Signature of Invigilators

1. .....

2. .....

Roll No. | | | | | |

(In figures as in Admit Card)

CHEMICAL SCIENCE

Paper II

Roll No. .....

.....

(In words)

D—0302

Name of the Areas/Section (if any) .....

Time Allowed : 75 Minutes] [Maximum Marks : 100

Instructions for the Candidates

1. Write your Roll Number in the space provided on the top of this page.
2. This paper consists of *fifty* **(50)** multiple choice type questions. *All* questions are compulsory.
3. Each item has upto four alternative responses marked (A), (B), (C) and (D). The answer should be a capital letter for the selected option. The answer letter 'A' should entirely be contained within the corresponding square.

   Correct method [A] Wrong Method [A] or [A]
4. Your responses to the items for this paper are to be indicated on the ICR Answer Sheet under paper II only.
5. Read instructions given inside carefully.
6. One sheet is attached at the end of the booklet for rough work.
7. You should return the test booklet to the invigilator at the end of paper and should not carry any paper with you outside the examination hall.

પરીક્ષાર્થીઓ માટે સૂચનાઓ :

૧. આ પૃષ્ઠના ઉપલા ભાગે આપેલી જગ્યામાં તમારી ક્રમાંક સંખ્યા (રોલ નંબર) લખો.

૨. આ પ્રશ્નપત્રમાં **૫૦ (પચાસ)** બહુવૈકલ્પિક ઉત્તરોવાળા પ્રશ્નો છે. **બધા જ** પ્રશ્નોના ઉત્તરો આપવા ફરજિયાત છે.

૩. પ્રત્યેક વિગતના (A), (B), (C) અને (D) એવા ચાર સંભવિત ઉત્તરો આપવામાં આવ્યા છે. તમે સ્વીકારેલા વિકલ્પનો ઉત્તર કેપિટલ (પહેલી એબીસીડી) અક્ષરમાં આપવાનો રહેશે.તમારા ઉત્તર આપેલા ચોરસમાં સરખી રીતે લખવા.

   સાચી પદ્ધતિ : [A] ખોટી પદ્ધતિ : [A] , [A]

૪. આ પ્રશ્નપત્રના ઉત્તરો આઈસીઆરના ઉત્તરપત્રકમાં Paper II ની નીચે લખવાના રહેશે.

૫. અંદર આપેલી સૂચનાઓ ધ્યાનથી વાંચો.

૬. આ ઉત્તરપોથીને અંતે આપેલું પૃષ્ઠ કાચા કામ માટે છે.

૭. પ્રશ્નપત્ર લખાઈ રહે એટલે આ ઉત્તરપોથી તમારા નિરીક્ષકને આપી દેવી. પરીક્ષાખંડની બહાર કોઈપણ પ્રશ્નપત્ર લઈ જવું નહીં.

CHEMICAL SCIENCE

Paper II

Note :—This paper contains *fifty* (**50**) multiple-choice questions, each question carrying **two** (**2**) **marks**. Attempt *all* the questions.

1. The standard deviation of a population is given by :

   (A) $\sqrt{\frac{\Sigma(X_i - \bar{X})^2}{N - 1}}$ (B) $\sqrt{\frac{\Sigma(X_i - \bar{X})^2}{N}}$

   (C) $\frac{X - \mu}{\sigma}$ (D) $\frac{\Sigma X_i - \bar{X}}{N}$

2. 0.50 mg of precipitate is lost during washing with 200 ml of wash liquid. If the precipitate weighs 500 mg, the relative error due to solubility loss is :

   (A) 0.001 (B) 0.01

   (C) 0.10 (D) 1.00

3. The suspect value from the data can be retained if the difference (d) between the mean and suspect value is :

   (A) $< 2.5\,d$ (B) $> 2.5\,d$

   (C) $> 3\,d$ (D) $= 3.5\,d$

4. The number of peaks observed in ESR spectrum of divalent Mn (At. No. = 25) is :

   (A) 5 (B) 4

   (C) 6 (D) 2

5. The median for the following data is :

   19.4, 19.5, 19.6, 19.8, 20.1, 20.2

   (A) 20.1 (B) 19.8

   (C) 19.7 (D) 19.6

6. For which of the following atomic orbitals, XY-plane is *not* a nodal plane ?

   (A) p_z (B) d_{z^2}

   (C) d_{xz} (D) d_{yz}

7. In PCl_5 molecule :

(A) all the P—Cl bonds are equivalent

(B) axial bonds are longer than equatorial bonds

(C) axial bonds are shorter than equatorial bonds

(D) all the Cl—P—Cl bond angles are equivalent

8. Electronic configuration of NO molecule is :

(A) $(\sigma_{1s})^2\ (\sigma_{1s}^*)^2\ (\sigma_{2s})^2\ (\sigma_{2s}^*)^2\ (\pi_{2p})^4\ (\sigma_{2p})^2\ (\pi_{2p}^*)^1$

(B) $(\sigma_{1s})^2\ (\sigma_{1s}^*)^2\ (\sigma_{2s})^2\ (\sigma_{2s}^*)^2\ (\sigma_{2p})^2\ (\pi_{2p})^4\ (\pi_{2p}^*)^1$

(C) $(\sigma_{1s})^2\ (\sigma_{1s}^*)^2\ (\sigma_{2s})^2\ (\sigma_{2s}^*)^2\ (\sigma_{2p})^2\ (\pi_{2p})^2\ (\pi_{2p}^*)^3$

(D) $(\sigma_{1s})^2\ (\sigma_{1s}^*)^2\ (\sigma_{2s})^2\ (\sigma_{2s}^*)^2\ (\sigma_{2p})^2\ (\pi_{2p})^4$

9. In ICl_2^- ion, the lone pairs are lying in equatorial plane, because :

(A) *s* character of iodine along equatorial bonds is greater

(B) *s* character of iodine along axial bonds is greater

(C) *p* character of iodine along equatorial bonds is greater

(D) *p* character of iodine along axial bonds is greater

10. The H—C—H bond angles in ethane is :

(A) greater than 109.45°

(B) equal to 109.45°

(C) lesser than 109.45°

(D) equal to 120°

11. The point group of $[CoF_6]^{4-}$ ion is :

(A) O_h (B) C_{4v}

(C) D_{4h} (D) C_{2v}

12. Solubility of $MgCl_2$ is less than $BaCl_2$ in water, because :

(A) In $BaCl_2$, lattice energy is less

(B) In $MgCl_2$, lattice energy is less

(C) In $BaCl_2$, lattice energy is more

(D) In $BaCl_2$, hydration energy is less

13. IUPAC name of $[CoCl(NO_2)(NH_3)_4]Cl$:

(A) tetramine chloronitrocobalt (III) chloride

(B) tetramine chloronitrocobalt (I) chloride

(C) tetrakis amino chloronitrocobalt (III) chloride

(D) nitrochloro tetramine cobalt (III) chloride

14. The most important mineral for isolation of Pb is :

(A) Galena (B) Anglesite

(C) Cerussite (D) Pyromorphite

15. The geometry of $K_4[Co(F)_6]$ is :

(A) tetragonally compressed octahedral

(B) tetragonally elongated octahedral

(C) regular octahedral

(D) square planar

16. The complex $[Co(en)_3]^{3+}$ is :

(A) paramagnetic with four unpaired electrons

(B) diamagnetic

(C) paramagnetic with three unpaired electrons

(D) paramagnetic with one unpaired electron

17. In $KMnO_4$, the color is due to :

(A) *d-d* transition

(B) ligand-to-metal charge transfer transition

(C) metal-to-ligand charge transfer transition

(D) interligand charge transfer transition

18. In metal carbonyls, the carbonyl ligand is :

(A) σ-donor ligand

(B) better σ-donor and poor π-acceptor ligand

(C) poor σ-donor and better π-acceptor ligand

(D) same σ-donor and π-acceptor abilities

19. The ground state of $[CrF_6]^{3-}$ is :

(A) $4T_{1g}(P)$ (B) $4A_{2g}(F)$

(C) $4T_{2g}(F)$ (D) $4T_{1g}(F)$

20. The number of unpaired electrons in $(NH_4)_2[NiCl_4]$ is :

(A) 0 (B) 2

(C) 3 (D) 4

21. $(CH_3)_3CMgBr$ on reaction with D_2O produces :

(A) $(CH_3)_3CD$ (B) $(CH_3)_3COD$

(C) $(CD_3)_3CD$ (D) $(CD_3)_3COH$

22. How many optically active stereoisomers are possible for 1, 2-dihydroxy-2-methyl pentane ?

(A) One (B) Two

(C) Three (D) Four

23. The following proton nmr spectrum of an organic compound :

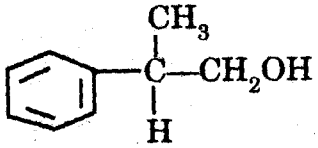
δ 7.2 (5H, singlet)

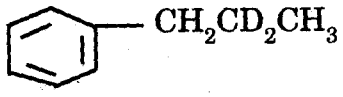
δ 2.3 (2H, triplet)

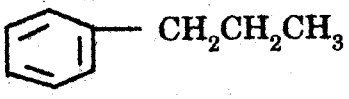
δ 1.3 (2H, multiplet)

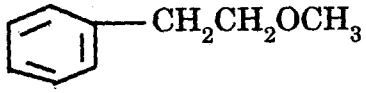
δ 0.9 (3H, triplet)

indicates that the compound is :

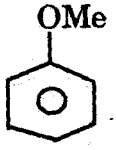
(A) 

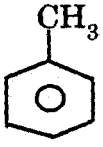
(B) 

(C) 

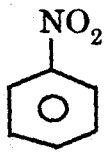
(D) 

24. The most reactive substrate towards Br_2 in the presence of $FeBr_3$ is :

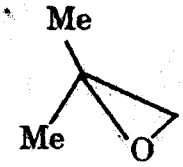
(A) 

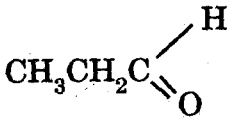
(B) 

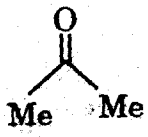
(C) 

(D) 

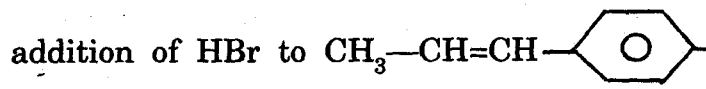
25. Which of the following compounds will react with isopropyl magnesium bromide followed by water to give 2, 4-dimethyl pentan-2-ol ?

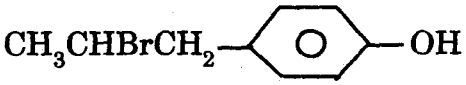
(A) 

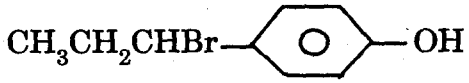
(B) 

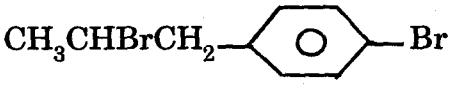
(C) 

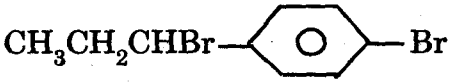
(D) 

26. The ionic addition of HBr to  will give :

(A) 

(B) 

(C) 

(D) 

27. When butamide is heated with Br_2 in alkali it gives :

(A) $CH_3CH_2CH_2Br$ (B) $CH_3CH_2NH_2$

(C) $CH_3CH_2CH_2COOH$ (D) $CH_3CH_2CH_2NH_2$

28. Which of the following compounds will exhibit geometrical isomerism ?

(A) 1-phenyl-2-butene (B) 3-phenyl-1-butene

(C) 2-phenyl-1-butene (D) 1, 1-diphenyl-1-propene

29. Which of the following compounds has the most acidic hydrogen ?

(A) 3-hexanone (B) 2, 4-hexanedione

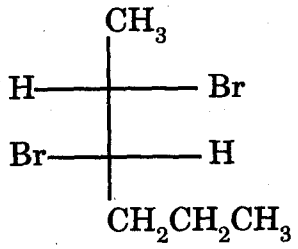
(C) 2, 5-hexanedione (D) 2, 3-hexanedione

30. Trans-cyclohexane-1, 2-diol can be obtained by the reaction of cyclohexene with :

(A) 2, 4-dinitrobenzoic acid (B) $KMnO_4$

(C) OsO_4 (D) 2, 4-dinitro perbenzoic acid

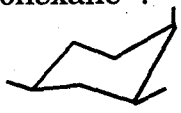
31. The configuration at C_2 and C_3 of the compound given below is :



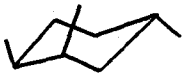
(A) 2R, 3S (B) 2S, 3R

(C) 2R, 3R (D) 2S, 3S

32. Which of the following stereostructures corresponds to cis, cis-1, 2, 4-trimethyl cyclohexane ?

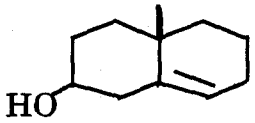
(A) 

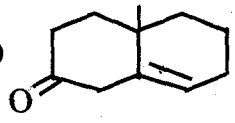
(B) 

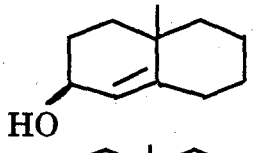
(C) 

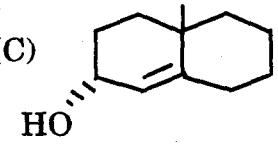
(D) 

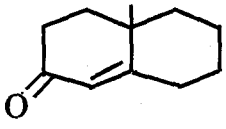
33. The given compound on Oppenauer oxidation will give :



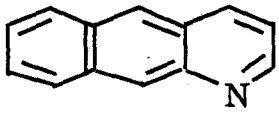
(A) 

(B) 

(C) 

(D) 

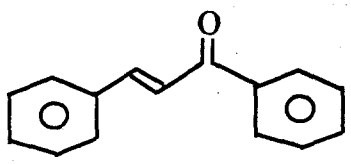
34. The IUPAC name of the given molecule is :



(A) 1-aza anthracene (B) naphtho [2, 3-b] pyridine

(C) benzo [g] quinoline (D) 4-aza anthracene

35. The intense absorption band at 1680 cm^{-1} for the following α, β-unsaturated ketone :



is due to :

(A) n, π^* transition of >= O group

(B) π, π^* transition of aromatic rings

(C) vibrational stretching of >= O group

(D) both n, π^* and π, π^* excitation of the >= O group

36. Consider a 1 component system. The maximum number of phases that can exist together in equilibrium is :

(A) 3 (B) 2

(C) 4 (D) 1

37. The point symmetry group of 1, 3, 5-trifluorobenzene is :

(A) C_{3v} (B) C_{3h}

(C) D_{3h} (D) C_{6v}

38. A cubic crystal system possesses :

(A) 4 threefold axes (B) 4 fourfold axes

(C) only one fourfold axis (D) only one threefold axis

39. The 'limit' of Lyman series ($n = 1 \rightarrow \infty$) is 109677 cm^{-1}. That of the Balmer series ($n = 2 \rightarrow \infty$) in cm^{-1} is :

(A) 109677/2 (B) 109677/4

(C) 10966 × 2 (D) 109677 × 4

40. Which of the following pairs have identical bond orders ?

(A) N_2 and O_2 (B) N_2 and O_2^-

(C) NO and N_2^+ (D) NO and O_2^+

41. The number of components in 0.1 N solution of acetic acid is :

(A) 1 (B) 2

(C) 3 (D) ∞

42. The SI unit of force constant is :

(A) Nm (B) N^2m

(C) Nm^{-1} (D) N^2m^{-1}

43. The heats of combustion of graphite and diamond are -393.51 and -395.40 kJ mol^{-1} respectively. The enthalpy change of the reaction

graphite $\rightarrow$ diamond

under identical conditions is (in kJ mol^{-1}) :

(A) -788.91 (B) 788.91

(C) -1.89 (D) 1.89

44. The pH concept was given by :

(A) Ostwald (B) Arrhenius

(C) Lowry (D) Sorensen

45. The oxidation number of sulphur in $Na_2S_2O_3$ is :

(A) +2 (B) +3

(C) 0 (D) −2

46. The pH of a buffer solution made of equal concentrations of weak acid and its salt will be :

(A) 7 (B) less than 7

(C) between 7 and 8 (D) between 8 and 9

47. An element has the electronic configuration $1s^2 2s^2 2p^6 3s^2 3p^2$. It will exhibit a valency of :

(A) +2 (B) −2

(C) +4 (D) −4

48. The molar enthalpy change during the neutralization of dilute solutions of a strong acid with strong base is constant and equal to :

(A) 1.987 kcal (B) −13.6 kcal

(C) 0.082 kcal (D) 13.6 kcal

49. Radioactive decay has the order of reaction equal to :

(A) 0 (B) 2

(C) 1 (D) 1.5

50. The scattering of light by vibrating molecules gives :

(A) IR spectra (B) UV spectra

(C) NMR spectra (D) Raman spectra

ROUGH WORK

ROUGH WORK

SEAL