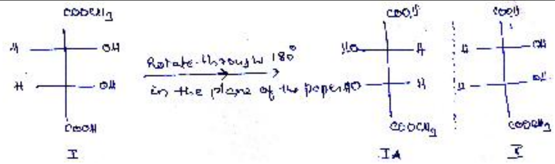
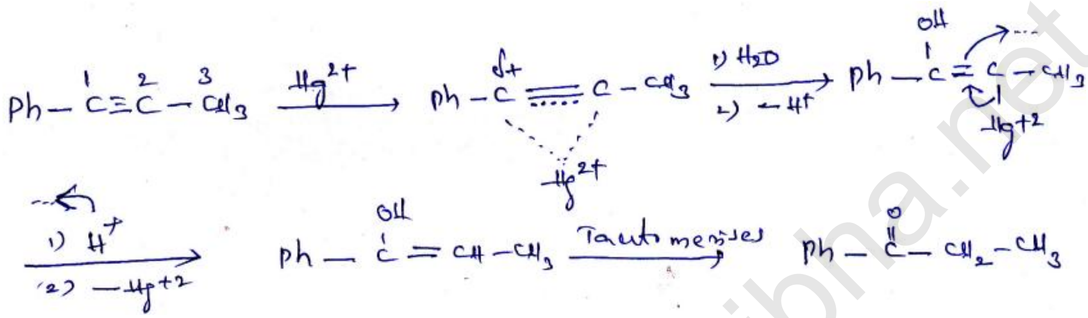
JEE MAIN MODEL GRAND TEST (2017)



I(or IA) and (II) are enantiomers

52. Cyclopentadiene, i.e option (1) contains only 4® electrons and is also non planar so non-aromatic

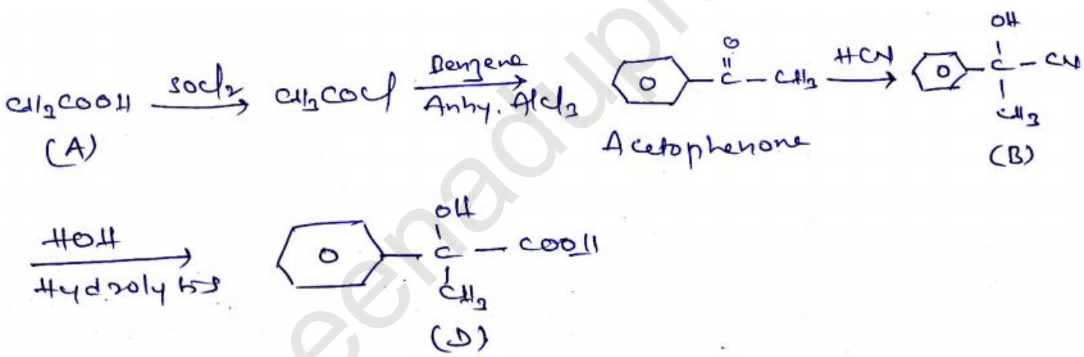
53. The initial complex formation between the alkyne and Hg^{+2} ion occurs in such a way that the developing the charge on C_1 is stabilized by +R effect of the 'Ph' ring. This is followed by nucleophilic attack by H_2O at C_1 and addition of a proton at C_2 to give enol (I) which subsequently tautomerises to give ketone (II)



54. Greater the steric hindrance, slower the reaction.

55. PCC converts 1^0 and 2^0 alcohols to corresponding aldehydes and ketones without the danger of their further oxidation.

56.



60. Larger cation – small anion – interaction gives more ionic character whereas smaller cation – larger anion interaction gives more covalent character. Thus the order of increasing ionic character is LiI < NaBr < KCl < CsF.

MATHEMATICS

61. 2 sin 2x = sin x + sin 3x = 2 sin 2x cos x/2

$\Rightarrow$ sin 2x = 0 or cos x/2 = 1

2x = n®

x = n® / 2

62. gof(x) = g(x – [x]) = cos [x – [x]] ®

= cos ([x] – [x]) ® = cos 0® = cos 0 = + 1

63. $P_1 = \frac{2r_1r_2}{r_2+r_3} = \frac{2(3)(4)}{3+4} = \frac{24}{7}$

64. $\sin\frac{\text{®}}{2n} + \cos\frac{\text{®}}{2n} = \frac{\sqrt{n}}{2}$

$\Rightarrow \left(\sin\frac{\text{®}}{4} + \frac{\text{®}}{2n}\right) = \frac{\sqrt{n}}{2\sqrt{2}} \Rightarrow -1 \le \frac{\sqrt{n}}{2\sqrt{2}} \le 1$

If n = 4 $\Rightarrow \sin\left(\frac{\text{®}}{4} + \frac{\text{®}}{8}\right) \ne \frac{\sqrt{4}}{2\sqrt{2}} \Rightarrow n > 4$

65. a : b : c = y + z : z + x : x + y = 5 : 4 : 3,

(x, y, z) = (1, 2, 3)

$\Rightarrow$ a + b + c = 12 = 3b

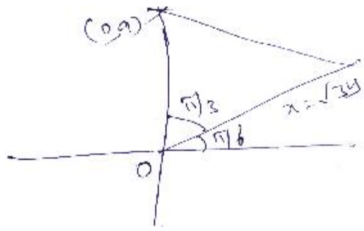
66. f : ax^2, g = bx^2, h = cx^2

$$\Rightarrow LHS = \begin{vmatrix} ax^2 & bx^2 & cx^2 \\ 2ax & 2bx & 2cx \\ 2a & 2b & 2c \end{vmatrix} = abc \begin{vmatrix} x^2 & x^2 & x^2 \\ 2x & 2x & 2x \\ 2 & 2 & 2 \end{vmatrix}$$

= abc (0) = 0 = constant

67. $\underset{x\to 0}{Lt}[1+3\sin^2\sqrt{x}]^{1/5x} = e^{ab} = e^{3\times\frac{1}{5}} = e^{3/5}$

68.



req.point = (0, a)

69. LHL = $a^2\cos^2 0 + b^2\sin^2 0 = a^2$
RHL = $e^{0+b} = e^b$
f is continuous ⇒ LHL = RHL
= $a^2 = e^b$ ⇒ 2log|a| = b

70. $\Delta = 0 \to abc + 2fgh - af^2 - bg^2 - ch^2 = 0$
1(P)(2) +
$2(\frac{-5}{2})(\frac{3}{2})(-4) - 1(1b) - P(\frac{9}{4}) - 2(\frac{25}{4}) = 0$
2P + 30 – 16 – 9P/4 – 25/2 = 0
8P + 120 – 64 – 9P – 50 = 0 ⇒ P = 6 ⇒ sin
$- = \frac{1}{\sqrt{50}}$

71. f(x) = $(x-1)^2 + (x-2)^2 + (x-3)^2 + (x-4)^2 + (x-5)^2$
For min,
$f' = 0 \to 2(x-1) + 2(x-2) + 2(x-3) + 2(x-4) + 2(x-5) = 0$
$\Rightarrow 10x - 30 = 0 \Rightarrow x = 3$

72. $f'(x) < 0$ then ad – bc < 0

73. $f(x) = x^{25}(1-x)^{75}$, f is max $\to f' = 0$
$f(x) = (x-0)^{25}(x-1)^{75}(-1)$
$f' = 0 \to x = \frac{mb+na}{m+n} = \frac{25(1)+75(0)}{25+75} = \frac{1}{4}$

74. $\frac{x-1}{1} = \frac{y-2}{2} = \frac{z-3}{3}$, with given conditions the direction ratios are
a + 2b + 3c = 0, a + b + c = 0
→ a = 5, b = - 1, c = - 1
plane is 5(x – 1) – 1(y – 2) – 1 (z – 3) = 0.
Verify the options

75. z = 1 + iy
$\Rightarrow z^2 + \sim z + \quad = 0$
$1 - y^2 + 2iy + \sim + i\sim y + \quad = 0$
$1 - y^2 + \sim + \quad = 0$; $2y + \sim y = 0$
$1 - y^2 - 2 + \quad = 0 \to \quad = y^2 + 1 > 1$
$\to \quad \in (1, \infty)$

76. $\frac{z_1}{z_2} + \frac{z_2}{z_1} = 1 \to z_1^2 + z_2^2 = z_1 z_2$
z_1, z_2, z_3 represents vertices of equi Δ with z_3 = origin

77. 7 women are arranged in $\lfloor 7-1 = \lfloor 6$ ways
7 gaps – 7men = $\lfloor 7$
⇒ req value = $\lfloor 6 . \lfloor 7$

78. n(s) = 2^4 = 16
E = evnent of getting det = - ve
$\Rightarrow E = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix} or \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix} or \begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}$
$\Rightarrow n(E) = 3 \to PC = 3/16$

79. LHS = $\frac{1}{{}^nC_0} - \frac{1}{{}^nC_1} + \frac{1}{{}^nC_2} - \frac{1}{{}^nC_3}$ (for n = 3)
= 1/1 – 1/3 + 1/3 – 1/1 = 0

80. LHS = ${}^{21}C_5 + {}^{22}C_5 + \ldots\ {}^{30}C_5$
= $[{}^5C_5 + {}^6C_5 + \ldots + {}^{20}C_5 + {}^{21}C_5 + \ldots + {}^{30}C_5]$
$[{}^5C_5 + {}^6C_5 + \ldots + {}^{20}C_5] = {}^{31}C_6 - {}^{21}C_6$

81. n(s) = 2^4 = 16, E = {3, 3, 3, 3} = P(E) = 1/16

82. $\frac{n-1}{2} = \frac{99-1}{2} = \frac{98}{2} = 49$

83. C_1 = (2, 2), $r_1 = \sqrt{4+4-6} = \sqrt{2}$
C_2 = (5, 5), $r_2 = \sqrt{25+25-a} = \sqrt{50-a}$
Now, $|r_1 - r_2| < C_1C_2 < r_1 + r_2$
$\sqrt{2} - \sqrt{50-a} < \sqrt{18} < \sqrt{2} + \sqrt{50-a}$
$2\sqrt{2} < \sqrt{50-a} \Rightarrow a < 42$

84. Differentiating both sides with respect to x,
$\frac{\cos 5x + \cos 4x}{1 - 2\cos 3x} = -2A\cos 2x + B\cos x$
$x = 0 \to \frac{1+1}{1-2} = -2A + B \to -2A + B = -2$
$x = \frac{®}{2} \to \frac{0+1}{1-2(0)} = -2A(-1) + 0 \to A = \frac{1}{2}$
$\therefore B = -2 + 2A = -2 + 1 = -1$
$\therefore A + B = \frac{1}{2} + (-1) = \frac{-1}{2}$

85. (3, 4) lies on given line, so it is diameter. And origin lies on the circle $\Rightarrow \lfloor \underline{AOB} = ® / 2$

86. Put x + 5 = t in I_1, 3x – 2 = t in I_2
$\Rightarrow I_1 = \int_1^0 e^{t^2} dt; \quad I_2 = \int_{-1}^0 e^{t^2} dt$
$I_1 + I_2 = 0$

87. $t_1 t_2 = 2$
$\therefore x_1 x_2 = (at_1^2)(at_2^2) = a^2(t_1t_2)^2 = 4a^2$

88. x = 0, x = 2a
$A = 2\int_0^{2a} y dx = 2\int_0^{2a} \sqrt{\frac{x^3}{2a-x}} dx$
Put x = 2asin^2–

$$A = 2\int_0^{®/2} \sqrt{\frac{8a^3 \sin^6 ¯}{2a\cos^2 ¯}}\, 2a(\cos ¯\, 2\sin ¯\, d¯)$$

$$16a^2 \int_0^{®/2} \sin^4 ¯\, d¯ = 3®\, a^2$$

89. Equation of external angular bisector is tangent at 'P(¯)'

$$\Rightarrow \frac{x}{a}\cos ¯ + \frac{y}{b}\sin ¯ = 1 \rightarrow \frac{x}{2}\left(\frac{1}{\sqrt{2}}\right) + \frac{y}{\sqrt{2}}\frac{1}{\sqrt{2}} = 1$$

$$\Rightarrow x + y\sqrt{2} = 2\sqrt{2}$$

90. LST = 2x

$$\Rightarrow \frac{y}{\left(\frac{dy}{dx}\right)} = 2x \Rightarrow \frac{ydx}{dy} = 2x$$

$$\frac{dx}{x} = \frac{2dy}{y} \rightarrow \log x = 2\log y + \log c$$

$$\Rightarrow x = cy^2$$

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