MOCK CET – 2
PHYSICS, CHEMISTRY, MATHEMATICS & BIOLOGY

ANSWER KEYS

ANSWERS												
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
2	4	1	1	1	1	2	1	3	1	2	3	2
14	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**
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27	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**
4	1	2	1	2	2	1	2	3	1	2	1	2
40	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**	**51**	**52**
2	1	2	4	2	1	4	4	3	1	1	3	4
53	**54**	**55**	**56**	**57**	**58**	**59**	**60**					
1	2	1	1	3	2	1	1					

HINTS & SOLUTIONS

1. $E = \frac{1}{2}mv^2$

   And $P.E = mg\left(\frac{u^2 sin^2\theta}{2g}\right)$

2. $F = \frac{mg\sin\theta}{cos(\theta-\phi)}$

   For F_{min} , $Cos(\theta - \phi) = 1$

3. $\frac{m_2 \times 100\%}{m_1+m_2}$

7. $P\alpha\, T^{\left(\frac{\gamma}{\gamma-1}\right)}$

12. PV=nRT

19. $V = \frac{1}{4\pi\varepsilon_0}\frac{\lambda(2\pi r)}{r} = \frac{\lambda}{2\varepsilon_0}$

22. $V_p = \frac{V_1C_1+V_2C_2}{C_1+C_2}$

25. $R\alpha\frac{l}{A}$

    $volume\ \alpha\ mass$

    $i.e., A\alpha\frac{m}{l}$

    $\therefore R\ \alpha\frac{l^2}{m}$

31. $s = \frac{G}{n-1} = \frac{I_g G}{I-I_g}$.

34. $F = mB = Mass\ \times Area$

35. $W = MB(cos\,\theta_1 - cos\,\theta_2)$

36. $i = \frac{Blv}{R}$

38. $E = -L\frac{dI}{dt}$

46. $M_1 = 1 + \frac{D}{f}$

$M_1 = \frac{D}{f}$

47. $\frac{I_{max}}{I_{max}} = \left(\frac{A_1+A_2}{A_1-A_2}\right)^2$

48. $\mu = \tan i_p$

$\theta = 90 - i_p$

52. $\frac{N}{N_0} = \left(\frac{1}{2}\right)^n \times 100\%$

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CHEMISTRY

ANSWER KEYS

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3	3			4	4	2	1	2	3	1	2	1
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4	1	4	1	3	3	2	3	1	2	1	2	2
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3	2	2	3	4	3	2	1					

HINTS & SOLUTIONS

1. A^+ ions at the corners before replacement by C^+ = 8

   After replacement of one A^+ by C^+, A^+ ions at the corners = 7, Hence their contribution towards unit cell = $\frac{7}{8}$

   C^+ ion at one corner contributes = $\frac{1}{8}$

   B^- ion at the body centre has contribution = 1

   Hence, ratio of A : B : C = $\frac{7}{8}:\frac{1}{8}:1$

   7 : 1 : 8

2. Both molality and mole fraction depend on mass is hence will not be affected by temperature

3. eq.wt of H_2O = H8 = 9. Hence 9g of H_2O is decomposed by 96500C. So 36g will be decomposed by?

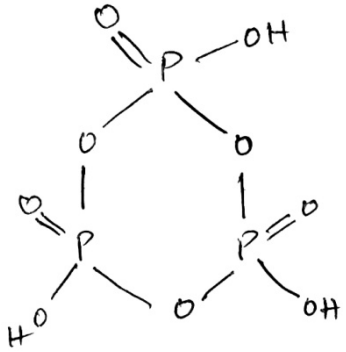
   Hence $t = \frac{Q}{I} = \frac{96500 \times 4}{3}$ = 35.7 hrs 36 $\approx$ hours

5. Earlier rate = k $a^n \cdot b^m$

   New rate = $k(2a)n \cdot \left(\frac{b}{2}\right)^m$

   $$\frac{New\,rate}{Earlier\,rate} = \frac{2^n \cdot a^n b^m a^{-m}}{a^n b^m} = 2^{n-m}$$

7. $2Cu_2O + Cu_2S \rightarrow 6Cu + SO_2$ (Bessemerization rec^n)

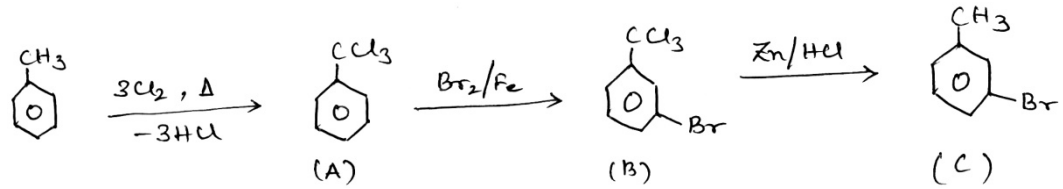
8. 

10. In $[Cu(CN)_4]^{2-}$ Cu undergoes dsp^2 – hybridization giving a square planar complex CN^- is a strong field legend.

Since Cu^{2+} (d^9 configuration) with one unpaired e^- (n = 1)

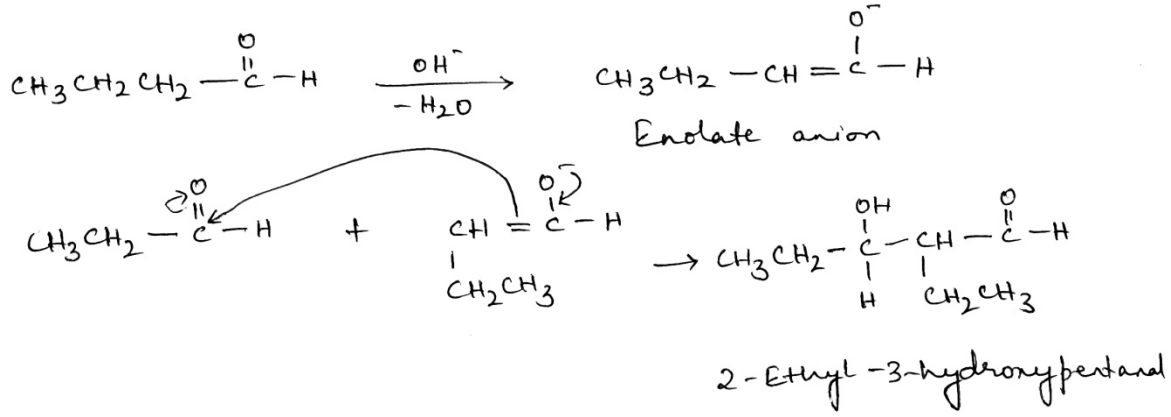
The magnetic moment = $\sqrt{n(n+2)}$

= $\sqrt{1(1+2)}$ = 1.73BM

11. 

(A) (B) (C)

12. Like nitration, bromination of 0 or p-phenolsulphonic acid occurs with simultaneous replacement of SO^3H group by Br atom to give ultimately 2, 4, 6-tribromophenol

13. 

15. Isoelectric point = ½ $(p^{k_1} + p^{k_2})$

$p^{k_1} = 2.34 \qquad p^{k_2} = 14 - 4.32 = 9.68$

$\therefore \quad p^I = \dfrac{2.34 + 9.68}{2} = 6.01$

17. To prepare 20g of the crystals, zinc required

$$= \frac{22.65}{100} \times 20 = 4.53g$$

18. $\lambda = \dfrac{h}{mr}; k \cdot r_e(E) = \dfrac{1}{2}mv^2 \; or \; v = \sqrt{\dfrac{2E}{m}}$

$\therefore \quad \lambda = \dfrac{h}{m}\sqrt{\dfrac{3}{2E}} = \dfrac{h}{\sqrt{2mE}}$

19. $\dfrac{P_1V_1}{P_2V_2} = \dfrac{n_1RT_1}{n_2RT_2} \; or \; \dfrac{P_1V_1}{P_2V_2} = \dfrac{n_1T_1}{n_2T_2} = \dfrac{w_1T_1}{w_2T_2}$

i.e., $\dfrac{1\times1}{0.75\times1} = \dfrac{2\times300}{1\times T_2} \qquad \therefore \; T_2 = 450K$

20. $3H_2O_{(l)} \rightarrow 3H_2O_{(g)}$; $\Delta n_{(g)} = 3$

$\Delta U = \Delta H - \Delta n_g RT$

$$= 30 - 3 \times \frac{2}{1000} \times 500 = 27kcal$$

21. $K_1 = \dfrac{[CO_2][H_2]}{[CO][H_2O]}$; $K_2 = \dfrac{[CO][H_2]^3}{[CO_4][H_2O]}$; $K_3 = \dfrac{[CO_2][H_2]^4}{[CO_4][H_2O]^2}$

$\therefore$ $K_1 \times K_2 = K_3$

22. $CH_3COOH \rightleftharpoons CH_3COO^- + H^+$

$[H^+] = [Ka[CH_3COOH]^{½}$

p^H = – log $[H^+]$

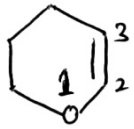
= ½ [log ka + log $[CH_3COOH]$]

= $\frac{1}{2}p^{ka} - \frac{1}{2}\log 0.1 = \frac{1}{2}\times 4.78 + 0.5 = 2.89$

24. Oxidation state of Mn is is +7, which is it's highest.
Oxidation state of Cr in CrO_2Cl_2 is + 6, which is it's highest.

26. Proton (H^+) being very small in size would have very large hydration energy

27. K is less denser than Na due to higher atomic size of K. ∴ the correct order is Li < K < Na < Rb

28. 

34. $i = \frac{118}{60} = 1.97$

38. $-\frac{1}{3}\frac{\Delta[H_2]}{\Delta t} = \frac{1}{2}\frac{\Delta[NH_3]}{\Delta t}$

$\therefore\ -\frac{\Delta[H_2]}{\Delta t} = \frac{3}{2}\frac{\Delta[NH_3]}{\Delta t} = \frac{3}{2}\times 2\times 10^{-4}$

= 3 x $10^{-}4$ mol $L^{-}1$ s^{-1}

43. NH_3 is most basic in the group

48. EAN = 27 + 8 (from 4 NH3) = 35

MATHEMATICS

ANSWER KEYS

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4	4	2	1		2	2	1					

HINTS & SOLUTIONS

7. for domain of given function $-\le \log_2\left(\frac{x}{12}\right)\le 1$

$\Rightarrow 2^{-1}\in\frac{x}{12}\le 2$

$\Rightarrow 2^{-1}\le\frac{x}{12}\le 2$

$\Rightarrow 6\in x\le 24$

$\Rightarrow x\in[6,24]$

8. $f(x)=\begin{cases} n^2 & if\ n\ is\ odd \\ 2n+1 & if\ n\ is\ even \end{cases}$

$f(1)=1^2=1 \qquad f(2)=2(2)+1=5$

$f(3)=3^2=9 \qquad f(4)=2(4)+1=9$

$f(3)=f(4)$ f is not injective

Also, f is not surpective as every element of N is not the image of any element of N

10. $\frac{x(x-3)}{2}=54$

$\Rightarrow x^2-3x-108=0$

$\Rightarrow (x-12)(n+91=0)$

$\Rightarrow x=12$

11. $\cos[2\tan^{-1}(-7)]=\cos\left[\cos^{-1}\left(\frac{1-49}{1+49}\right)\right]=\cos\left[\pi-\cos^{-1}\frac{48}{50}=-\frac{24}{25}\right]$

13. consider $\begin{bmatrix}1&0&0\\0&1&0\\0&0&1\end{bmatrix}$ by placing a, in any one of the 6 position and 0 elsewhere. we get 6 non-singular matrices. Similarly, $\begin{bmatrix}0&0&1\\0&1&0\\1&0&0\end{bmatrix}$ gives at least one non-singular

14. $B=\dfrac{A+A^{|}}{2}=\begin{bmatrix}6 & 6 & 7\\ 6 & 2 & 5\\ 7 & 5 & 1\end{bmatrix}$

15. Given A is singular $\Rightarrow$ |A| = 0
    Now A (adj A) = |A| I_n = 0
    A (adj A) = 0 A (adj. A) is a zero matrix

16. det (2A) = 2^4 det (A) = 16 det (A)

17. $\begin{vmatrix}1 & 1 & 1\\ 1 & 1+x & 1\\ 1 & 1 & 1+y\end{vmatrix}=xy$

18. $A.A^{-1} = I$

20. $m_1=\dfrac{x^2-y^2}{2xy}\qquad m_2=\dfrac{-2xy}{x^2-y^2}\quad m_1m_2=-1$

21. $A=2\int_0^{16}\sqrt{y}dy$

25. $(\sqrt{3}\vec{a}-\vec{b})2=3(\vec{a})^2+(\vec{b})^2-2\sqrt{3}\vec{a}\cdot\vec{b}$

$$\Rightarrow \vec{a}\cdot\vec{b}=\frac{\sqrt{3}}{2},\theta=30$$

31. $P(A\cap B)=P(A/B)P(B)$

= 0.5 x .2 = .1

$$P(A'/B')=\frac{P(A'\cap B')}{P(B')}=\frac{P[(A\cup B)]}{1-P(B')}=\frac{1-P(A\cup B)}{1-P(B)}$$

$$=\frac{1-P(A)-P(B)+P(A\cup B)}{1-0.2}=3/8$$

32. $E(x)=30\times\dfrac{1}{5}+10\times\dfrac{3}{10}-10\times\dfrac{1}{2}=4$

34. Probability of selecting a white ball from x bag = $\dfrac{2}{5}$

Probability of selecting a white ball from y large = $\dfrac{4}{6}=\dfrac{2}{3}$

Probability of selecting a white ball from x or y bags $=\dfrac{2}{5}+\dfrac{2}{3}=\dfrac{16}{15}$

Probability of selecting the white ball from one of the bags = $\dfrac{1}{2}\cdot\dfrac{16}{15}=\dfrac{8}{15}$

36. $\sqrt{3}(\vec{a}\cdot\vec{b})=|\vec{a}\times\vec{b}|$

$\sqrt{3}(\vec{a})(b)\cos\theta=|\vec{a}||\vec{b}|\sin\theta$

$\sqrt{3}\cos\theta=\sin\theta\qquad\tan\theta=\sqrt{3}$

$$\theta=\frac{\pi}{3}$$

37. $\vec{a}\cdot(\vec{b}\times\vec{c})=0, m=8/5$

39. $\tan\left(\frac{\pi}{4}\right) = \cot\left(\frac{B\pi}{4}\right)$

$\Rightarrow \frac{\alpha\pi}{4} = n\pi + \frac{\pi}{2} - \frac{B\pi}{4}$

$\Rightarrow \alpha + \beta = 2(2x+1)$

40. $(\sin x + \cos x)^2 = \frac{1}{25}$

$\Rightarrow \sin 2x = -\frac{24}{25}$

$\Rightarrow \cos 2x = -\frac{\sqrt{49}}{25}$

$\Rightarrow \tan 2x = \frac{24}{7}$

41. Put z = x + y and eliminate modulus

44. From the number 11 22 33 the number of 6 digits that can be formed the digits = $\frac{6!}{2!2!2!} = \frac{720}{8} = 90$

45. ${}^{21}C_r = {}^{21}C_{r+1}$ r + 1 = 21 – r

${}^{21}C_r = {}^{21}C_{21-r}$ r = 10

46. $S_\infty = \frac{4}{3}$ and $a = \frac{3}{4}$ and formula $S_\infty = \frac{a}{1-r}$

48. Centre ≡ (2, 2) and r = 2

50. $\bar{x} = 16$, variance = $\frac{1}{x}\sum xi^2 - |\bar{x}i|^2$

$0 = \frac{1}{x}400 - 25$

$x = 16$

KEYS TO MOCK CET - 2

BIOLOGY

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1	3	1	3	3	3	2	4					