

විභාග පුහුණු පරීක්ෂණය - 41
ආකල්ප විද්‍යාලය - අවසාන වර්ෂ පරීක්ෂණය
Exam Training Test (ETT - 41)
Marking Scheme

A - කොටස - විද්‍යාගත රචනා

01. (a) (i) අසාහයි (ii) සාහයි
 (iii) අසාහයි (iv) සාහයි
 (v) අසාහයි
 (04 x 5 = 20)
 (a කොටසට ලකුණු 20)
- (b) (i)
$$\text{H}-\overset{\text{O}}{\parallel}{\text{C}}-\overset{\cdot\cdot}{\text{N}}-\text{C}\equiv\text{C}-\text{H}$$
 (08)
- (ii)
$$\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\overset{\cdot\cdot}{\underset{(-)}{\text{N}}}\equiv\overset{\cdot\cdot}{\overset{(+)}{\text{N}}}-\text{N}\equiv\text{N} \longleftrightarrow \text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\overset{\cdot\cdot}{\text{N}}-\overset{\cdot\cdot}{\overset{(+)}{\text{N}}}=\overset{\cdot\cdot}{\overset{(-)}{\text{N}}}-\text{N}\equiv\text{N} \longleftrightarrow \text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\overset{\cdot\cdot}{\overset{(-)}{\text{N}}}-\overset{\cdot\cdot}{\overset{(+)}{\text{N}}}=\overset{\cdot\cdot}{\overset{(-)}{\text{N}}}-\text{N}\equiv\text{N}$$
 (08 x 3 = 24)
- (iii)

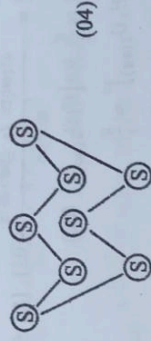
	C ₂	N	C ₇	O ₈
(i)	3	3	4	4
(ii)	තලීය ත්‍රිකෝණාකාර	තලීය ත්‍රිකෝණාකාර	වකුඤ්චකලීය	වකුඤ්චකලීය
(iii)	තලීය ත්‍රිකෝණාකාර	තලීය ත්‍රිකෝණාකාර	වකුඤ්චකලීය	කෝණික
(iv)	sp ²	sp ²	sp ³	sp ³

(01 x 16 = 16)

- (iv) (1) sp² sp²
 (2) sp² sp²
 (3) sp² sp³
 (4) sp² sp³
 (v) (1) 2P 2P
 (2) 2P 2P
 (01 x 8 = 08)
 (01 x 4 = 04)
 (b කොටසට ලකුණු 60)

- (c) 1. He < Ne < CO₂ < NH₃
 2. CCl₄ < CF₄ < C₂H₄ < CO
 3. SO₂ < SOCl₂ < SO₄²⁻ < S₂O₃²⁻
 4. MgCO₃ < CaCO₃ < LiCO₃ < Na₂CO₃
 5. γ < x < අධෝරක්ත < සුළු කර්ම (04 x 5 = 20)
 (c කොටසට ලකුණු 20)

02. (a) (i) S (08)
 Z තුන්වන අවර්තයේ පිහිටි මූලද්‍රව්‍යයක් නිසාත් F₂ සමග පිහේස්සා අණුකලීය සංකීර්ණ සාදන නිසා (04)
 (ii) 1s² 2s² 2p⁶ 3s² 3p⁴ (04)
 (iii) S₈



- (iv) I. 3S + 6NaOH → 2Na₂S + Na₂S₂O₃ + 3H₂O
 II. S + 4NH₃ → SO₂ + 4NO₂ + 2H₂O
 (05 x 2 = 10)

(v)

සංයෝගය	ජලය සමඟ ප්‍රතික්‍රියාව
SO ₂	SO ₂ + H ₂ O → H ₂ SO ₃ (03+02)
SO ₃	SO ₃ + H ₂ O → H ₂ SO ₄ (03+02)

(05 x 2 = 10)

- (vi) H₂SO₃ (02)
 H₂SO₄ (02)
 (vii) ★ H₂SO₄ නිපදවීමට
 ★ පවුලෝර්ධනායක (01 x 2 = 02)
 (a කොටසට ලකුණු 46)

- (b) (i) Pb(NO₃)₂
 FeSO₄
 (08 x 2 = 16)

(ii)

අංකය	නිමැණික	නිමැණිකය
1	NO ₃ ⁻ ඓ.	
2	NO ₃ ⁻ ඓ.	
3	PbCl ₂ ඓ.	
4	SO ₄ ²⁻ ඓ.	
5	Fe ³⁺ /Al ³⁺ /Cr ³⁺ නැත.	
6	Fe ³⁺ ඓ. සා. HNO ₃ මගින් Fe ²⁺ → Fe ³⁺	

(03 x 6 = 18)

- (iii) I. 2Pb(NO₃)₂ → 2PbO + 4NO₂ + O₂
 II. 3NO₃⁻ + 2H₂O + 5OH⁻ + 8Al → 8AlO₂⁻ + 3NH₃
 III. Pb(NO₃)₂ + 2HCl → PbCl₂ + 2HNO₃
 IV. FeSO₄ + BaCl₂ → BaSO₄ + FeCl₂
 (05 x 4 = 20)
 (b කොටසට ලකුණු 54)

03. (a)
 (i) H₂O_{2(aq)} + 2I⁻ + 2H⁺ → 2H₂O(l) + I_{2(aq)} (10)
 (ii) n_{S₂O₃²⁻} = 1 mol dm⁻³ × $\frac{10}{10^3}$ dm³ = 1 × 10⁻² mol (02)
 n_{I₂} = n_{H₂O₂} = 0.5 × 10⁻² mol (03)

$$[H_2O_2(aq)] = 5 \times 10^{-3} \text{ mol} \times \frac{10^3}{20} \text{ dm}^{-3} \quad (02)$$

$$R = \frac{[H_2O_2(aq)]}{t} \quad (03) = \frac{5}{20} \times \frac{1}{40}$$

$$= 6.25 \times 10^{-3} \text{ mol dm}^{-3} \text{ s}^{-1} \quad (02+01)$$

(ii) $R = \frac{\text{පැයෙහි } I_2 \text{ ප්‍රමාණය}}{\text{කාලය}} \quad (02) \quad [I_2] \text{ නියත නිසා}$

$$R = \frac{k}{t} \cdot R_0 [H_2O_2(aq)]^x \quad (02)$$

$$[H_2O_2(aq)]^x = \frac{k}{t}$$

$$\frac{(0.16 \text{ mol dm}^{-3})^x}{(0.08 \text{ mol dm}^{-3})^x} = \frac{80s}{40s} \quad (03)$$

$$x = 1 \quad (03)$$

$$t = \frac{[H_2O_2(aq)]}{k} \quad (05)$$

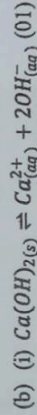
$$k = 0.16 \text{ mol dm}^{-3} \times 40s = 6.4 \text{ mol dm}^{-3} \text{ s} \quad (05)$$

(iii) $[H_2O_2(aq)]t = k;$

$$t = \frac{6.4 \text{ mol dm}^{-3} \text{ s}^{-1}}{0.15 \text{ mol dm}^{-3}} \quad (05)$$

$$= 42.7s \quad (04+01)$$

(a) කොටසට ලකුණු 50)



x 2x



$$= 2 \times 10^{-3} \text{ mol} \quad (03)$$

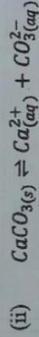
$$[OH^{-}_{(aq)}] = \frac{2 \times 10^{-3}}{100} \times 10^3$$

$$= 2 \times 10^{-2} \text{ mol dm}^{-3} \quad (03)$$

$$K_{sp} = [Ca^{2+}_{(aq)}][OH^{-}_{(aq)}]^2 \quad (03)$$

$$5.6 \times 10^{-6} \text{ mol}^3 \text{ dm}^{-9} = x \times (2 \times 10^{-2} \text{ mol dm}^{-3})^2 \quad (02+02)$$

$$x = 0.014 \text{ mol dm}^{-3} \quad (02+01)$$



y y

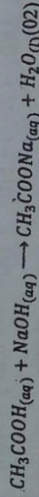
$$1.6 \times 10^{-7} \text{ mol}^2 \text{ dm}^{-6} = (0.014 \text{ mol dm}^{-3})y \quad (05)$$

$$y = \frac{1.6 \times 10^{-7}}{1.4 \times 10^{-2}} = 1.14 \times 10^{-5} \text{ mol dm}^{-3}$$

$$n_{Na_2CO_3} = 1.14 \times 10^{-5} \text{ mol dm}^{-3} \times \frac{100 \text{ dm}^3}{10^3} \times 106 \text{ g mol}^{-1} \quad (05)$$

$$= 120.84 \times 10^{-6} \text{ g} = 120 \mu\text{g} \quad (03+01)$$

(iii)

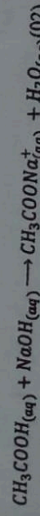


$$n_{NaOH} = 0.02 \text{ mol dm}^{-3} \times \frac{20}{10^3} \text{ dm}^{-3}$$

$$= 4 \times 10^{-4} \text{ mol} \quad (02)$$

$$n_{CH_3COOH} = 0.1 \text{ mol dm}^{-3} \times \frac{10}{10^3} \text{ dm}^{-3}$$

$$= 1 \times 10^{-3} \text{ mol} \quad (02)$$



$$1 \times 10^{-3} \text{ mol} \quad 1 \times 10^{-4} \text{ mol} \quad -$$

$$6 \times 10^{-4} \quad - \quad 4 \times 10^{-4} \quad (02)$$

$$n_{CH_3COONa} = 4 \times 10^{-4} \text{ mol}$$

$$[CH_3COONa] = \frac{4 \times 10^{-4}}{30} \times 10^3 = \frac{0.4}{30} \quad (02)$$

$$[CH_3COOH] = \frac{6 \times 10^{-4}}{30} \times 10^{-3} = \frac{0.6}{30} \quad (02)$$

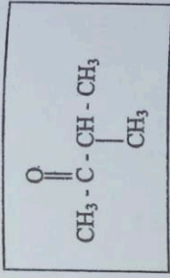
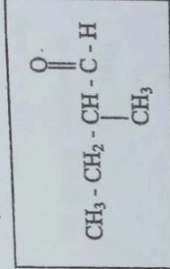
$$p^H = p^{K_a} + \log \left[\frac{[CH_3COO^-]}{[CH_3COOH]} \right] \quad (02)$$

$$p^H = -\log 1.8 \times 10^{-8} + \log \frac{0.4/30}{0.6/30}$$

$$p^H = 4.565 \quad (04)$$

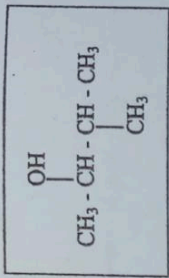
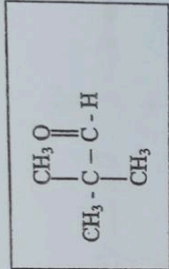
(b) කොටසට ලකුණු)

04. (a) (i)



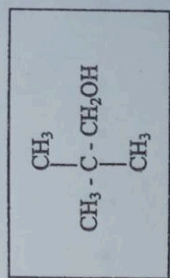
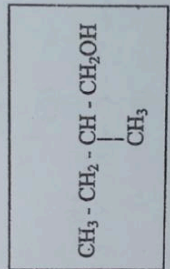
(A)

(B)



(C)

(D)



(E)

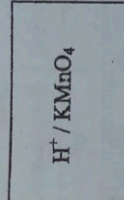
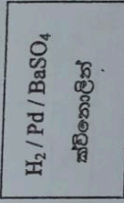
(F)

(05 x 6 = 30)

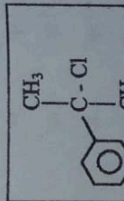
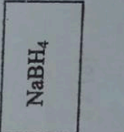
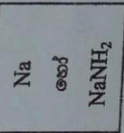
(a) කොටසට ලකුණු 30)

(b)

G H



I

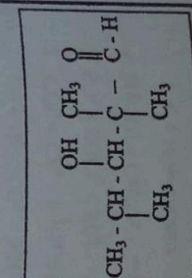
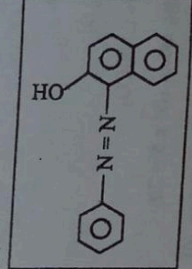


(06 x 5 = 30)

(b) කොටසට ලකුණු 30)

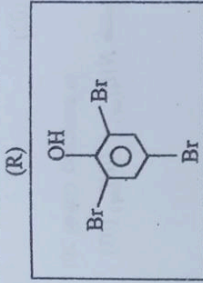
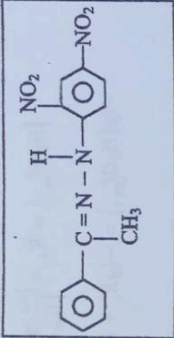
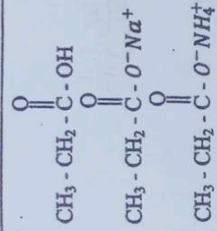
කිරිඳිලිය AlCl₃

(c)



(P)

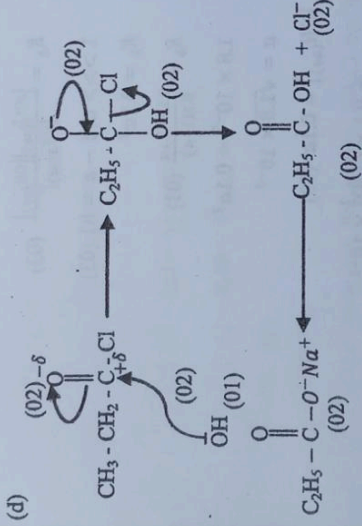
(Q)



$(05 \times 5 = 25)$

(c) නොවසම ලකුණු 25)

(T)



(d) නොවසම ලකුණු 15)

B - නොවසම - රචනා

05. (i) $PV = nRT$ (02)

$5 \times 10^5 \text{ Pa} \times 2 \times 10^{-3} \text{ m}^3 = n \times 2000 \text{ Jmol}^{-1} \times (03)$

$n = 0.5 \text{ mol}$ (05)

$A_2 = B_2 = \frac{0.5 \times 0.2}{2}$

$= 0.15 \text{ mol}$ (05)

$P_{B_2} = P_{A_2} = \frac{0.15}{0.50} \times 5 \times 10^5 \text{ Pa}$

$= \frac{0.20}{0.50} \times 5 \times 10^5 \text{ Pa}$ (05)



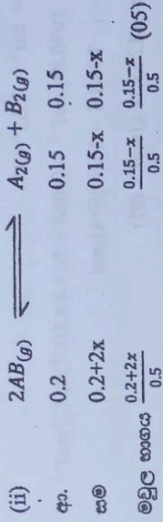
ආ. 0.2 mol

$Q_P = \frac{P_{A_2} P_{B_2}}{P_{AB}^2}$ (03)

$Q_P = \frac{(1.5 \times 10^5 \text{ Pa})^2}{(2 \times 10^5 \text{ Pa})^2} = \frac{1.5 \times 1.5}{2 \times 2}$

$= 0.5625$ (05)

$Q_P > K_P$ ආපසු ප්‍රතික්‍රියාව වැඩිවී පිරිසිදු වේ. (05)



ආංශික පීඩන $P_{AB(g)} = \frac{(0.2+2x)}{0.5} \times 5 \times 10^5 \text{ Pa}$

$= (0.2 + 2x) \times 10^6 \text{ Pa}$ (03)

$P_{A_2(g)} = \frac{(0.15-x)}{0.5} \times 5 \times 10^5 \text{ Pa}$

$= (0.15 - x) \times 10^6 \text{ Pa}$ (03)

$P_{B_2(g)} = \frac{(0.15-x)}{0.5} \times 5 \times 10^5 \text{ Pa}$

$= (0.15 - x) \times 10^6 \text{ Pa}$ (03)

$K_P = \frac{P_{A_2(g)} P_{B_2(g)}}{P_{AB(g)}^2}$ (03)

$0.16 = \frac{[(0.15-x) \times 10^6 \text{ Pa}]^2}{[(0.2+2x) \times 10^6 \text{ Pa}]^2}$

$\sqrt{0.16} = \sqrt{\frac{(0.15-x)^2}{(0.2+2x)^2}}$

$0.4 = \frac{0.15-x}{0.2+2x}$ $x = \frac{0.07}{1.8}$

$0.08 + 0.8x = 0.15 - x$ $x = 0.039$ (04)

$P_{AB(g)} = (0.2 + 2 \times 0.039) \times 10^6 \text{ Pa}$

$= 0.278 \times 10^6 \text{ Pa}$ (02)

$P_{A_2} = (0.15 - 0.039) \times 10^6 \text{ Pa}$

$= 0.111 \times 10^6 \text{ Pa}$ (02)

$P_{B_2} = 0.111 \times 10^6 \text{ Pa}$ (02)

(a) නොවසම ලකුණු 60)

(b) (i) දහනලේදී 10x mol ඇදේ නම්



$\Delta H_{T_2}^\ominus = \Sigma \Delta H_{f, \text{ප්‍රභව}}^\ominus - \Sigma \Delta H_{f, \text{ප්‍රතික්‍රියා}}^\ominus$ (03)

$= x \times \Delta H_{f, CO}^\ominus + (10-x) \times \Delta H_{f, CO_2}^\ominus + 10 \times \Delta H_{f, H_2O}^\ominus$
 $- 5 \times \Delta H_{f, C_2H_4}^\ominus$

$-5484 \text{ kJ} = [(x \times -110 \text{ kJmol}^{-1}) + (10-x) \times 394 \text{ kJmol}^{-1} + 10 \times$
 $-285 \text{ kJmol}^{-1} - 54 \times 5 \text{ kJmol}^{-1}]$

$-5484 = -7060 + 284x$

$x = \frac{1576}{284} = 5.55 \text{ mol}$ (05)

$n_{CO} = 5.55 \text{ mol}$ (05)

$n_{CO_2} = 4.45 \text{ mol}$ (05)

$\Delta S^\ominus = \Sigma S^\ominus_{\text{ප්‍රභව}} - \Sigma S^\ominus_{\text{ප්‍රතික්‍රියා}}$ (03)

$= (198 \times 5.55 + 214 \times 4.45 + 70 \times 10) -$

$(68 \times 5 + 200 \times 9.45) \text{ J K}^{-1}$

$= 2751.2 - 2230$

$= +521.2 \text{ J K}^{-1} \text{ mol}^{-1}$ (05)

C_2H_4 දහන එන්තැල්පිය = $\frac{5484}{5} = -1096.8 \text{ kJmol}^{-1}$ (02)

$$\Delta G^\circ = \Delta H^\circ - T\Delta S^\circ \quad (03)$$

$$= -1096.8 \text{ kJ/mol}^{-1} - (300\text{K} + 521.2 \times 10^{-3}) \text{ KJ/K}^{-1} \text{ mol}^{-1}$$

$$= (-1098.8 - 156.36) \text{ kJ/mol}^{-1}$$

$$= -1253.16 \text{ kJ/mol}^{-1} \quad (05)$$

ස්වයංසිද්ධව සිදුවේ.

$$\text{C}_2\text{H}_4 + 3\text{O}_2 \longrightarrow 2\text{CO}_2 + 2\text{H}_2\text{O}$$

$$\Delta H_f^\circ = \Sigma \Delta H_f^\circ (\text{ප්‍රභව}) - \Sigma \Delta H_f^\circ (\text{ප්‍රතිභව})$$

$$= (-394 \times 2 - 285 \times 2) - (68 + 0)$$

$$= -788 - 570 - 68 \quad (05)$$

$$= -1426 \text{ kJ/mol}^{-1} \quad (04)$$

$$= \frac{1098.8}{1426} \times 100\%$$

$$= 77.05\% \quad (05)$$

(b) කොටසට ලකුණු 50

(c) (i) වෝල්ට්මීටරේ ආංශික විචන්‍ය නියමයෙන්

$$P_T = P_L + P_M \quad (02)$$

$$P_L = Y_L \times P_T$$

$$Y_L = \frac{P_L}{P_T} \quad (02)$$

රදුල් නියමයෙන්,

$$P_T = P_L^\circ \cdot X_L + P_M^\circ \cdot X_M \quad (02)$$

$$Y_L = \frac{P_L^\circ \cdot X_L}{P_L^\circ \cdot X_L + P_M^\circ \cdot X_M} \quad (04)$$

$$X_L = X_M$$

$$\therefore Y_L = \frac{P_L^\circ}{P_L^\circ + P_M^\circ} \quad (05)$$

(ii) $Y_L = 0.2 \quad Y_M = 0.8 \quad (03)$

$$0.2 = \frac{80X_L}{80X_L + 60X_M} \quad (1) \quad (04)$$

$$0.8 = \frac{60X_M}{80X_L + 60X_M} \quad (2) \quad (04)$$

$$\frac{(1)}{(2)} \Rightarrow \frac{1}{4} = \frac{4X_L}{3X_M}$$

$$\frac{1}{4} = \frac{4X_L}{3(1-X_L)} = \frac{4X_L}{3-3X_L}$$

$$3 - 3X_L = 16X_L$$

$$3 = 19X_L$$

$$X_L = \frac{3}{19} \quad (03)$$

$$X_M = \frac{16}{19} \quad (03)$$

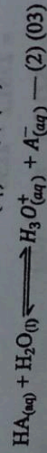
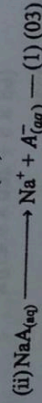
$$P_T = \frac{3}{19} \times 80 + \frac{16}{19} \times 60 \quad (03)$$

$$= 12.63 \text{ kPa} + 50.52 \text{ kPa}$$

$$= 63.16 \text{ kPa} \quad (05)$$

(c) කොටසට ලකුණු 40

06. (a) (i) අම්ලයකින් ස්වල්පයක් හෝ හම්ලයකින් ස්වල්පයක් හෝ ජලයෙන් තනුක කළ විට pH අගයේ සැලකිය යුතු වෙනසක් සිදු නොවන ද්‍රාවණ (05)



$$(2) \Rightarrow K_a = \frac{[\text{H}_3\text{O}^+_{(\text{aq})}][\text{A}^-_{(\text{aq})}]}{[\text{HA}_{(\text{aq})}]} \quad (03)$$

$$[\text{H}_3\text{O}^+_{(\text{aq})}] = K_a = \frac{[\text{HA}_{(\text{aq})}]}{[\text{A}^-_{(\text{aq})}]}$$

$$-\lg[\text{H}_3\text{O}^+_{(\text{aq})}] = -\lg K_a + \lg \frac{[\text{A}^-_{(\text{aq})}]}{[\text{HA}_{(\text{aq})}]} \quad (03)$$

$\text{HA}_{(\text{aq})}$ හි විචන්‍යත ඉහා කුඩා වැඩිත්

$$\text{pH} = \text{p}K_a + \lg \left[\frac{\text{ප්‍රභව}}{\text{අභව}} \right] \quad (03)$$

(a) කොටසට ලකුණු 20



ආරම්භක 0.1

(mol dm⁻³)

සමතුලිත 0.1(1-α) 0.1 α 0.1 α (03)

(mol dm⁻³)

$$K_b = \frac{[\text{NH}_4^+_{(\text{aq})}][\text{OH}^-_{(\text{aq})}]}{[\text{NH}_3_{(\text{aq})}]} \quad (03)$$

$$1 \gg \alpha \Rightarrow \alpha; 1 - \alpha \approx 0.1 \quad (03)$$

$$K_b = 0.1\alpha^2$$

$$K_b = \frac{0.1\alpha \times 0.1\alpha}{0.1(1-\alpha)} \quad (03)$$

$$1.8 \times 10^{-5} = 0.1\alpha^2$$

$$\alpha = \sqrt{1.8 \times 10^{-2}}$$

$$[\text{OH}^-_{(\text{aq})}] = 0.1\alpha \quad (03)$$

$$= 0.1 \times (1.8)^{\frac{1}{2}} \times 10^{-2}$$

$$= (1.8)^{\frac{1}{2}} \times 10^{-3} \quad (03)$$

$$\text{pOH} = -\lg[\text{OH}^-_{(\text{aq})}] \quad (03)$$

$$= -\lg(1.8)^{\frac{1}{2}} \times 10^{-3} \quad (03)$$

$$= -\left\{ \lg(1.8)^{\frac{1}{2}} + \lg 10^{-3} \right\}$$

$$= -\left\{ \frac{1}{2} \lg(1.8) - 3 \right\}$$

$$= 2.95 \quad (03)$$

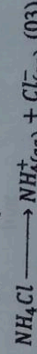
$$\text{pH} + \text{pOH} = 14 \quad (03)$$

$$\text{pH} = 14 - \text{pOH}$$

$$= 14 - 2.95$$

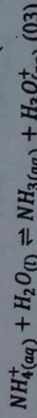
$$= 11.04 \quad (03)$$

(ii) සමතුලන ලක්‍ෂ්‍යයේදී



සෑදී ඇති NH_4Cl සාන්ද්‍රණය $= \frac{0.1}{1000} \times 25 \times \frac{1000}{50}$

$$= 0.05 \text{ mol dm}^{-3} \quad (03+01)$$



0.05 mol dm⁻³

0.05(1-α)

(03)

$$K_a = \frac{[\text{NH}_3_{(\text{aq})}][\text{H}_3\text{O}^+_{(\text{aq})}]}{[\text{NH}_4^+_{(\text{aq})}]} \quad (03)$$

(03)

$$\frac{K_w}{K_b} = \frac{0.05\alpha \times 0.05\alpha}{0.05(1-\alpha)}$$

$$\frac{1 \times 10^{-14}}{1.8 \times 10^{-5}} = \frac{0.05\alpha^2}{(1-\alpha)}$$

$$1 - \alpha \approx 1; 1 >> \alpha$$

$$\frac{1 \times 10^{-9}}{1.8} = 0.05\alpha^2 \quad (03)$$

$$\alpha^2 = \frac{1 \times 10^{-9}}{9 \times 10^{-2}} = \frac{1 \times 10^{-7}}{9}$$

$$\alpha = \left(\frac{0.1}{9}\right)^{\frac{1}{2}} \times 10^{-3}$$

$$[OH^-]_{(aq)} = 0.1\alpha \quad (03)$$

$$= 0.1 \times \frac{(0.1)^{\frac{1}{2}}}{3} \times 10^{-3}$$

$$= \frac{(0.1)^{\frac{1}{2}}}{3} \times 10^{-4}$$

$$pOH = -\lg \left(\frac{(0.1)^{\frac{1}{2}}}{3} \right) \times 10^{-4}$$

$$= \left\{ \lg(0.1)^{\frac{1}{2}} - \lg 3 - 4 \right\}$$

$$= -\left\{ \frac{1}{2}(-1) - 0.48 - 4 \right\}$$

$$= 4.98 \quad (03)$$

$$\therefore pH = 9.02 \quad (03)$$

(iii) HCl 15.00cm^3 එකතු කළ විට සෑදෙන NH_4Cl වල මූල

$$\text{ගණන} = \frac{0.1}{1000} \times 15 \quad (03+01)$$

$$\therefore NH_4Cl \text{ සාන්ද්‍රණය} = \frac{0.1}{1000} \times 15 \times \frac{1000}{40} = 3.75 \times 10^{-2} \quad (03+01)$$

$$\text{ඉතිරි } (NH_3)_{(aq)} \text{ මූල} = \frac{0.1}{1000} \times 10 \quad (03+01)$$

$$\text{ඉතිරි } NH_3(aq) \text{ සාන්ද්‍රණය} = \frac{0.1}{1000} \times 10 \times \frac{1000}{40}$$

$$= \frac{0.1}{4} (03+01)$$

$$pOH = pK_b + \lg \left[\frac{\text{ලවණ}}{\text{හේම}} \right] \quad (03)$$

$$pOH = -\lg(1.8) + -\lg 10^{-5} + \lg \frac{1.5/40}{0.1/4} \quad (03)$$

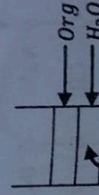
$$pOH = -\lg(1.8) + 5 + \lg 1.5$$

$$pOH = -0.5225 + 5 + 0.18 = 4.66 \quad (03)$$

$$pH = 14 - 4.66 = 9.34 \quad (03)$$

(iv) වෙනසක් නොවේ. (05)

(b) කොටසට ලකුණු 100



$$n = \frac{2\text{mol dm}^{-3} \times 100\text{dm}^3}{10^3}$$

$$= 0.2\text{mol}$$

$$n_{HCl} = \frac{1\text{mol dm}^{-3} \times 10\text{dm}^3}{1000}$$

$$= 1 \times 10^{-2}\text{mol} \quad (02+01)$$

$$n_{NH_3} = 1 \times 10^{-2}\text{mol} \quad (02+01)$$

$$\text{උලයේ ඇති } n_{NH_3} = \frac{1 \times 10^{-2}\text{mol} \times 10^2}{25} \quad (02+01)$$

$$= 4 \times 10^{-2}\text{mol} \quad (03+01)$$

$$\therefore \text{කාබනික ක්වරයේ } n_{NH_3} = (0.2 - 0.04)\text{mol}$$

$$= 0.16\text{mol}$$

$$[NH_3]_{org} = \frac{0.16}{100} \times 10^3 = 1.6\text{mol dm}^{-3} \quad (03+01)$$

$$[NH_3]_{H_2O} = \frac{4 \times 10^{-2}}{100} \times 10^3 = 0.4\text{mol dm}^{-3} \quad (03+01)$$

$$K_D = \frac{[NH_3]_{org}}{[NH_3]_{H_2O}} = \frac{1.6\text{mol dm}^{-3}}{0.4\text{mol dm}^{-3}} \quad (03)$$

$$= 4 \quad (06)$$

(c) කොටසට ලකුණු 50

07. (a) (i) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^8$ (05)

(ii) A හි ව්‍යුහය

සුදු ↓ AgCl වේ.

ද්‍රාවණයේ A හි මූල ගණන = $0.5 \times 10^{-3} \times 25\text{mol}$

$$= 1.25 \times 10^{-2}\text{mol} \quad (04)$$

$$\text{අවක්ෂේපයේ AgCl මූල ගණන} = \frac{3.5875\text{g}}{143.5\text{g mol}^{-1}} \quad (01)$$

$$= 2.5 \times 10^{-3}\text{mol} \quad (04)$$

\therefore A හි අතිරික් Cl^- 2 ක් අඩංගු වේ. (04)

Ni^{2+} මැකරණ අවස්ථාවේ පවතී.

සංගත තෝලයේ ආරෝපණය +2 වේ. (03)

උදාහරණ ලෙස Ni සමඟ සංගත වේ. (03)

$$NH_3 \text{ මූල ගණන} = \frac{0.425\text{g}}{17\text{g mol}^{-1}} \quad (01)$$

$$= 2.5 \times 10^{-2}\text{mol} \quad (03)$$

\therefore සංගත තෝලයේ NH_3 ලීතන 2 කි. (03)

අව්‍යවහාරයේ ජායමිතිකත් නිසා H_2O ලීතන 4 කි. (02)

$$\therefore A = [Ni(H_2O)_4(NH_3)_2]Cl_2 \quad (05)$$

B හි ව්‍යුහය

$$\text{ද්‍රාවණයේ B මූල ගණන} = 0.5 \times 10^{-3} \times 50\text{mol}$$

$$= 2.5 \times 10^{-2}\text{mol} \quad (04)$$

$$AgCl \text{ මූල ගණන} = \frac{3.5825\text{g}}{143.5\text{g mol}^{-1}}$$

$$= 2.5 \times 10^{-2}\text{mol} \quad (03)$$

B හි අතිරික් Cl^- එකකි. (04)

සංගත තෝලයේ ආරෝපණය +1 විය යුතුය. (03)

අව්‍යවහාරයේ ජායමිතිකත් නිසා උදාහරණ ලෙස 5ක් සමබන්ධ

වේ. (03)

$$NH_3 \text{ මූල ගණන} = \frac{1.275\text{g}}{17\text{g mol}^{-1}}$$

$$= 7.5 \times 10^{-3}\text{mol} \quad (03)$$

සංගත සංකීර්ණයේ NH_3 ලීතන 3 කි. H_2O ලීතන 02 කි. (02+02)

$$B \text{ හි ව්‍යුහය} = [Ni(H_2O)_4(NH_3)_2]Cl \quad (05)$$

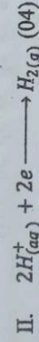
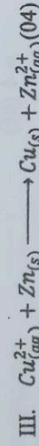
(iii) A-diamminetetraaquanickel(II) chloride (05)

B - triamminediaquachloridonickel(III) chloride (05)

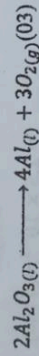
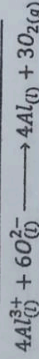
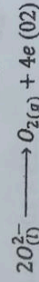
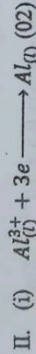
(a) කොටසට ලකුණු 80)

(b) (i) $E_{cell}^{\theta} = E_{cat.hode}^{\theta} - E_{anode}^{\theta}$ (02)
 $= 0.34V - (-0.76V)$
 $= 1.1V$ (02+01)

(ii) විද්‍යුත් විච්ඡේද්‍ය දෙක අතර ඇති වන ද්‍රව සන්ධි විචලය අවම කර ගැනීම සඳහා (04)



(v) I. වෙනස් නොවේ. (02)



80 වූ O_2 මවුල ප්‍රමාණය $= \frac{168.00 \text{ cm}^3}{22400 \text{ cm}^3 \text{ mol}^{-1}}$ (02)

පෑදෙන Al මවුල ප්‍රමාණය $= \frac{4}{3} \times \frac{168}{22400} \text{ mol}$
 $= 0.01 \text{ mol}$ (02)

පෑදෙන Al ස්කන්ධය $= 0.01 \text{ mol} \times 27 \text{ g mol}^{-1}$ (03)
 $= 0.27 \text{ g}$ (05)

(iii) e මවුලයක ආරෝපණය Q නම්

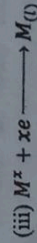
O_2 මවුල 1ක් පෑදීමේ දී ලබා යන විද්‍යුත් ප්‍රමාණය $= 4Q$ (02)

O_2 $\frac{168}{22400} \text{ mol}$ ක් නිදහස් විච්ඡේදී ලබා යන විද්‍යුත් ප්‍රමාණය $= \frac{168}{22400} \times 4Q$ (02)

ගැලු විද්‍යුත් ප්‍රමාණය $= I \times t$
 $= 3.7A \times 13 \times 60s$

$\therefore \frac{168}{22400} \times 4Q = 3.7 \times 13 \times 60$ (02)

$Q = 96200C$ (02)



ලැබුණු M මවුල ප්‍රමාණය $= \frac{1.373 \text{ g}}{137.3 \text{ g mol}^{-1}}$
 $= 0.01 \text{ mol}$ (02)

M හි මවුල 1 ක් විසර්ජනයට අවශ්‍ය e ප්‍රමාණය $= x \text{ mol}$ (02)

M හි 0.01 mol විසර්ජනයට අවශ්‍ය e ප්‍රමාණය $= 0.01x \text{ mol}$ (02)

අවශ්‍ය විද්‍යුත් ප්‍රමාණය $= 0.01x \times 96500$

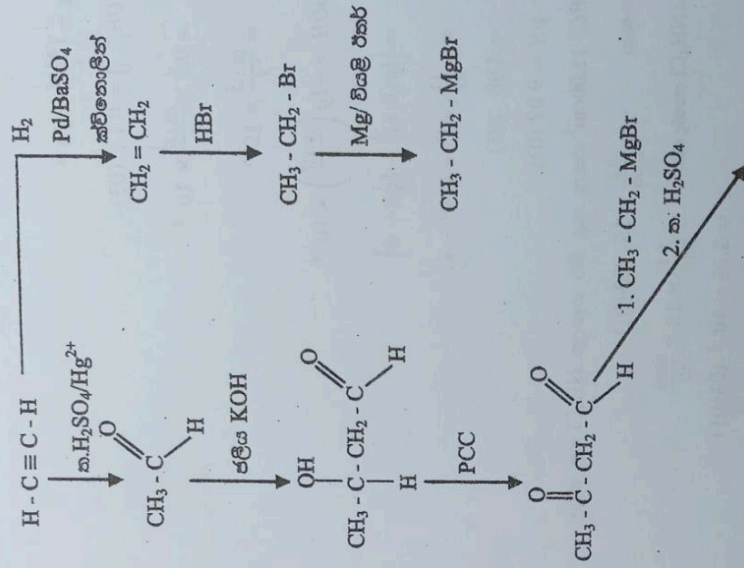
$0.01x \times 96500 = 3.7 \times 13 \times 60$ (02)

$x = +3$

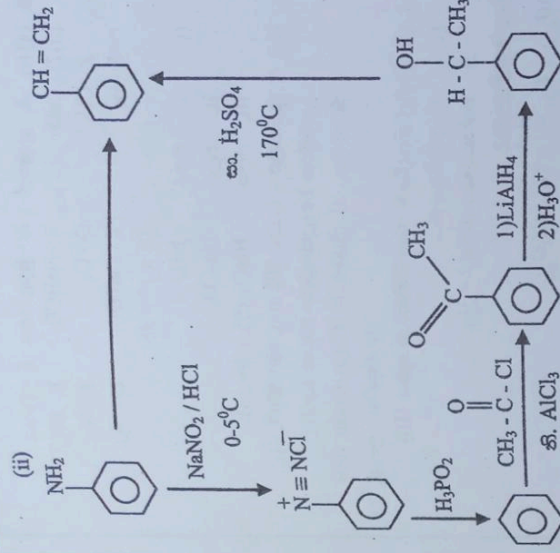
කැටයන මත ආරෝපණය +3 (02)

(b) කොටසට ලකුණු 70)

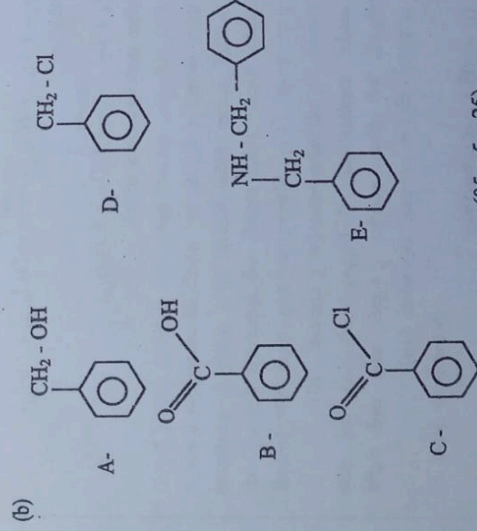
08. (a) (i)



සංයෝග වලට	$= 04 \times 8 = 32$
ප්‍රතිකාරක	$= 03 \times 9 = 27$
	$= 59$



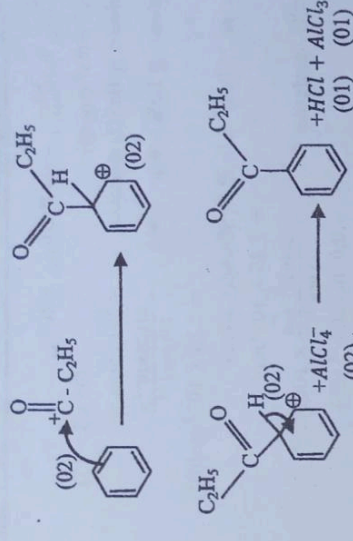
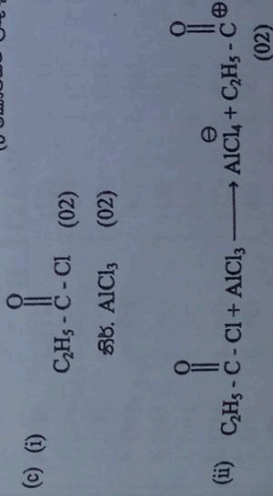
(a) කොටසට ලකුණු 85)



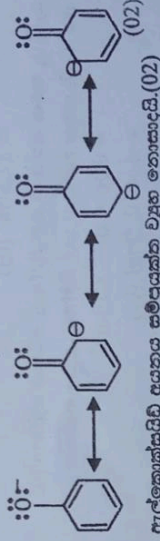
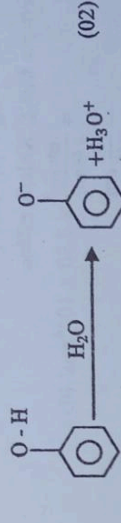
P - NaNO_2 / සා. HCl (04)
 Q - H^+ / KMnO_4 (03)
 R - PCl_3 (03)

(05 x 5 = 25)

(b) කොටසට ලකුණු 35)



(iii) ශ්‍රීතලේ කාරකය (02)



ආරම්භකයෙහි අයනය සම්ප්‍රයුක්ත වූහ නොසාදයි. (02)

නමුත් ඊනෙට් අයනය සම්ප්‍රයුක්ත වූහ සාදයි. (02) ස්ථායී වේ.

:: එකතෝල් වලට වඩා ඊනෙට් ආම්ලික වේ. (02)

(c) කොටසට ලකුණු 30)

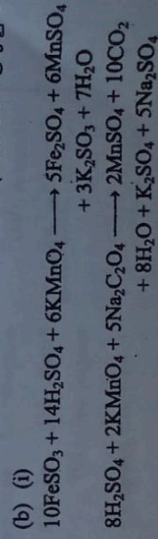
09. (a) (i) A - Fe D - Fe_2O_3 G - NO_2
 B - Ni E - NiO J - Fe(OH)_3
 X - NO_2 F - O_2 K - Ni(OH)_2
 L - $\text{KFe[Fe(CN)}_6]$ (03 x 10 = 30)

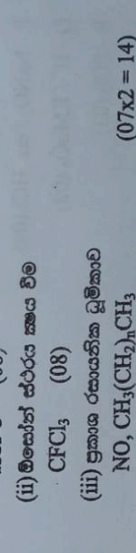
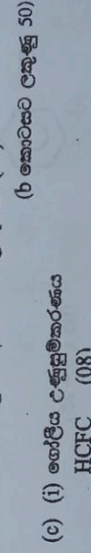
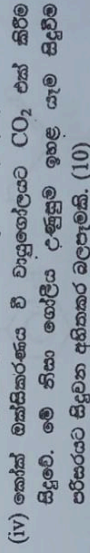
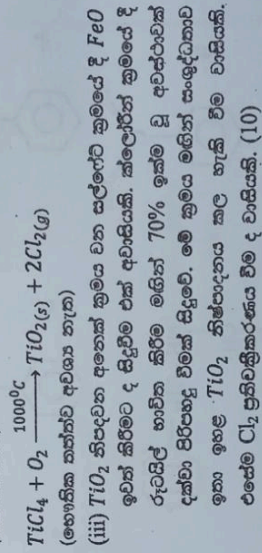
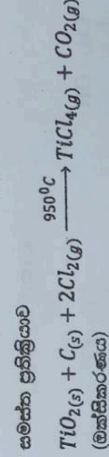
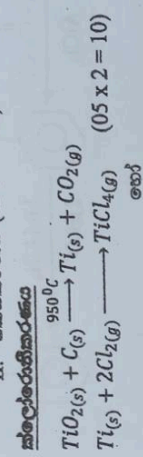
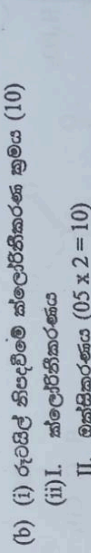
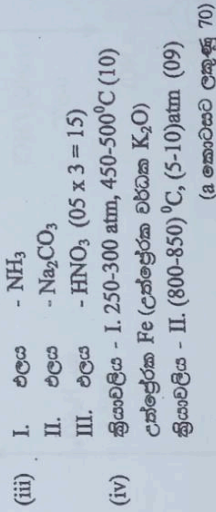
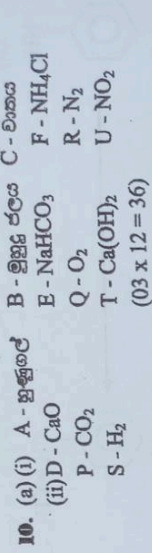
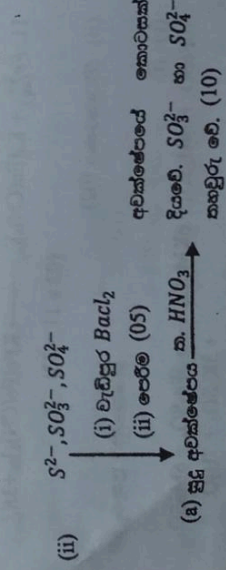
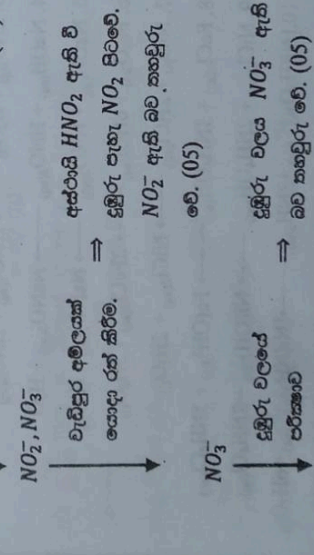
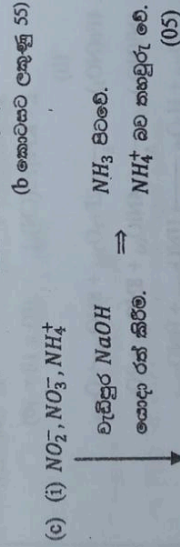
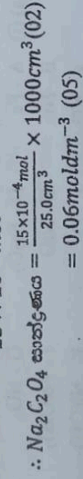
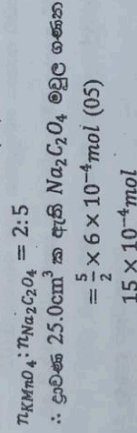
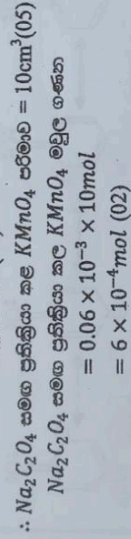
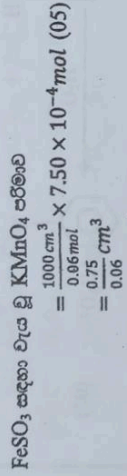
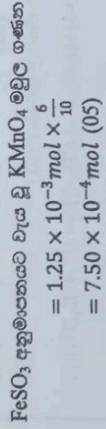
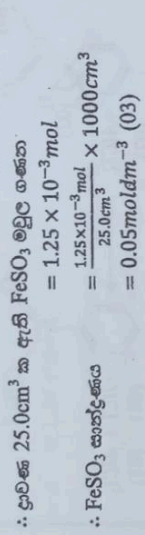
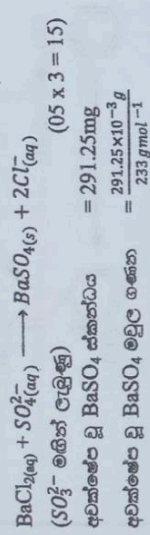
(ii)

- $4\text{Fe(NO}_3)_2 \xrightarrow{\Delta} 2\text{Fe}_2\text{O}_3 + 8\text{NO}_2 + \text{O}_2$ (02)
 - $4\text{Ni(NO}_3)_2 \xrightarrow{\Delta} 4\text{NiO} + 8\text{NO}_2 + 2\text{O}_2$ (02)
 - $2\text{NO}_2 + \text{H}_2\text{O} \longrightarrow \text{HNO}_3 + \text{HNO}_2$ (02)
 - $\text{NaOH}_{(\text{aq})} + \text{HNO}_3 \longrightarrow \text{NaNO}_3 + \text{H}_2\text{O}$ (02)
 - $\text{NaOH}_{(\text{aq})} + \text{HNO}_2 \longrightarrow \text{NaNO}_2 + \text{H}_2\text{O}$ (02)
 - $\text{Fe}_2\text{O}_3 + 6\text{HCl}_{(\text{aq})} \longrightarrow 2\text{FeCl}_3 + 3\text{H}_2\text{O}$ (02)
 - $\text{NiO} + 2\text{HCl}_{(\text{aq})} \longrightarrow \text{NiCl}_2 + \text{H}_2\text{O}$ (02)
 - $\text{FeCl}_3 + 3\text{NH}_4\text{OH}_{(\text{aq})} \longrightarrow \text{Fe(OH)}_3 + 3\text{NH}_4\text{Cl}_{(\text{aq})}$ (02)
 - $\text{NiCl}_2 + 2\text{NH}_4\text{OH}_{(\text{aq})} \longrightarrow \text{Ni(OH)}_2 + 2\text{NH}_4\text{Cl}_{(\text{aq})}$ (02)
 - $[\text{Ni(H}_2\text{O)}_6]^{2+} + 3\text{NH}_3 \longrightarrow [\text{Ni(NH}_3)_6]^{2+} + 6\text{H}_2\text{O}$ (02)
 - $\text{Fe}^{2+} + \text{K}_4[\text{Fe(CN)}_6] \longrightarrow \text{K}_3[\text{Fe(CN)}_6] + \text{K}^+$ (02)
- (03 x 11 = 33)

(ii) ද්විධාකරණය (02)

(a) කොටසට ලකුණු 65)





MCQ ETT - 41					
(1) 3	(11) 2	(21) 3	(31) 5	(41) 4	
(2) 1	(12) 1	(22) 5	(32) 2	(42) 1	
(3) 5	(13) 3	(23) 4	(33) 5	(43) 5	
(4) 2	(14) 5	(24) 5	(34) 1	(44) 4	
(5) 3	(15) 1	(25) 1	(35) 3	(45) 3	
(6) All	(16) 1	(26) 5	(36) 5	(46) 1	
(7) 2	(17) 2	(27) 1	(37) 4	(47) 2	
(8) 4	(18) 3	(28) 3	(38) 5	(48) 5	
(9) 5	(19) 4	(29) 1	(39) 1	(49) 3	
(10) 5	(20) 2	(30) 4	(40) 4	(50) 5	

ETT - 40 සංඛේදනය				
MCQ = (42)	3	MCQ = (40)	5	