JEE-MAIN
MODEL GRAND TEST

Time : 3 hrs] [Number of questions : 90

PHYSICS

1. Order of magnitude of density of Uranium nucleus is, $\left[m_p = 1.67\times10^{-27}\,kg\right]$

1) $10^{20}\,kg/m^3$ 2) $10^{17}\,kg/m^3$ 3) $10^{14}\,kg/m^3$ 4) $10^{11}\,kg/m^3$

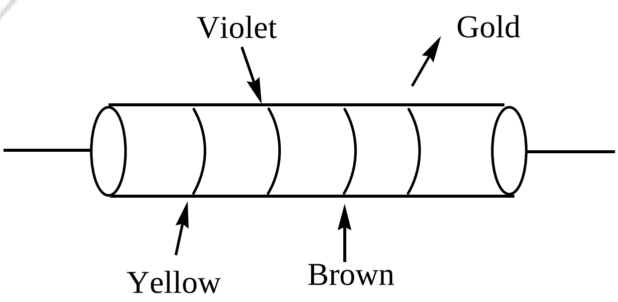
2. A circular plate of radius $\frac{R}{2}$ is cut from one edge of a thin circular plate of radius R of mass M. The moment of inertia of the remaining portion about an axis passing through centre and perpendicular to plane of the original plate is

1) $\frac{11}{24}\mathrm{MR}^2$ 2) $\frac{7}{12}\mathrm{MR}^2$ 3) $\frac{13}{32}MR^2$ 4) $\frac{5}{7}MR^2$

3. Each division on the main scale is 1mm. Which of the following vernier scales give least count equal to 0.01 mm?

1) 9mm divided into 10 divisions 2) 90 mm divided into 100 divisions
3) 99 mm divided into 100 divisions 4) 9 mm divided into 100 divisions

4. The figure shows a colour- coded resistor , the resistance of this resistor is



1) $52\times10^3 \pm 20\%\ \Omega$ 2) $47\times10^1 \pm 5\%\ \Omega$
3) $53\times10^6 \pm 10\%\ \Omega$ 4) $42K\,\Omega \pm 10\%\,\Omega$

5. Two photons having same frequency moving in same medium must have
1) Same linear momenta and same wavelengths
2) Same linear momenta and same speeds
3) Same energies and same speed
4) Same energies and same linear momenta

6. Which of the following pairs have same dimensions?

A) $\frac{L}{R}, CR$ B) LR and CR C) $\frac{L}{R}$ and $\sqrt{LC}$ D) CR and $\frac{L}{LC}$

1) A and C 2) B and D 3) A and D 4) A only

7. An U tube of uniform bore of cross- sectional area A is set up vertically with open ends up. A liquid of mass M and density d is poured into it. The liquid column will oscillate with a period

1) $2\pi\sqrt{\frac{M}{g}}$ 2) $2\pi\sqrt{\frac{MA}{dg}}$ 3) $2\pi\sqrt{\frac{M}{Adg}}$ 4) $2\pi\sqrt{\frac{M}{2Adg}}$

8. The ratio of the adiabatic modulus to the isothermal bulk modulus of a perfect gas with f degrees of freedom is

1) $\frac{2}{f}$ 2) $1+\frac{1}{f}$ 3) $1+\frac{2}{f}$ 4) $1+\frac{f-1}{4}$

9. In an experiment with post office box, the ratio arms are 1000: 10, If the values of third resistance is 999Ω, the unknown resistance is

1) 3.33Ω 2) 1.11Ω 3) $9.99\ \Omega$ 4) $4.44\ \Omega$

10. In germanium the energy gap is about 0.75 eV. The wavelength of light which germanium starts absorbing is (nearly)

1) $5000A^0$ 2) $1650A^0$ 3) $16500A^0$ 4) $165000A^0$

11. A parallel plate condenser of capacity 200 pF is connected to 230 V of AC supply of 600 rad/sec frequency. The rms value of displacement current is

1) $6.9\mu A$ 2) $27.6\mu A$ 3) $9.2\mu A$ 4) $4.6\mu A$

12. If K.E. of free electron doubles. then the ratio of final to the initial de-Broglie wavelength is

1) $1/\sqrt{2}$ 2) $\sqrt{2}$ 3) $1/2$ 4) 2

13. If the ratio of the concentration of electrons to that of holes in a semiconductor is $\frac{7}{5}$ and the ratio of currents is $\frac{7}{4}$ then what is the ratio of their drift velocities?

1) $\frac{4}{7}$ 2) $\frac{5}{8}$ 3) $\frac{4}{5}$ 4) $\frac{5}{4}$

14. The focal lengths of objective and eyepiece of an astronomical Telescope are 2m and 5 cm respectively, final image is formed at i) infinity and ii) the minimum distance of distinct vision D = 25 cm. The magnifying power of telescope in the two cases will be

1) $-40;-32$ 2) $-48;-32$ 3) $-48;-40$ 4) $-40;-48$

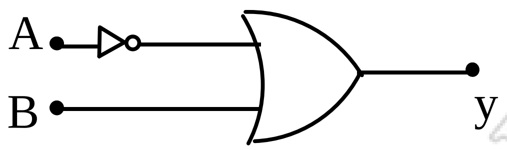
15. It takes 10 minutes to cool a liquid from 61ºC to 59ºC If room temperature is 30ºC , then time taken in cooling from 51ºC to 49ºC is

1) 10 minutes 2) 11 minutes 3) 13 minutes 4) 15 minutes

16. An ammeter gives full scale deflection when a current of 2A flows through it. The resistance of ammeter is 12Ω . If the same ammeter is to be used for measuring a maximum current of 5A, then ammeter must be connected with a resistance of

1) 18Ω in parallel 2) 8Ω in parallel 3) 18Ω in series 4) 8Ω in series

17. What is the Boolean equation for the logic gate shown



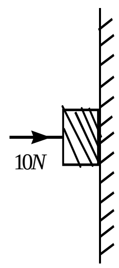
1) $y = A + \overline{B}$ 2) $y = \overline{A + B}$ 3) $y = \overline{A} + B$ 4) $y = \overline{A} + \overline{B}$

18. A boy playing on the roof of a 10m high building throw a ball with a speed of $10\,\text{ms}^{-1}$ at an angle of 30^0 with the horizontal. How far away from the throwing point will the ball be, at the same height of 10 m from the ground ?

$$\left[g = 10\ ms^{-2}, \sin 30^0 = \frac{1}{2}, \cos 30^0 = \frac{\sqrt{3}}{2} \right]$$

1) 8.66 m 2) 5.20 m 3) 4.33 m 4) 2.60 m

19. A horizontal (and perpendicular to the wall) force of 10 N is necessary to just hold a block stationary against a vertical wall. The coefficient of friction between the block and the wall is 0.2. Weight of the block is:



1) 2 N 2) 20 N 3) 50 N 4) 100 N

20. An ideal gas with pressure P, volume V and temperature T is expanded isothermally to a volume 2V and final pressure P_1 . The same gas is expanded adiabatically to a volume 2V and the final pressure P_2 . In terms of the ratio of the two specific heats γ for the gas, the ratio $\frac{P_1}{P_2}$ is:

1) 2^{γ} 2) 2γ 3) $2^{1-\gamma}$ 4) $2^{\gamma-1}$

21. The lengths of two open organ pipes are ℓ and $(l+\Delta l)$ respectively. Neglecting end correction, the frequency of beats will be (ν =velocity of sound in air)

1) $\frac{v\Delta l}{2l^2}$ 2) $\frac{v}{2\Delta l^2}$ 3) $\frac{v}{4l}$ 4) $\frac{v}{2\Delta l}$

22. For the structural analysis of crystal, X-rays are used because

1) X-rays have wavelength of the order of inter atomic spacing
2) X-rays are highly penetrating radiations
3) Wavelength of X-rays is of the order of nuclear size
4) X-rays are coherent radiations.

23. A $3\mu F$ capacitor is charged to a potential of 300 V and a $2\mu F$ capacitor is charged to 200 V. The capacitors are then connected in parallel with plates of opposite polarity joined together. What amount of charge will flow through the connecting wire when the plates are so connected?

1) $1300\mu C$ 2) $700\ \mu C$ 3) $250\mu C$ 4) $600\mu C$

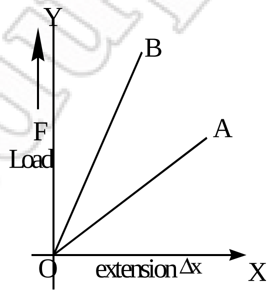
24. The susceptibility is positive and very large for

1) Ferromagnetic substance 2) Diamagnetic substance
3) Paramagnetic substance 4) Non magnetic substance

25. In Bohr's model hydrogen atom, the single electron rotates around the nucleus in a circle of radius of 53×10^{-12} m making 6.6×10^{15} revolutions each second. What is the magnetic field at the centre?

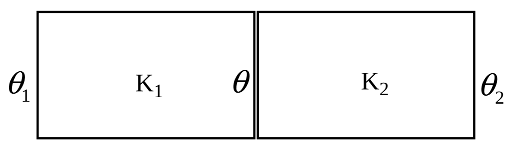
1) 7 tesla 2) 9 tesla 3) 12.5 tesla 4) 11 tesla

26. Two wires A and B of same length are made of same material. The figure represents the load F versus extension Δx graphs for the two wires. Then



1) The cross sectional area of A is greater than that of B
2) The elasticity of B is greater than that of A
3) The cross sectional area of B is greater than that of A
4) The elasticity of A is greater than that of B

27. Two rods having thermal conductivity in the ratio of 5: 3 and having equal length and equal cross-section are joined face to face as shown. If temperature of free-end of first rod is 100^0C and the free end of second rod is 20^0C, then calculate the temperature of junction



1) 50^0 C 2) 70^0 C 3) 85^0 C 4) 100^0 C

28. A soap bubble (surface tension T) is charged to a surface charge density σ. If the pressure inside the bubble is equal to outside in equilibrium, the radius of the bubble is given by

1) $\frac{\sigma^2}{8\varepsilon_0 T}$ 2) $\frac{8\varepsilon_0 T}{\sigma^2}$ 3) $\frac{\sigma}{\sqrt{8\varepsilon_0 T}}$ 4) $\frac{\sqrt{8\varepsilon_0 T}}{\sigma}$

29. A block is kept on a smooth inclined plane of angle of inclination 30^0 that moves with a constant acceleration so that the block does not slide relative to the inclined plane. Let F_1 be the contact force between the block and the plane. Now the inclined plane stops and let F_2 be the contact force between the two in this case. Then F_1 / F_2 is

1) 1 2) $\frac{4}{3}$ 3) 2 4) $\frac{3}{2}$

30. Three discs, A, B and C having radii 2m, 4m and 6m respectively are coated with carbon black on their outer surfaces. The wavelengths corresponding to maximum intensity are 300 nm, 400 nm, and 500 nm respectively. The power radiated by them are Q_A, Q_B, and Q_C respectively. Then

1) Q_A is maximum 2) Q_B is maximum 3) Q_C is maximum 4) $Q_A = Q_B = Q_C$

MATHEMATICS

31. If $|z-1|+|z+3| \le 8$ then the range of values of $|z-4|$ is (z is a complex number in the argand plane)

1) (0 , 8) 2) $[0,8]$ 3) $[1,9]$ 4) $[5,9]$

32. The value of $\sum_{K=1}^{n}(n-k)\cos\frac{2k\pi}{n}(n \ge 3)$ is

1) $-\frac{n}{2}$ 2) 0 3) $\frac{n}{2}$ 4) $-n$

33. Let $g(x)=\frac{f(x)}{x+1}$ where $f(x)$ is differentiable on [0, 5] such that $f(0)=4, f(5)=-1$. There exists $c \in (0,5)$ such that $g'(c)$ is

1) $-\frac{1}{6}$ 2) $\frac{1}{6}$ 3) $-\frac{5}{6}$ 4) -1

34. If $4x^4+9y^4=64$ then the maximum value of x^2+y^2 is (where x and y are real)

1) $\frac{4}{\sqrt{3}}$ 2) $\frac{4}{3}\sqrt{13}$ 3) $\frac{32}{3}$ 4) $\frac{32}{13}$

35. A chord of the circle $x^2+y^2-4x-6y=0$ passing through origin subtends an angle $\tan^{-1}(7/4)$ at the point where the circle meets positive y-axis, then equation of the chord is

1) $2x+3y=0$ 2) $x+2y=0$ 3) $x-2y=0$ 4) $2x-3y=0$

36. The number of points of extremum of the function $f(x)=(x-2)^{2/3}(2x+1)$ is

1) 1 2) 0 3) 2 4) 3

37. **Statement-I :-** Let the vector $\bar{a} = \hat{i} + \hat{j} + \hat{k}$ be vertical. The line of greatest slope on a plane with normal $\bar{b} = 2\hat{i} - \hat{j} + \hat{k}$ is along the vector $\hat{i} - 4\hat{j} + 2\hat{k}$.

Statement-II:- If $\bar{a}$ is vertical then the line of greatest slope on a plane with normal $\bar{b}$ is along the vector $(\bar{a} \times \bar{b}) \times \bar{b}$

1) Both Statement - 1 and Statement - 2 are true and Statement - 2 is the correct explanation of Statement - 1
2) Both Statement - 1 and Statement - 2 are true but Statement - 2 is not the correct explanation of Statement - 1
3) Statement - 1 is true, Statement - 2 is false
4) Statement - 1 is false, Statement - 2 is true

38. The probability that the triangle formed by choosing any three vertices from the vertices of a cube is equilateral is

1) $\frac{3}{7}$ 2) $\frac{6}{7}$ 3) $\frac{4}{7}$ 4) $\frac{1}{7}$

39. Let $A = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}$, $X = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$, $Y = \begin{bmatrix} y_1 \\ y_2 \end{bmatrix}$ (X^1, Y^1 denote the transpose of X and Y)

Statement-I:- If A is symmetric then $X^1AY = Y^1AX$ for each pair of
Statement-II:- for each pair of then A is symmetric

1) Both Statement - 1 and Statement - 2 are true and Statement - 2 is the correct explanation of Statement - 1
2) Both Statement - 1 and Statement - 2 are true but Statement - 2 is not the correct explanation of Statement - 1
3) Statement - 1 is true, Statement - 2 is false
4) Statement - 1 is false, Statement - 2 is true

40. Consider the following relations

$R = \{(x, y) / x, y$ are real numbers and $x = wy$ for some rational number $w\}$

$S = \left\{\left(\frac{m}{n}, \frac{p}{q}\right)\right\}$ m,n,p,q are integers such that $n.q \neq 0$ and $qm = pn\}$

Statement I:- S is an equilvalence relation but R is not an equivalence relation

Statement II:- R and S both are symmetric

1) Both Statement - 1 and Statement - 2 are true and Statement - 2 is the correct explanation of Statement - 1
2) Both Statement - 1 and Statement - 2 are true but Statement - 2 is not the correct explanation of Statement - 1
3) Statement - 1 is true, Statement - 2 is false
4) Statement - 1 is false, Statement - 2 is true

41. $\int \frac{x^2-1}{(x^2+1)\sqrt{x^4+1}}dx =$

1) $\sec^{-1}\left(\frac{x^2+1}{\sqrt{2}x}\right)+c$

2) $\frac{1}{\sqrt{2}}\sec^{-1}\left(\frac{x^2+1}{\sqrt{2}x}\right)+c$

3) $\frac{1}{\sqrt{2}}\sec^{-1}\left(\frac{x^2+1}{\sqrt{2}}\right)+c$

4) None

42. Let $I_1 = \int_0^1 \frac{e^x}{1+x}dx$ and $I_2 = \int_0^1 \frac{x^2}{e^{x^3}(2-x^3)}dx$ then =

1) $\frac{3}{e}$ 2) $\frac{e}{3}$ 3) 3e 4) $\frac{1}{3e}$

43. If $\sum_{i=1}^{18}(x_i-8)=9$ and $\sum_{i=1}^{18}(x_i-8)^2=45$ then the standard deviation of the observations $x_1, x_2, ...x_{18}$ is

1) 4/9 2) 9/4 3) 3/2 4) 2/3

44. The distance of the point (1,2,3) from the plane x+y+z=11 measured parallel to the line $\frac{x+1}{1}=\frac{y-12}{-2}=\frac{z-7}{2}$ *is*

1)5 2) 10 3)15 4)20

45. The diameter of the circle having the pair of lines $x^2+2xy+3x+6y=0$ as its normals and having the size just sufficient to contain the circle x(x-4)+y(y-3)=0 is

1)10 2)15 3)7 4)11

46. The point of intersection of two tangents to the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$, the product of whose slopes is c^2, lies on the curve,

1) $y^2-b^2=c^2(x^2+a^2)$

2) $y^2+b^2=c^2(x^2-a^2)$

3) $x^2+b^2=c^2(x^2-a^2)$

4) $y^2-a^2=c^2(x^2+a^2)$

47. If f(x) is the solution of the equation $\frac{dy}{dx}=-2x(y-1)$ *with* $f(0)>1$, *then* $\underset{x\to\infty}{Lt} f(x)$ is

1) 0 2) 2 3) 1 4) doesn't exist.

48. Length of the normal chord of the parabola $y^2=4x$ which makes an angle of $\frac{\pi}{4}$,with the x-axis is

1) 8 2) $8\sqrt{2}$ 3)4 4) $4\sqrt{2}$

49. $\underset{x\to\infty}{Lt}\frac{x^n}{e^x}=0$ (n is an integer) for

1) no value of n

2) all values of n

3)only negative values of n

4)only positive values of n

50. Statement -1: $f : A \to B$ *and* $g : B \to C$ are any functions then $(gof)^{-1} = f^{-1}og^{-1}$

Statement-2: $f : A \to B$ *and* $g : B \to C$ are bijections then f^{-1}, g^{-1} are also bijections

1) Statement -I , Statement -II are correct, Statement -II is correct explanation to Statement -I

2) Statement -I, Statement -II are correct, Statement -II is not correct explanation to Statement - I

3) Statement -I is true, Statement -II is false

4) Statement -I is false, Statement -II is true

51. The sum of all the non-real roots of $(x^2 + x - 2)(x^2 + x - 3) = 12$ is

1)1 2) -1 3) 6 4) -2

52. **Statement 1 :** The equation $\sin x + x\cos x = 0$ has at least one root in the interval $(0, \pi)$

Statement II : Between any two roots of f(x) = 0 there exists atleast one root of $f'(x) = 0$

1) Statement -1 is true , Statement -2 is true; Statement -2 is a correct explanation for statement -1

2) Statement -1 is true , Statement -2 is true; Statement -2 is not correct explanation for statement -1

3) Statement -1 is true , statement – 2 is false

4) Statement -1 is false , statement – 2 is true

53. If LCM of p,q is $r^2t^4s^2$ where r,s,t are prime numbers and p,q are positive integers . Then the number of ordered pairs (p,q) is

1) 252 2) 254 3) 225 4)224

54. Statement – 1: The sum of the first 30 terms of the sequence 1,2,4,7,11,16,22,29,37,46...is 4520

Statement – 2: The successive differences of the terms of the sequence form an AP

1) Statement -1 is true , Statement -2 is true; Statement -2 is a correct explanation for statement -1

2) Statement -1 is true , Statement -2 is true; Statement -2 is not correct explanation for statement -1

3) Statement -1 is true , statement – 2 is false

4) Statement -1 is false , statement – 2 is true

55. Let $f(x) = \max\{x, x^3\}$ $x \in R$ the set of points where f(x) is not differentiable is

1) {–1,1} 2) [–1,0} 3) {0,1} 4) {–1,0,1}

56. $\sum_{r=1}^{n} \tan^{-1}\left(\frac{1}{2r^2}\right) =$

1) $\tan^{-1}n$ 2) $\tan^{-1}\frac{n}{n+1}$ 3) $\tan^{-1}\frac{n}{n+2}$ 4) $\tan^{-1}\left(\frac{n+1}{n+2}\right)$

57. The statement $p \to (q \to p)$ is equivalent to

1) $p \to (p \to q)$ 2) $p \to (p \vee q)$ 3) $p \to (p \wedge q)$ 4) $p \to (p \leftrightarrow q)$

58. The remainder left out when $8^{2n} - (62)^{2n+1}$ is divisible by 9 (where $n \in N$)

1) 0 2) 2 3) 7 4) 8

59. Consider all functions that can be defined from the set A = {1,2,3} to the set B = {1,2,3,4,5}. A function f(x) is selected at random from these functions. The probability that, selected function satisfies $f(i) \leq f(j)$ for $i < j$, is equal to

1) $\frac{6}{25}$ 2) $\frac{7}{25}$ 3) $\frac{2}{5}$ 4) $\frac{12}{25}$

60. $\int_0^{\pi}[\cot x]dx =$ (where [.] denotes the greatest integer function)

1) $\frac{\pi}{2}$ 2) 1 3) -1 4) $-\frac{\pi}{2}$

CHEMISTRY

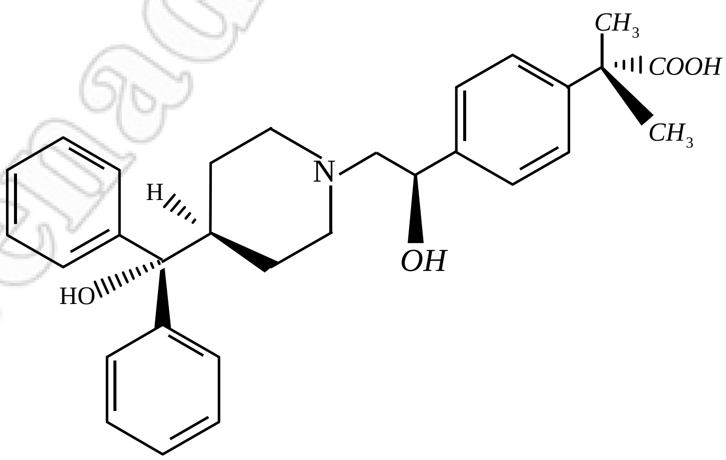
61. Which of the following statement is wrong regarding CH_2F_2

1) It has perfect tetrahedral structure
2) All bond angles are equal
3) All the hybrid orbitals have same s and p character
4) All are wrong

62. The interplanar distance between the closest packed layers in the face-centered cubic unit cell is

1) equal to the edge length
2) equal to the half the edge length
3) equal to the one third of body diagonal
4) equal to the half of face diagonal.

63. Allegra, a common prescription drug with the structure shown below, is given for the treatment of seasonal allergies. How many stereogenic carbon does allegra possess ?



1) 2 2) 1 3) 3 4) 5

64. The maximum number of angles between bond pair of electrons is observed in

1) dsp^3 hybridization
2) sp^3d^2 hybridization
3) dsp^2 hybridization
4) sp^3d hybridization

65. An electron is allowed to move freely in a closed cubic box of length of side 10 cm. The minimum uncertainty in its velocity will be:

1) $3.33\times10^{-4} m\sec^{-1}$ 2) $5.8\times10^{-4} m\sec^{-1}$ 3) $4\times10^{-5} m\sec^{-1}$ 4) $4\times10^{-6} m\sec^{-1}$

66. Arrange the following compounds in the order of increasing tendency to undergo electrophilic substitution

1) Nitrobenzene 2) Benzene 3) Phenol 4) Toluene

5) Trimethyl phenyl ammonium ion

1) 5<1<2<4<3 2) 3>2>1>4>5 3) 1>2>5>3>4 4)5<2<4<1<3

67. Which of the bonding conversions show minimum energy release

1) $C \rightarrow C^-$ 2) $H \rightarrow H^-$ 3) $O \rightarrow O^-$ 4) $F \rightarrow F^-$

68. For a real gas PV > RT at all pressure ranges, then :

1) The gas is less compressible 2) The gas is highly compressible

3) The gas is not compressed at all 4) The gas is liquefied easily

69. $CaC_2 + H_2O \rightarrow (A) \xrightarrow{H_2SO_4, HgSO_4} (B)$ Then A and B are

1) CH_4 and HCOOH 2) C_2H_4 and CH_3COOH 3) C_2H_2 and CH_3CHO 4) C_2H_2 and CH_3COOH

70. Which of the following is diamagnetic ?

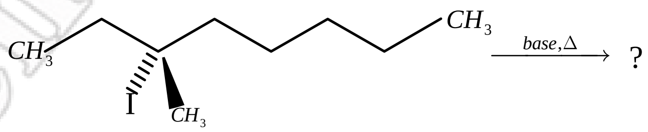
1) $\left[Fe(H_2O)_5(NO)\right]^{2+}$ 2) $\left[Fe(CN)_5(NO)\right]^{3-}$

3) $\left[Fe(CN)_5(NO)\right]^{2-}$ 4) $\left[Fe(H_2O)_5(NO)\right]^{3+}$

71. 20 ml of an H_2O_2 solution on reaction with excess of acidified $KMnO_4$ released 224 CC of O_2. What is the volume strength of that H_2O_2 ?

1) 5.6 vol 2) 11.2 vol 3) 22.4 vol 4) 2.8 vol

72. How many distinct alkene products are possible when the alkyl iodide below undergoes E2 elimination ?



1) 1 2) 2 3) 3 4) 5

73. The false statement among the following is

1) Metallic or interstitial hydrides can be considered as solid solutions

2) Hydrogen can be purified by occlusion process

3) H-H bond length is longer than D-D bond length and thus D_2 has more bond energy than H_2

4) High pure hydrogen is obtained by the electrolysis of warm $Ba(OH)_2$ solution

74. $I_2(S)/I^-(0.1M)$ half cell is connected to a H^+ (aq)/ H_2 (1bar)/Pt half cell and emf is found to be 0.7714V. If $E^0_{I_2/I^-} = 0.535V$, find the P^H of H^+/H_2 half cell.

1) 5 2) 3 3) 4 4)6

75. In the reaction sequence $Glycerol \xrightarrow{KHSO_4/\Delta} X \xrightarrow{Zn-Hg/conc HCl/\Delta} Y \xrightarrow{NBS/CCl_4} Z$ Z will be

1) 1,2-dibromopropane
2) 1-bromopropane
3) 2-bromopropane
4) 3-bromopropene

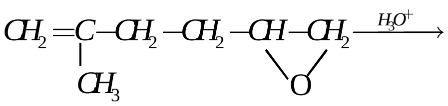
76. The wrong statement among the following is

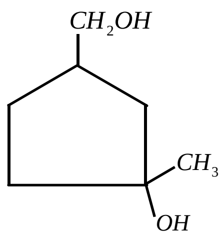
1) With nitrogen lithium forms nitride but sodium forms azide
2) with sodium carbonate $FeSO_4$ gives basic iron (II) carbonate precipitate but $FeCl_3$ gives reddish brown $Fe(OH)_3$ precipitate
3) Magnesium chloride gives white precipitate with Na_2CO_3 but not with $NaHCO_3$ in cold condition
4) Enthalpies of alkali metal chlorides decreases down the group77.

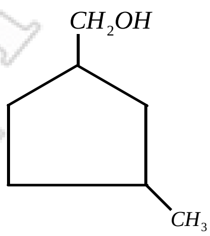
77. Equivalent conductivity of $BaCl_2, H_2SO_4$ and HC*l*. are x_1, x_2 and x_3 $S-cm^{-1}-eq^{-1}$ at infinite dilution. If conductivity of saturated $BaSO_4$ solution is x $S-cm^{-1}$, then K_{sp} of $BaSO_4$ is

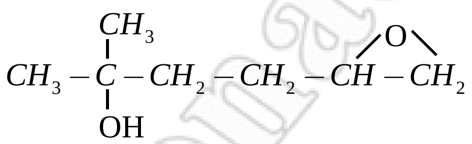
1) $\dfrac{500x}{(x_1+x_2-2x_3)^2}$
2) $\dfrac{2.5\times10^5 x^2}{(x_1+x_2-2x_3)^2}$
3) $\dfrac{10^6 x^2}{(x_1+x_2-2x_3)^2}$
4) $\dfrac{0.25x^2}{(x_1+x_2-x_3)^2}$

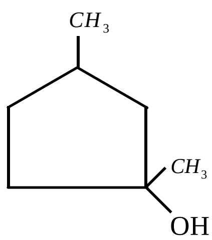
78. The major product of the reaction,


will be

1) 

2) 

3) 

4) 

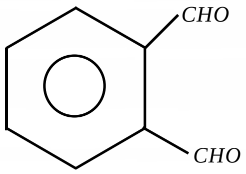
79. Among $(CH_3)_3 N \rightarrow O$ and $(CH_3)_3 P \rightarrow O$

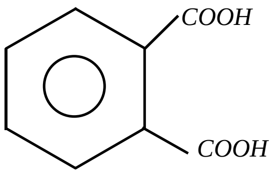
1) $N \rightarrow O$ bond has more dipole moment than $P \rightarrow O$
2) $N \rightarrow O$ bond is stronger than $P \rightarrow O$ bond
3) $N \rightarrow O$ bond is shorter than $P \rightarrow O$ bond
4) Amine oxides $(R_3N \rightarrow O)$ are more stable than phosphine oxides $(R_3P \rightarrow O)$

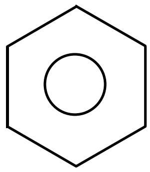
80. Bredig's arc method cannot be used for the preparation of colloidal sol of :

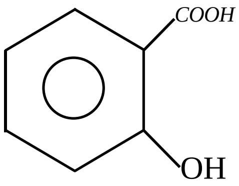
1) copper
2) gold
3) silver
4) sodium

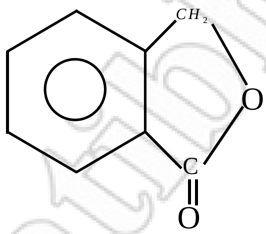
81. Identify the product in the following reaction:

 $\xrightarrow[2H^{+}/\Delta]{1.con.NaOH}$

1) 

2) 

3) 

4) 

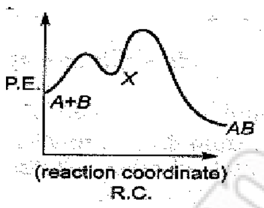
82. The molecule with zero dipole moment is

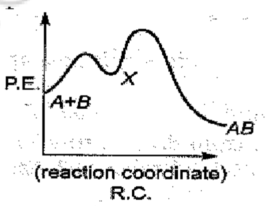
1) ClF_3 2) $Br\,F_5$ 3) IF_7 4) ClF

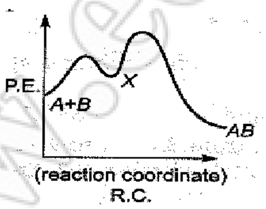
83. For an exothermic chemical process occurring in two steps as follows

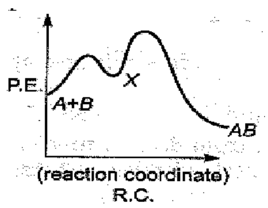
$(i)\,A+B \rightarrow X\,(slow)$ $(ii)\,X \rightarrow AB\,(fast)$

The process of reaction can be best describe by

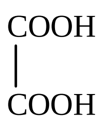
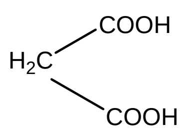
1) 

2) 

3) 

4) 

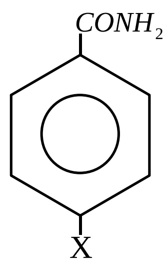
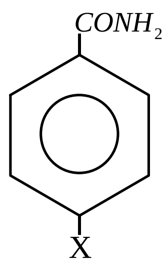
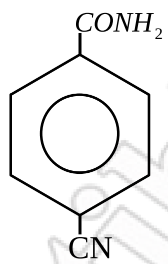
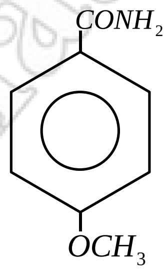
84 Which of the following is most acidic.

1)  2)  3) CH_3COOH 4) HCOOH

85. An element of 3d-transition series shows two oxidation states x and y, differ by two units. Then
1) compounds in oxidation state x are ionic if $x > y$
2) compounds in oxidation state x are ionic if $x < y$
3) oxidation state has no relation to the nature of bond
4) compounds in oxidation state y are covalent is $y < x$

86. The molal elevation constant of water is $0.52 K\ kg mol^{-1}$. The boiling point of 1.0 molal aqueous KCl solution (assuming complete dissociation of KCl), should be
1) $98.96°C$ 2) $100.52°C$ 3) $101.04°C$ 4) $107.01°C$

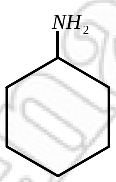
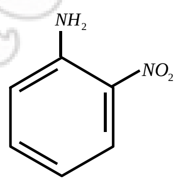
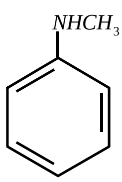
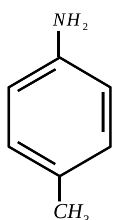
87. Which of the following can undergo Hoffmann reaction most easily?

1) 
2) 
3) 
4) 

88. In which of the following the impure metal is not purified by the oxidation of impurities
1) silver containing lead
2) preparation of wrought iron from pig iron
3) zinc containing iron and cadmium
4) bessemerisation of pig iron

89. For a particular reversible reaction at temperature T, ΔH and ΔS were found be both + ve. If T_e is the temperature at equilibrium, the reaction would non-spontaneous when
1) $T = T_e$ 2) $T_e > T$ 3) $T_e < T$ 4) T_e is 2 times T

90. The correct order of decreasing base strength among the amines given is


(I)

(II)

(III)

(IV)

1) III>I>IV>II
2) IV>III>I>II
3) I>IV>III>II
4)I>III>IV>II

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MODEL GRAND TEST PAPER - I

KEY SHEET

PHYSICS :

1) 2	2) 3	3) 3	4) 2	5) 3	6) 1	7) 4	8) 3	9) 3	10) 3
11) 2	12) 1	13) 4	14) 4	15) 4	16) 2	17) 3	18) 1	19) 1	20) 4
21) 1	22) 1	23) 4	24) 1	25) 3	26) 3	27) 2	28) 2	29) 2	30) 2

MATHEMATICS :

1) 3	2) 1	3) 3	4) 2	5) 3	6) 3	7) 4	8) 4	9) 2	10) 3
11) 2	12) 3	13) 3	14) 3	15) 2	16) 2	17) 3	18) 2	19) 2	20) 4
21) 2	22) 3	23) 3	24) 4	25) 4	26) 2	27) 2	28) 2	29) 2	30) 4

CHEMISTRY :

1) 4	2) 3	3) 2	4) 2	5) 1	6) 1	7) 2	8) 1	9) 3	10) 3
11) 1	12) 4	13) 3	14) 2	15) 4	16) 4	17) 2	18) 1	19) 1	20) 4
21) 4	22) 3	23) 3	24) 1	25) 2	26) 3	27) 4	28) 3	29) 3	30) 4

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MODEL GRAND TEST PAPER - I

HINTS & SOLUTIONS

PHYSICS

1. Nuclear density is of the order of 10^{17}kg / m^3
2. Use parallel axes theorem

$$I_{rem} = I_{tot} - I_{removed}, I_{rem} = \frac{MR^2}{2} - \left[\frac{MR^2}{32} + \frac{MR^2}{16}\right]$$

3. $L.C = 1MSD - 1VSD = 1mm - \frac{99}{100}mm$
4. follow color coding Table
5. Momentum is a vector quantity. Photons may move in opposite directions
6. Verify dimensions
7. $T = 2\pi\sqrt{\frac{L}{2g}}, L = \frac{M}{Ad}$
8. $\gamma = 1 + \frac{2}{f}$
9. $\frac{P}{Q} = \frac{1000}{10} = 100$

   The third resistance $R = 999\Omega$

   Let 'X' be the unknown resistance Applying formula

   $\frac{P}{Q} = \frac{R}{X}$

   $X = \frac{P}{Q}(R) = \frac{1}{100}(999) = 9.99\Omega$

10. $E = 12400/\lambda$
11. $i_d = V_{rms}\,\omega\, C$

    $= 230 \times 600 \times 200 \times 10^{-12} = 27.6\ \mu A$

12. Using $\lambda = \frac{h}{\sqrt{2km}}$ *we find* $\lambda\,\alpha\,\frac{1}{\sqrt{k}}$
13. Using $v_d\ \alpha \frac{1}{n}$ *we get* $\frac{\upsilon_{de}}{\upsilon_{dh}} = \frac{l_e}{l_h} \times \frac{n_h}{n_e} = -\frac{7}{4} \times \frac{5}{7} = \frac{5}{4}$

14. 1) $M=\frac{-f_0}{f_e}=\frac{-200}{5}=-40$

2) for distinct vision

$$M=\frac{-f_0}{f_e}\left(1+\frac{f_e}{D}\right)$$

$$M=-40\left(1+\frac{5}{25}\right)$$

$$M=-40\left(\frac{6}{5}\right)=-48$$

15. $$\frac{d\theta}{dt}=k\left(\frac{\theta_1+\theta_2}{2}-\theta_s\right)$$

$$\frac{30}{20}=\frac{2}{10}\times\frac{x}{2}$$

16. Using $S=\frac{I_g}{I-I_g}G, we\ get\ =\frac{2}{5-2}\times 12=8\Omega$

Shunt is used in parallel.

17. From basic knowledge.

18. (1) Here $R=\frac{u^2\sin 2\theta}{g}=\frac{(10)^2\sin 60^0}{10}=5\sqrt{3}=8.66m.$

19. (1) Here frictional force is equal to the weight of the body.

$F_f=W=mg$

$\mu R=mg=W \qquad W=0.2\times 10=2N.$

20. (4) Since A is expanded isothermally, then $PV=P_1 2V \quad or \quad P_1=\frac{P}{2}$

Again since gas is expanded adiabatically.

$\therefore PV^\gamma=P_2(2V)^\gamma \quad or \quad P_2=\frac{P}{2^\gamma}$

So, $\frac{P_1}{P_2}=\frac{2^\gamma}{2}=2^{\gamma-1}$

21. (1) The frequency of beats for two open organ pipes ae given as $n_1=\frac{v}{2l}$ and $n_2=\frac{v}{2(l+\Delta l)}$

Therefore, beats frequency $n=n_1-n_2$

$$=\frac{v}{2l}-\frac{v}{2(l+\Delta l)}=\frac{v}{2}\left[\frac{l+\Delta l-l}{l(l+\Delta l)}\right]=\frac{v}{2}\frac{\Delta l}{l(l+\Delta l)}=\frac{v\Delta l}{2l^2}$$

22. (1) The diffraction of X-rays can take place only when spacing between two adjacent planes is of the order of wavelength of X-rays. It happens so in case of crystals. So, X-rays are used for structural analysis of crystals.

23. (4) The capacitance of first capacitor $C_1 = 3\mu F$
The capacitance of second capacitor $C_2 = 2\mu F$
Voltage across first capacitor $V_1 = 300V$
Voltage across second capacitor $V_2 = 200V$
In parallel combination, charge across first capacitor $q_1 = C_1V_1 = 3\times300 = 900\ \mu C$
Charge across second capacitor $q_2 = C_2V_2 = 2\times200 = 400\ \mu C$
Therefore, total charge in circuit $q = q_1 + q_2 = 900 + 400 = 1300\ \mu C$
and common voltage is 100 V, so the charge flow through the connecting wire is $600\mu C$

24. (1) Susceptibility of ferromagnetic substance is very high and positive

25. (3) The frequency f the electron $= 1.6\times10^{15}$ / sec

$$\therefore i = \frac{charg\,e\,on\,electron(q)}{time(t)}$$

= charge (q) $\times$ frequency of electorn (v)

$= 6.6\times10^{-19}\times6.6\times10^{15} = 1.06\times10^{-3}$ amp

Now magnetic filed at the centre is

$$B = \frac{\mu_0 i}{2R} = \frac{4\pi\times10^{-7}\times1.06\times10^{-3}}{2\times53\times10^{-12}} = 12.5 \text{ tesla}$$

26. $$\mathrm{Y} = \frac{\mathrm{F/A}}{\Delta\mathrm{x}/\ell} \Rightarrow \mathrm{Y} = \frac{\mathrm{F}}{\Delta\mathrm{x}}\times\frac{\ell}{\mathrm{A}} \Rightarrow \mathrm{Y} = \mathrm{k}\frac{\ell}{\mathrm{A}}$$

$(\mathrm{F} = \mathrm{k}\Delta\mathrm{x})$

27. (2) In steady state

$$\frac{Q}{t} = \frac{K_1A(\theta_1-\theta)}{1} \Rightarrow \frac{Q}{t} = \frac{K_2A(\theta-\theta_2)}{1}$$

θ = temperature of interface

$$K_1(\theta_1-\theta) = K_2(\theta-\theta_2) \qquad 5(100^0-\theta) = 3(\theta-20^0)$$

$$500^0 - 5\theta = 3\theta - 60^0 \quad 8\theta = 560^0 \qquad \text{Hence, } \theta = \frac{560^0}{8} = 70^0C$$

28. (2) At equilibrium just before bursting the force due to surface tension is balanced by electrostatic repulsion so,

$$\frac{4T}{r}\times Area = \frac{\sigma^2}{2\varepsilon_0}\times Area$$

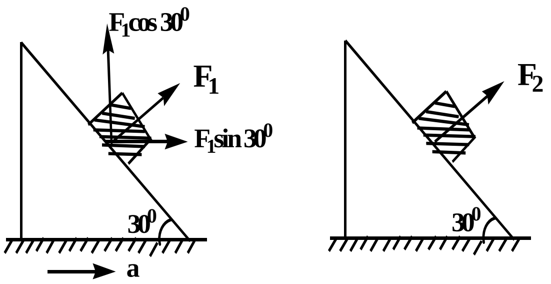
$$\Rightarrow\ r = \frac{8\varepsilon_0 T}{\sigma^2}$$

29. Surface is smooth. Therefore, force of friction between the block and the plane is zero. So, contact force is really the normal reaction between the two. In the first case

$F_1 \sin 30^0 = ma$ and $F_1 \cos 30^0 = mg$ or $F_1 = \dfrac{mg}{\cos 30^0}$

And in the second case $F_2 = mg\cos 30^0$

$\therefore \dfrac{F_1}{F_2} = \dfrac{1}{\cos^2 30^0} = \dfrac{4}{3}$



30. $Q \propto AT^4$ and $\lambda_m T =$ constant, Hence,

$Q\alpha \dfrac{A}{(\lambda_m)^4}$ or $Q\alpha \dfrac{r^2}{(\lambda_m)^4}$

$Q_A : Q_B : Q_C = \dfrac{(2)^2}{(3)^4} : \dfrac{(4)^2}{(4)^4} : \dfrac{(6)^2}{(5)^4} = \dfrac{4}{81} : \dfrac{1}{16} : \dfrac{36}{625} = 0.05 : 0.0625 : 0.0576$

i.e., Q_B is maximum.

Mathematics

31. Z lies on or inside an ellipse with foci (-3, 0) and (1, 0) and (4, 0) is a point out side the ellipse. Its min and max distances from any point on the ellipse are 1 and 9

32. $S = (n-1)\cos\dfrac{2\pi}{n} + (n-2)\cos\dfrac{4\pi}{n} + (n-3)\cos\dfrac{6\pi}{n} + ... + \cos\dfrac{2(n-1)\pi}{n}$

$S = 1\cos\dfrac{2\pi}{n} + 2\cos\dfrac{4\pi}{n} + ... + (n-1)\cos\dfrac{2(n-1)\pi}{n}$

$2S = n\left(\cos\dfrac{2\pi}{n} + \cos\dfrac{4\pi}{n} + ... + \cos\dfrac{2(n-1)\pi}{n}\right)$

$2S = n\dfrac{\sin(n-1)\dfrac{\pi}{n}}{\sin\dfrac{\pi}{n}}\cos\left(\dfrac{\dfrac{2\pi}{n} + \dfrac{2(n-1)\pi}{n}}{2}\right) = -n$

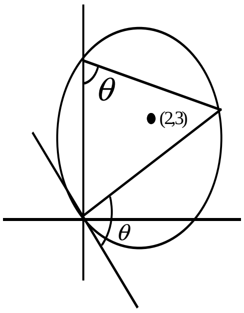
33. $g'(c) = \dfrac{\dfrac{f(5)}{6} - \dfrac{f(0)}{1}}{5}$ $(from\, L.M.V.T)$

$$= \frac{-\frac{1}{6} - 4}{5} = \frac{-25}{6\times 5} = -\frac{5}{6}$$

34. Let $x^2 = 4\sin\theta, y^2 = \frac{8}{3}\cos\theta \Rightarrow x^2 + y^2 = 4\sin\theta + \frac{8}{3}\cos\theta$

$\therefore$ maximum value $= \sqrt{16 + \frac{64}{9}} = \frac{4\sqrt{13}}{3}$

35



Equation of tangent at origin is

$-2(x+0) - 3(y+0) = 0$

$\Rightarrow 2x + 3y = 0$

$\tan\theta = \frac{7}{4}$

$\Rightarrow \left|\dfrac{m + \frac{2}{3}}{1 - \frac{2m}{3}}\right| = \frac{7}{4} \qquad \Rightarrow \dfrac{3m+2}{3-2m} = \frac{7}{4}$

$\Rightarrow 12m + 8 = 21 - 14m \qquad \Rightarrow 26m = 13 \Rightarrow m = \frac{1}{2}$

$\therefore y = \frac{1}{2}x \Rightarrow x - 2y = 0$

36. $f'(x) = (x-2)^{2/3}2 + (2x+1)\frac{2}{3}(x-2)^{-1/3}$

$= \dfrac{6(x-2) + 2(2x+1)}{3(x-2)^{1/3}} = \dfrac{10x - 10}{3(x-2)^{1/3}}$

$x = 1$ is a point of maximum and $x = 2$ is a point of minimum

$\therefore$ No.of extremum points is 2

37. $\left(\overline{a}\times\overline{b}\right)\times\overline{b}=\left(\overline{b}.\overline{a}\right)\overline{b}-\left(\overline{b}.\overline{b}\right)\overline{a}$

$=2(2\overline{i}-\overline{j}-\overline{k})-6(\overline{i}+\overline{j}+\overline{k})$

$=-2\overline{i}-8\overline{j}-8\overline{k}$

38. $n(s)=8_{C_3}=56$

Choosing a vertex 3 triangles can be formed from the diagnols of the faces not passing through the vertex. But each triangle is repeated 3 times....$n(E)=\dfrac{8\times 3}{3}=8$

$\therefore\ p(E)=\dfrac{8}{56}=\dfrac{1}{7}$

39. A is symmetric $\Rightarrow A' = A$ now $X'AY=\left((X'AY)'\right)$

$=(Y'A'X)$

$=(Y'AX)$ $\quad(\because\ X'AY$ is 1×1 matrix)

Let $E_1=\begin{bmatrix}1\\0\end{bmatrix},\ E_2=\begin{bmatrix}0\\1\end{bmatrix}$

If $X=E_1\ and\ Y=E_2\ then$

$E^1{}_1AE_2=E^1{}_2\cap E_1\Rightarrow a_{12}=a_{21}$

$\therefore$ A is symmetric.

40. For $(x,y)\in R\Rightarrow x=wy$

but $(y,x)\in R\Rightarrow R\Rightarrow y=xw\Rightarrow x=y$

$\therefore$ R is not symmetrix.

41. $\displaystyle\int\frac{x^2-1}{x^2\left(x+\frac{1}{x}\right)\sqrt{x^2+\frac{1}{x^2}}}dx=\int\frac{1-\frac{1}{x^2}}{\left(x+\frac{1}{x}\right)\sqrt{\left(x+\frac{1}{x}\right)^2-2}}dx$ put $x+\dfrac{1}{x}=t$

$$=\int\frac{dt}{t\sqrt{t^2-2}}\qquad t=\sqrt{2}\sec\theta$$

$$=\int\frac{\sqrt{2}\sec\theta\tan\theta d\theta}{\sqrt{2}\sec\theta\sqrt{2}\tan\theta}=\frac{1}{\sqrt{2}}\theta+C$$

42. Put $x^3=t$

$$\therefore I_2=\frac{1}{3}\int_0^1\frac{dt}{e^t(2-t)}=\frac{1}{3}\int_0^1\frac{e^t}{e(1+t)}dt=\frac{1}{3e}I_1$$

$$\Rightarrow\frac{I_1}{I_2}=3e$$

43. Let $x_i - 8 = \times$

$$\sum_{i=1}^{18} \times = 9, \ \sum_{i=1}^{18} \times^2 = 45$$

$$\therefore S.D = \sqrt{\frac{\sum x_i^2}{n} - \left(\frac{\sum x_i}{n}\right)^2} \quad = \sqrt{\frac{9}{4}} = \frac{3}{2}$$

44. $\frac{x-1}{1} = \frac{y-2}{-2} = \frac{3-3}{2} = \lambda$

$$\left.\begin{matrix} point\ on\ the \\ plane \end{matrix}\right\} (\lambda+1, -2\lambda+2, 2\lambda+3)$$

$= \lambda + 6 = 11 \quad \lambda = 5$

$(6, -8, 13)$

45. Normals $\Rightarrow \left(-3, \frac{3}{2}\right)$

Centre of given circle =(2,3/2)

Radius =5/2

Radius of required circle = 5 + 5/2

= 15/2

Diameter =15.

46. $y = mx + \sqrt{a^2m^2 - b^2}$

$y - mx - \sqrt{a^2m^2 - b^2} = 0$

$y^2 + m^2x^2 - 2mxy = a^2m^2 - b^2$

$k^2 + m^2b^2 - 2mhk = a^2m^2 - b^2$

$m^2(b^2 - a^2) - 2mhk + b^2 + k^2 = 0$

$\frac{b^2 + k^2}{h^2 - a^2} = c^2$

$b^2 + y^2 = c^2(x^2 - a^2)$

47. $\frac{dy}{dx} + 2xy = 2x$

$e^{\int 2x dx} = e^{x^2}$

$ye^{x^2} = \int e^{x^2} 2x dx = e^{x^2} + c$

$y = 1 + \frac{c}{e^{x^2}}$

$\underset{x \to \infty}{Lt} \quad y = 1$

48. $2y\frac{dy}{dx}=4$, $\frac{dy}{dx}=\frac{2}{y}$, $-\frac{dx}{dy}=\frac{-y}{2}=1$, $y=-2$, $x=1$

Chord $=y+2=(x-1)$ solve with the curve.

49. Successive application of L 'hospital's rule.

50. Function need not be invertible.

51. If $x^2+x=y$ then $y^2-5y-6=0$

$$(y^2-6)(y+1)=0$$

$$x^2+x-6=0, x^2+x+1=0$$

$$x=3,-2, \qquad x=\omega,\omega^2$$

Sum of non-real roots = $\omega+\omega^2$ = -1

52. Take $f(x)=x\sin x$, which is continuous and differentiable $f(0)=f(\pi)=0$

By Roll'e theorem, there exists at least one root is $f^1(x)=0 \Rightarrow x\cos x+\sin x=0$

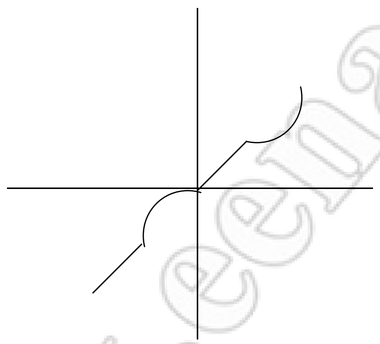
53. no. of orderd pairs = $(2(2)+1)(2(4)+1)(2(2)+1)$

$=5\times 9\times 5=225$

54. $a_2-a_1=1, a_3-a_2=2, a_4-a_3=3,...$

$$a_n=1+\frac{n(n-1)}{2}=\frac{n^2-n+2}{2}$$

$$\text{sum}=\frac{1}{2}\left\{\frac{30.31.61}{6}-\frac{30.31}{2}+2.30\right\}=4525$$

55. 

From graph

56. $\frac{1}{2r^2}=\frac{2}{4r^2}=\frac{(2r+1)-(2r-1)}{1+(4r^2-1)}$

$$sum=\sum\left(\tan^{-1}(2r+1)-\tan^{-1}(2r-1)\right)$$

$$=\tan^{-1}(2r+1)-\tan^{-1}(1)$$

$$=\tan^{-1}\left(\frac{n}{n+1}\right)$$

57. $p \rightarrow (q \rightarrow p) = \sim p \vee (q \rightarrow p)$

$= \sim p \vee (\sim q \vee p)$

$= \sim p \vee p \vee q \quad = p \rightarrow (p \vee q)$

58. $(1+63)^x - (63-1)^{2x+1}$

Reminder is 2.

59. Total Function $= 5^3$

60. Let $\ell = \int_0^x [cot\, x]dx \Rightarrow \ell = \int_0^x [cot(\pi - x)]dx$

$\therefore \ell + \ell = \int_0^x (-1)dx \quad (\because [x]+[-x] = -1 \text{ if } x \notin z) = 0 \text{ if } x \in z \text{ ; } \ell = -\frac{\pi}{2}$

Chemistry

61. Fluorine being more electronegative than carbon bond pairs mole towards fluorine In C-H bonds bond pairs move towards carbon. Hence all bond angles are not equal. As bond angle decreases (in F-C-F) s- character of hybrid orbitals also decreases . The molecule has obstorted tetrahedral shape.

62. equal to the one third of body diagonal for fcc.

63. Second carbon from nitrogen is only chiral.

64. (2) sp^3d^2 is octahedral 6 bond angle are with 90^0

65. $\Delta x = \sqrt{3}a$

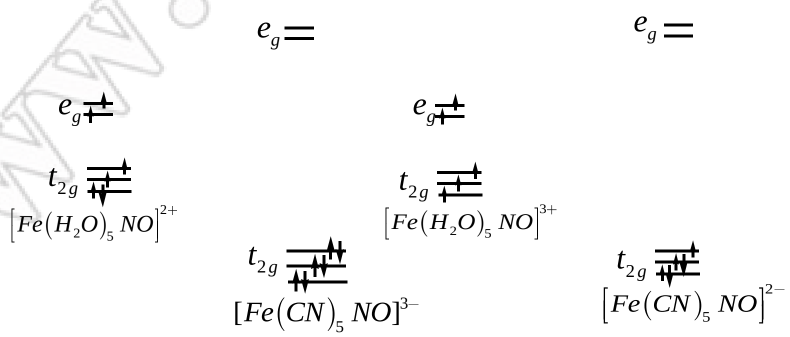
66. Hydration reaction.

67. The electron affinity values are in the order fluorine > oxygen > carbon.

68. The gas is less compressible (vander waals equation)

69. $CaC_2 + H_2O \rightarrow C_2H_2 \xrightarrow{H_2SO_4, HgSO_4} CH_3 + CHO$

70.



In $\left[Fe\left(H_2O\right)_5 NO\right]^{2+}$ and $\left[Fe\left(H_2O\right)_5 NO\right]^{3+}$, the unpaired electron present in higher energy anti bonding MO of NO transfers to lower energy t_{2g} orbital of Fe Still these contain unpaired electrons and are paramagnetic In $\left[Fe\left(CN\right)_5 NO\right]^{3-}$, the unpaired electron in higher. Energy anti bonding MO of NO cannot go into the higher energy eg orbital of Fe as there is no vacancy in lower energy t_{2g} orbital. So it remain in NO and as a whole the complex is paramagnetic. In $\left[Fe\left(CN\right)_5 NO\right]^{2-}$ the electron from NO can be transferred to vacant lower energy t_{2g} orbital. Since all the electrons are paired in this complex it is diamagnetic .

71. (1) $2MnO_4^- + 5H_2O_2 + 6H^+ \rightarrow 2Mn^{2+} + 5O_2 + 8H_2O$

22,400 ml of $O_2 \equiv$ 34 g of H_2O_2

224 ml of $O_2 \equiv$ 0.34 g of H_2O_2

Normality $= \frac{0.34}{17} \times \frac{1000}{20} = 1$

Volume strength = (5.6) (N) = 5.6 Vol

72. Two E and two Z isomers, one from methyl groups (Total Five)

73. Atomic sizes of both H and D are equal and hence H-H and D-D bond lengths are equal. The difference in H-H and D-D bond energies is not due to difference in bond lengths but due to difference in vibrational energies.

74. $H_2 / H^+ / I^- / I_2$

$H_2 + I_2 \rightarrow 2H^+ + 2I^-$

$0.7714 = 0.533 - \frac{0.059}{1} 10g\left(H^+\right)(0.1)$

75. $Zn - Hg / HCl$ with non polar solvent reduces double bond.

76. Magnesium slats gives precipitate with sodium bicarbonate only on boiling because $Mg\left(HCO_3\right)_2$ is soluble but on heating it decomposes to insoluble $MgCO_3$ and CO_2

77. $\wedge_{eq} = X_1 + X_2 - X_3$

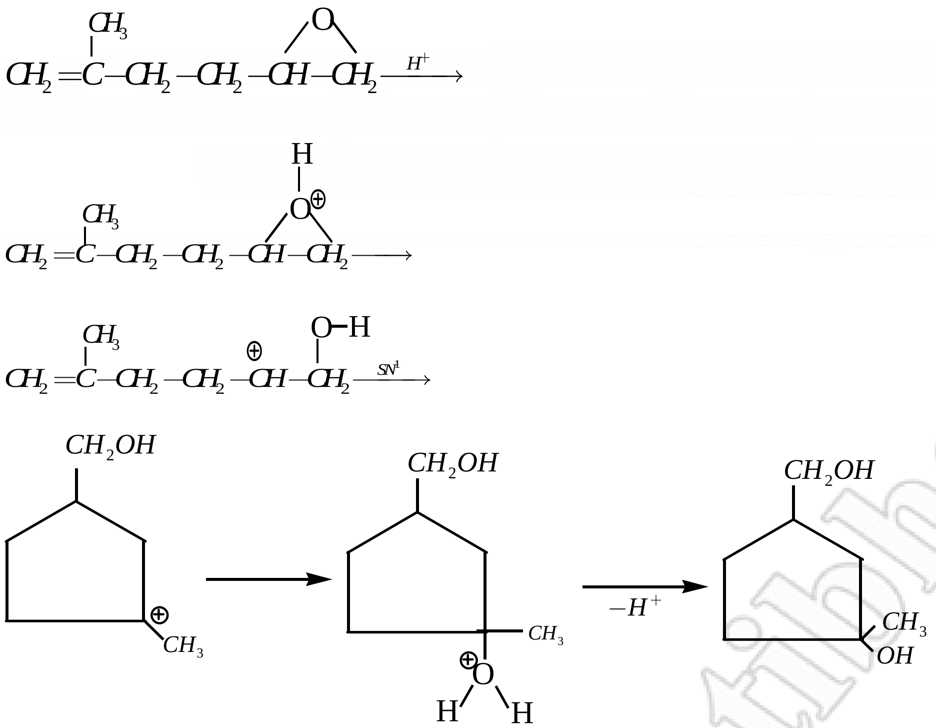
$\wedge_m = 2\left(x_1 + x_2 - x_3\right)$

$\wedge_m = \frac{K\,1000}{m}$

$S = \frac{10^3 x}{2\left(x_1 + x_2 - x_3\right)}$

$K_{sp} = S^2 = \frac{2.5\,x^2 10^5}{\left(x_1 + x_2 - x_3\right)^2}$

78.



79. Among $(CH_3)_3 N \to O$ and $(CH_3)_3 P \to O$ $P \to O$ bond is stronger and shorter due to back bonding from oxygen to phosphorous $P \rightleftharpoons O$ thus polarity also decreases

80. Bredig's arc method

81. This is an example of intermolecular cannizzaro reaction.

82. IF_7 has zero dipolemoment

83. slow step will the rate determining step.

84. (1) Due to –I effect of -COOH ; oxalic acid is more acidic

85. Transition metals form ionic compounds in lower oxidation states while they form covalent compound in higher oxidation states .

86. (3) $i = 2\ (KCl \to K^+ + Cl^-)$

$\Delta T_b = iK_b m\ = 2 \times 0.52 \times 1\ = 1.04$

$\therefore T_b = 101.04°C$

87. Rearrangement (In RDS migration is easy when donating groups present)

88. Except in the case of zinc, remaining three cases impurities are oxidized during the purification

89. (3) $\Delta G = \Delta H - T\Delta S$

At equilibrium $\Delta G = 0$

For a reaction to be non spontaneous ΔG should be positive

$\therefore T > T_e$

90. Resonance decreases basicity.

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