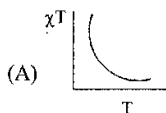
Note : • This paper contains Seventy Five (75) multiple choice questions, each question carrying two (2) marks.

नोट : • इस प्रश्नपत्र में पच्चेत्तर (75) बहुविकल्पीय प्रश्न हैं। प्रत्येक प्रश्न के दो (2) अंक हैं।

- The Lewis acidity of  $\text{BF}_3$  is less than  $\text{BCl}_3$ , even though Fluorine is more electronegative than chlorine. It is due to :  
(A) Stronger  $2p(\text{B}) - 2p(\text{F})$   $\sigma$ -bonding (B) Stronger  $2p(\text{B}) - 2p(\text{F})$   $\pi$ -bonding  
(C) Stronger  $2p(\text{B}) - 3p(\text{Cl})$   $\sigma$ -bonding (D) Stronger  $2p(\text{B}) - 3p(\text{Cl})$   $\pi$ -bonding
- Among the following pentachlorides the one which does not exist due to the "inert-pair effect" is :  
(A)  $\text{PCl}_5$  (B)  $\text{BeCl}_5$   
(C)  $\text{SbCl}_5$  (D)  $\text{AsCl}_5$
- Structurally nickelocene is similar to Ferrocene. Nickelocene attains stability due to the formation of :  
(A) a monocation (B) a dication  
(C) a monoanion (D) a dianion
- Band theory predicts that magnesium is an insulator. However, in practice it acts as a conductor due to :  
(A) Presence of filled 3s orbital  
(B) Overlap of filled 2p and filled 3s orbital  
(C) Overlap of filled 3s and empty 3p orbital  
(D) Presence of unfilled 3p orbital
- Sulphur can exist in four phases. The possible number of triple points is :  
(A) 1 (B) 2  
(C) 3 (D) 4
- $\text{Fe}_3\text{O}_4$  and  $\text{Co}_3\text{O}_4$  are metal oxides having spinel structure. Considering the CFSEs, the correct statement regarding their structure is :  
(A)  $\text{Fe}_3\text{O}_4$  has inverse and  $\text{Co}_3\text{O}_4$  has normal spinel structure  
(B)  $\text{Fe}_3\text{O}_4$  has normal and  $\text{Co}_3\text{O}_4$  has inverse spinel structure  
(C) Both have normal spinel structure  
(D) Both have inverse spinel structure

7. The d-d absorption band of  $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$  is split due to :
- (A) Dynamic Jahn-Teller distortion                      (B) Static Jahn-Teller distortion  
(C) Presence of octahedral geometry                      (D) Presence of trigonal bipyramidal geometry
8. The crystal-field symbol for the ground-state of  $[\text{Mn}(\text{CN})_6]^{4-}$  is :
- (A)  ${}^2T_{2g}$     (B)  ${}^1A_{1g}$   
(C)  ${}^5E_g$     (D)  ${}^6A_{1g}$
9.  $[\text{CoCl}_4]^{2-}$  is a blue colored complex-controlled treatment of this complex with water generates two isomer light pink coloured complexes of composition  $[\text{Co}(\text{H}_2\text{O})_4\text{Cl}_2]$ .  
Identify the correct point groups for  $[\text{CoCl}_4]^{2-}$  and two isomeric complexes  $[\text{Co}(\text{H}_2\text{O})_4\text{Cl}_2]$
- (A)  $D_{4h}$  and ( $C_{2v}$  and  $C_{2h}$ )                                      (B)  $T_d$  and ( $C_{2v}$  and  $D_{4h}$ )  
(C)  $D_{4h}$  and ( $C_{2v}$  and  $D_{4h}$ )                                      (D)  $C_{2v}$  and ( $T_d$  and  $C_{4v}$ )
10. The number of terminal carbonyl groups present in  $\text{Fe}_2(\text{CO})_9$  is :
- (A) 2    (B) 5  
(C) 6    (D) 3
11. A metal Chelate that can be used for separation and quantitative analysis of aluminium ions by gas chromatography is :
- (A) EDTA    (B) Ethylene glycol  
(C) Dinonyl phthalate    (D) Trifluoroacetyl acetone
12. Hemoglobin is an oxygen carrying protein. The correct statement about oxy-hemoglobin is that :
- (A) The metal is low-spin in +3 oxidation state while dioxygen is in  $\text{O}_2^-$  form  
(B) The metal is high-spin in +3 oxidation state while dioxygen is in  $\text{O}_2^-$  form  
(C) The metal is low spin in +3 oxidation state while dioxygen is in neutral form  
(D) The metal is high-spin in +3 oxidation state while dioxygen is in neutral form

13. The plot of  $\chi T$  versus  $T$  (where  $\chi$  is molar magnetic susceptibility and  $T$  is the temperature for a paramagnetic complex which strictly follows Curie equation is) :



14. The IUPAC nomenclature of  $\text{Na}[\text{PCl}_6]$  is :

- (A) Sodium hexachlorophosphine (V)      (B) Sodium hexachlorophosphate (V)  
 (C) Sodium hexachlorophosphine      (D) Sodium hexachlorophosphite (V)

15. An isotope of  $\text{Ge}_{32}^{76}$  is :

- (A)  $\text{Ge}_{32}^{77}$       (B)  $\text{As}_{33}^{77}$   
 (C)  $\text{Se}_{34}^{77}$       (D)  $\text{Se}_{34}^{78}$

16. Which one of the following is the strongest base :

- (A)  $\text{AsH}_3$       (B)  $\text{NH}_3$   
 (C)  $\text{PH}_3$       (D)  $\text{SbH}_3$

17. The set with correct order of acid strength is :

- (A)  $\text{HClO} < \text{HClO}_2 < \text{HClO}_3 < \text{HClO}_4$       (B)  $\text{HClO}_4 < \text{HClO}_3 < \text{HClO}_2 < \text{HClO}$   
 (C)  $\text{HClO} < \text{HClO}_4 < \text{HClO}_3 < \text{HClO}_2$       (D)  $\text{HClO}_4 < \text{HClO}_2 < \text{HClO}_3 < \text{HClO}$

18. The complex ion which has no 'd'-electrons in the central metal ion is :
- (A)  $[\text{MnO}_4]^-$  (B)  $[\text{Co}(\text{NH}_3)_6]^{3+}$   
(C)  $[\text{Fe}(\text{CN})_6]^{3-}$  (D)  $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$
19. The compound having tetrahedral geometry is :
- (A)  $[\text{Ni}(\text{CN})_4]^{2-}$  (B)  $[\text{Pd}(\text{CN})_4]^{2-}$   
(C)  $[\text{PdCl}_4]^{2-}$  (D)  $[\text{NiCl}_4]^{2-}$
20. The complex showing a spin-only magnetic moment of 2.82 B.M is :
- (A)  $\text{Ni}(\text{CO})_4$  (B)  $[\text{NiCl}_4]^{2-}$   
(C)  $\text{Ni}(\text{PPh}_3)_4$  (D)  $[\text{Ni}(\text{CN})_4]^{2-}$
21. Geometrical shapes of the complexes formed by the reaction of  $\text{Ni}^{2+}$  with  $\text{Cl}^-$ ,  $\text{CN}^-$  and  $\text{H}_2\text{O}$  respectively, are :
- (A) Octahedral, tetrahedral and square planar  
(B) Tetrahedral, square planar, and octahedral  
(C) Square planar, tetrahedral, and octahedral  
(D) Octahedral, square planar and octahedral
22. AFM stands for what :
- (A) Atomic force microscopy (B) Atom field microscope  
(C) Argon fill measurement (D) Atom face measurement
23. In FT-IR spectroscopy, the molecule to be FT-IR active should have :
- (A) Permanent dipole moment (B) No dipole moment  
(C) Permanent magnetic moment (D) No magnetic moment
24. Catalytic oxidation of ammonia by passing a mixture of ammonia and air over heated Pt gauze gives :
- (A) NO (B)  $\text{N}_2\text{O}$   
(C)  $\text{N}_2\text{O}_3$  (D)  $\text{N}_2\text{O}_5$

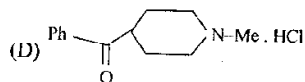
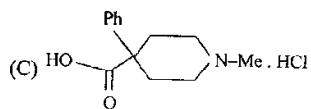
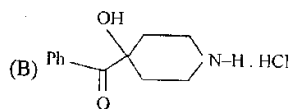
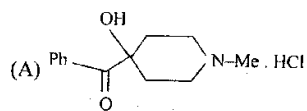
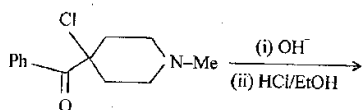
25. Polyphosphates are used as water softening agents because they :

- (A) Form soluble complexes with anionic species
- (B) Precipitate anionic species
- (C) Form soluble complexes with cationic species
- (D) Precipitate cationic species

26. Which of the following carbene is nucleophilic :

- (A)  $\text{MeO}-\ddot{\text{C}}-\text{OMe}$
- (B)  $\text{MeO}-\ddot{\text{C}}-\text{Cl}$
- (C)  $\text{Cl}-\ddot{\text{C}}-\text{Cl}$
- (D)  $\text{Ph}-\ddot{\text{C}}-\text{Cl}$

27. Product in the following reaction will be :



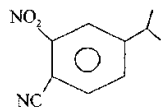
28. Which of the following undergoes solvolysis in methanol most rapidly :

- (A)  $\text{Ph}_3\text{CBr}$
- (B)  $\text{PhCH}_2\text{Br}$
- (C)  $\text{PhCH}_2\text{CH}_2\text{Br}$
- (D)  $\text{PhCH}_2\text{CH}_2\text{CH}_2\text{Br}$

29.  $\beta$ -sheet found in a protein can be considered an example of :

- (A) Primary structure (B) Tertiary structure  
(C) Quaternary structure (D) Secondary structure

30. The correct name of the following compound is :



- (A) ortho-isopropyl-nitro benzocyan (B) 4-isopropyl-2-nitro-benzonitrile  
(C) 4-isopropyl-2-nitro-cyano-benzene (D) 1-cyano-4-isopropyl-2-nitrobenzene

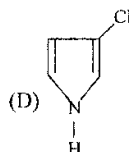
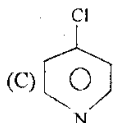
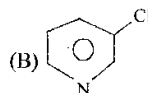
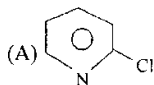
31. Which of the following is the same as the tropylium ion :

- (A) Cyclopentadienyl cation (B) Cyclopentadienyl anion  
(C) Cycloheptatrienyl anion (D) Cycloheptatrienyl cation

32. What is the major difference between an antiaromatic and aromatic compound :

- (A) Aromatic compounds cannot have a charged atom in the structure.  
(B) Anti-aromatic compound can assume a chair like structure while aromatic compounds are nearly flat.  
(C) Only aromatic compounds follow Huckle's rule.  
(D) Antiaromatic compounds have atleast one  $Sp^3$  hybridized atom in the ring.

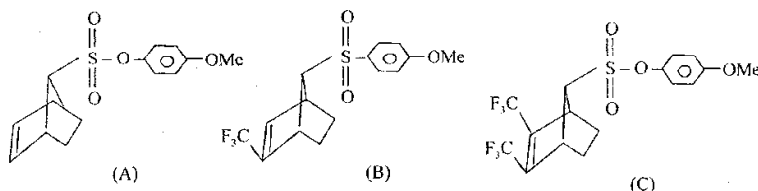
33. Reaction of dichlorocarbene with pyrrole yields :



34. 2-methyl butanal and 3-methyl butanal can be differentiated by MS. Which of the following statement is correct :

- (A) Both 2-methyl butanal and 3-methyl butanal undergoes Mc Lafferty rearrangement and gives base peak at  $m/z$  58 and  $m/z$  44 respectively.
- (B) Only 2-methyl butanal undergoes Mc Lafferty rearrangement and gives base peak at  $m/z$  58.
- (C) Only 3-methyl butanal undergoes Mc Lafferty rearrangement and gives base peak at  $m/z$  44.
- (D) Both 2-methyl butanal & 3-methyl butanal does not undergo Mc Lafferty rearrangement.

35. The correct order of hydrolysis of following norbornane system is :

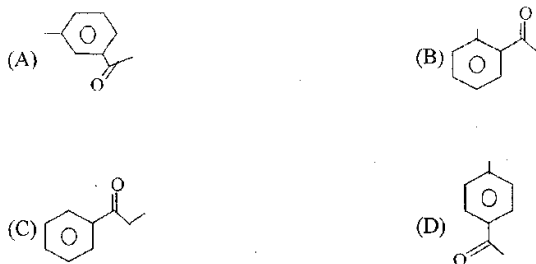


- (A)  $C > B > A$
- (B)  $B > A > C$
- (C)  $A > B > C$
- (D)  $C > A > B$

36. An organic compound with MF  $C_9H_{10}O$  shows following spectral data; IR ( $Cm^{-1}$ ) : 1700;

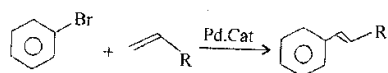
$^1H$  NMR : 2.35 (s, 3H), 2.55 (s, 3H), 7.17 (d,  $J = 8H_z$ , 2H), 7.74 (d,  $J = 8H_z$ , 2H).

The possible structure of the compound is :



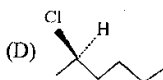
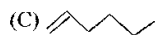
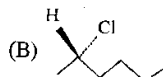
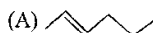
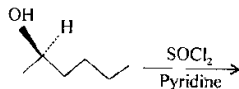


37. Following reaction is known as :

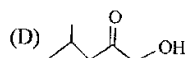
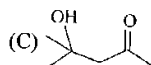
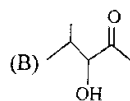
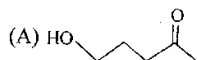


- (A) Sonogashira coupling  
(B) Suzuki coupling  
(C) Heck reaction  
(D) Stille coupling
38. Which of the following reaction involves nitrene as an intermediate :
- (A) Wolf rearrangement  
(B) Curtius rearrangement  
(C) Simmons-Smith reaction  
(D) Corey-Fuchs reaction
39. In the  $\alpha$ -helix the hydrogen bonds :
- (A) are roughly parallel to the axis of the helix.  
(B) are roughly perpendicular to the axis of the helix.  
(C) occur only between some of the amino acids of the helix.  
(D) occur only near amino and carboxyl termini of the helix.
40. A mixture of toluene, benzoic acid and phenol was dissolved in diethyl ether and extracted with 5% NaHCO<sub>3</sub> solution. This extract was acidified until a white crystalline compound appeared. The compound is :
- (A) Toluene  
(B) Aniline  
(C) Phenol  
(D) Benzoic acid
41. The reason that the chemical shift for an alkynic hydrogen atom is upfield from an alkene hydrogen atom is that :
- (A) The alkyne carbon has a greater relative electronegativity due to the fact that it is sp hybridized.  
(B) There are two  $\pi$  bonds for resonance in the alkyne versus only one pi bond in the alkene.  
(C) The anisotropic effect of the triple bond shields the alkyne hydrogen atoms whereas the anisotropic effect of the double bond deshields the alkene hydrogen atom.  
(D) It is more acidic than alkene hydrogen.

42. The major product of the following reaction will be :



43. Which of the following compounds is the product of an aldol condensation reaction :



44. Match the followings :

Column A

Column B

(A) Wilkinson's catalyst

(i)  $(i\text{-Pr})_2\text{N}^+\text{Li}^-$

(B) DDQ

(ii)  $\text{RhCl}[\text{Ph}_3\text{P}]_3$

(C) Prevoist reagent

(iii) 2,3-dichloro-5,6-dicyano-1,4-benzoquinone

(D) LDA

(iv) Mixture of Ag salt an acid and iodine

(A) A  $\rightarrow$  ii ; B  $\rightarrow$  iii ; C  $\rightarrow$  iv ; D  $\rightarrow$  i

(B) A  $\rightarrow$  iii ; B  $\rightarrow$  ii ; C  $\rightarrow$  i ; D  $\rightarrow$  iv

(C) A  $\rightarrow$  i ; B  $\rightarrow$  ii ; C  $\rightarrow$  iii ; D  $\rightarrow$  iv

(D) A  $\rightarrow$  iv ; B  $\rightarrow$  iii ; C  $\rightarrow$  ii ; D  $\rightarrow$  i

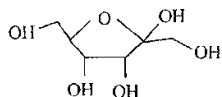
45. Camphor is used as a :

- (A) Moth repellent and preservative properties
- (B) It has no physiological activity
- (C) Used as a pain killer
- (D) Used as an antipsychotic drug

46. Match the following :

Column A	Column B
(A) Hantzsch reaction	(i) Oxime synthesis
(B) Pictet-Spengler reaction	(ii) isoquinoline synthesis
(C) Bischler-Napieralski reaction	(iii) 2-Methyl quinoline synthesis
(D) Barton reaction	(iv) Pyrrole synthesis
(A) A → iv ; B → iii ; C → ii ; D → i	(B) A → i ; B → ii ; C → iii ; D → iv
(C) A → ii ; B → iii ; C → i ; D → iv	(D) A → iv ; B → ii ; C → i ; D → iii

47. Which descriptors fit the following sugar best :



- (A) ketose, furanose,  $\alpha$
  - (B) ketose, furanose,  $\beta$
  - (C) aldose, pyranose,  $\beta$
  - (D) aldose, pyranose,  $\alpha$
48. Which is a meso compound :
- (A) (2R, 3R)-2, 3-Dibromobutane
  - (B) (2R, 3S)-2, 3-Dibromopentane
  - (C) (2R, 4R)-2, 4-Dibromopentane
  - (D) (2R, 4S)-2, 4-Dibromopentane
49. Presence of a sulfur atom in an organic compound can be confirmed by :
- (A)  $^1\text{H}$  NMR
  - (B) MS
  - (C) IR
  - (D) UV

50. Histamine is a derivative of :
- (A) imidazole (B) pyridine  
(C) purine (D) pyrrole
51. If the estimated uncertainty in reading a calibrated buret is  $\pm 0.02$  mL. We call this as :
- (A) Absolute uncertainty (B) Error  
(C) Random Error (D) Relative uncertainty
52. The point group of  $\text{BCl}_3$  molecule is :
- (A)  $C_{2v}$  (B)  $C_{3v}$   
(C)  $D_{3h}$  (D)  $C_3$
53. For the term symbol  $3D_0$  the values of J will be :
- (A)  $3D_{\frac{3}{2}}$  (B)  $3D_1, 3D_2, 3D_3$   
(C)  $3D_{\frac{3}{2}}, 3D_{\frac{5}{2}}$  (D)  $3D_0$
54. The compressibility factor of a Vanderwaal's gas at the critical state is :
- (A)  $\frac{3}{8}$  (B)  $\frac{8}{3}$   
(C)  $\frac{3}{27}$  (D)  $\frac{8}{27}$
55. If  $e^{\alpha x}$  is an eigen function and  $\frac{d^n}{dx^n}$  is an operator then the eigen value will be :
- (A)  $\alpha^n$  (B)  $\alpha$   
(C)  $n$  (D)  $n^\alpha$
56. An electron is confined to a one-dimensional box,  $1\text{\AA}$  in extension, its ground state energy will be :
- (A)  $6.024 \times 10^{-18}$  J (B)  $6.024 \times 10^{-24}$  J  
(C)  $6.024 \times 10^{-26}$  J (D)  $6.024 \times 10^{-16}$  J

57. For a rigid rotator the rotational constant "B" for a diatomic molecule will be :

(A)  $B = \frac{h^2}{8\pi^2 I} \text{ cm}^{-1}$

(B)  $B = \frac{h}{8\pi I} \text{ cm}^{-1}$

(C)  $B = \frac{h}{8\pi^2 I} \text{ cm}^{-1}$

(D)  $B = \frac{h^2}{8\pi I^2} \text{ cm}^{-1}$

58. The force constant of the bond in HCl can be calculated using :

(A)  $K = 4\pi^2 \bar{\omega}_e^2 C^2 \mu$

(B)  $K = 4\pi^2 \bar{\omega}_e C \mu$

(C)  $K = 4\pi \bar{\omega}_e^2 C \mu$

(D)  $K = 4\pi^2 \bar{\omega}_e^2 C^2 \mu^2$

59. For a CO<sub>2</sub> molecule, how many modes of Vibrations are active in Raman Spectra ?

(A) Two

(B) Three

(C) One

(D) Zero

60. If  $\Delta G = 0$  for a reaction, then :

(A)  $\Delta H = 0$

(B)  $\Delta S = 0$

(C)  $K$  (equilibrium constant) = 0

(D)  $K = 1$

61. If each letter of the word "MOLECULE" is written separately on each card and shuffled.

What will be the probability of obtaining the word molecule :

(A)  $8!$

(B)  $\frac{1}{8}!$

(C) 8

(D)  $8^8$

62. Among the following, which one is the path function :

(A) Energy, Enthalpy

(B) Free energy, Entropy

(C) Heat, work

(D) Work, Entropy

63. System A is 1 mole of ice at  $-10^{\circ}\text{C}$  and system B is 1 mole of super-cooled water at  $-10^{\circ}\text{C}$ .  
Choose the correct statement :
- (A) A has greater Vapour pressure than B  
 (B) A has greater free energy than B  
 (C) A has lower free energy than B  
 (D) Both A and B have the same free energy
64. The origin of intermolecular attraction in Helium gas is :
- (A) Dipole-induced dipole attraction  
 (B) Dipole-dipole attraction  
 (C) Instantaneous dipole – induced dipole attraction  
 (D) Induced dipole–induced dipole attraction
65. Indicate which of the following function is acceptable as wave function :
- (A)  $\psi = x^2$  (B)  $\psi = e^{-x^2}$   
 (C)  $\psi = \tan x$  (D)  $\psi = x$
66. The unit of Vanderwaal's constant "a" is :
- (A)  $\text{lit.atm.mole}^{-2}$  (B)  $\text{lit.atm. mole}^{-1}$   
 (C)  $\text{dm}^3.\text{atm. mole}^{-2}$  (D)  $\text{dm}^6.\text{atm. mole}^{-2}$
67. Standard deviation can be calculated using :
- (A)  $s = \frac{\sum(xi - \bar{x})^2}{n-1}$  (B)  $s = \sqrt{\frac{\sum(xi - \bar{x})^2}{n-1}}$   
 (C)  $s = \sqrt{\frac{\sum(xi - \bar{x})^2}{n-1}}$  (D) None of the above
68. Faraday's laws of electrolysis are related to the :
- (A) Atomic number of cation (B) Atomic number of anion  
 (C) Equivalent weight of the electrolyte (D) Speed of the cation

69. 15.0 grams of pure acetic acid, (mol.wt. = 60), dissolved in water and made up to a litre. The concentration of the solution will be :
- (A) 0.25 F (B) 0.25 M  
(C) 0.25 m (D) 0.25 N
70. In the reaction  $A + B \rightarrow \text{Product}$ , keeping [A] constant if [B] is doubled, rate becomes double and keeping [B] constant if [A] is doubled, the rate becomes four times. The order of reaction is :
- (A) 1 (B) 2  
(C) 3 (D) 4
71. When a weak electrolyte is diluted, what happens to the equivalent conductance :
- (A) Decreases with dilution (B) Remains unchanged  
(C) Increases on dilution (D) None of the above
72. Cell emf :
- (A) Does not depend upon temperature (B) Varies linearly with temperature  
(C) Decreases with increase in temperature (D) Varies exponentially with temperature
73. The number of Bravais lattices are :
- (A) 7 (B) 14  
(C) 231 (D) 32
74. For a Tetragonal crystal system :
- (A)  $a = b = c, \alpha = \beta = \gamma \neq 90^\circ$  (B)  $a = b \neq c, \alpha = \beta = 90^\circ \neq \gamma = 120^\circ$   
(C)  $a = b = c, \alpha = \beta = \gamma = 90^\circ$  (D)  $a = b \neq c, \alpha = \beta = \gamma = 90^\circ$
75. Calomel electrode is used in :
- (A) Conductometric titrations (B) Red-ox potentiometric titrations  
(C) Acid-base potentiometric titrations (D) Volumetric titrations