ANSWERS TO A2 TRIAL EXAMS (ACCORDING TO INTAKE)

June 2010 Intake (P3)

1. $x \leq 1$
2. $x = \pm ln2$
3. a = -2 b = - 4
4. iii) 5.29
5. i) $R = \sqrt{13}$ $\alpha = 33.7°$
   ii) $42.4°, 70.2°$
6. i) $2 - \frac{2}{2x+1} + \frac{2}{2x-1}$ ii) $k = \frac{9}{5}$
7. i) $-2\sin^3 t\cos t$ ii) $y = -\frac{1}{2}x + 2$
8. i) $\boldsymbol{r} = \begin{pmatrix} -1 \\ 1 \\ 5 \end{pmatrix} + \lambda \begin{pmatrix} 2 \\ 1 \\ -1 \end{pmatrix}$ ii) $\begin{pmatrix} 1 \\ 2 \\ 4 \end{pmatrix}$
   iii) $x + 2y + 4z = 21$
9. i) $\frac{250}{\pi r^2(2t+1)^2}$ ii) $v = \frac{-500}{2t+1} + 500$ $\frac{dr}{dt} = 0.029$
10. i) a) $k^3(cos3\alpha + isin3\alpha)$
    b) $\frac{1}{3k}(cos5\alpha + isin5\alpha)$
    ii) $z = \left(3 + \sqrt{2}\right) - i(3 + \sqrt{2})$

June 2010 Intake (P4)

1. $12 ms^{-1}$
2. i) 19.2N, 039° ii) 12.9N, 219°
3. i) $\frac{15}{56}$ ii) $s = -\frac{16}{7t} + 2t + \frac{18}{7}$
4. –
5. i) 4.2N iii) 0.5m
6. ii) $v = \sqrt{2l}\ ms^{-1}$ iii) $v = \sqrt{12l}\ ms^{-1}$
7. i) 105J ii) 10.2N iii) 0.337 iv) $5.39 ms^{-1}$

January 2010 Intake (P3)

1. $x > \frac{1}{3}a$
2. $\frac{1}{27}(2 - \frac{17}{e^3})$
3. i) a = -5, b = 19
   ii) $(x-3)(x+1)(-5x-2)$
4. $5y = -4x - 6$
5. i) R = 3, $\alpha = 35.26°$
   ii) $128.5°, 176.7°, -3.3°, -51.5°$
6. i) $P = P_o\, e^{sin\lambda t}$ ii) 441 minutes
7. i) $\begin{pmatrix} -3 \\ 3 \\ 7 \end{pmatrix}$ iii) $3x - y + 5z = 23$
8. iv) 1.80
9. i) $\frac{4}{2+x} + \frac{1}{1-2x} + \frac{2}{(1-2x)^2}$
   ii) $5 + 9x + \frac{57}{2}x^2 + \frac{287}{4}x^3 + \cdots, |x| < \frac{1}{2}$
10. i) $\frac{21}{29} - \frac{20}{29}i$
    ii) $625[\cos(2.573) + isin(2.573)]$ iv) 7

January 2010 Intake (P4)

1. 6.25
2. i) $138.2°$ ii) 8.94
3. i) $x = \frac{t^3}{3} - \frac{5}{2}t^2 + 4t + 2$
   ii) $\left(1,\ 3\frac{5}{6}\right)\ max.point\ \left(4,\ -\frac{2}{3}\right) \min.point$
   iii) 2 times
4. i) $5l$ ii) 0
5. iii) $A = \frac{17}{6}$ $B = \frac{11}{60}$
6. ii) $20 ms^{-1}$ iii) 80m
7. i) 300 000J ii) 6870N iv) 3.38m

June 2009 Intake (P3)

1. $\frac{1}{81} - \frac{4}{243}x + \frac{10}{729}x^2$
2. 2.32, 1.58
3. -2
4. A = -3 $(x^2 + 2x + 5)(x + 2)(x - 3)$
5. $y = ln(2e - 1)$
6. 1.94
7. $-\theta tan\theta + 1$
8. Show
9. i) $R = \sqrt{52}$, $\alpha = 56.3°$ ii) $257.6°$, $349.8°$
10. $i)$ $\frac{2}{x+2} - \frac{2}{x+1} + \frac{3}{(x+1)^2}$ ii) $ln\frac{25}{64} + \frac{9}{4}$
11. $ii)$ $\sqrt{2}$ iii) $\sqrt{8}\left(cos\frac{3\pi}{4} + isin\frac{3\pi}{4}\right)$ iv) -1 + 2i
12. ii) $r = \begin{pmatrix} -5 \\ 4 \\ 2 \end{pmatrix} + t\begin{pmatrix} 9 \\ \lambda - 4 \\ -3 \end{pmatrix}$
    iii) $\sin\theta = \frac{-5\lambda - 13}{\sqrt{42}\sqrt{\lambda^2 - 8\lambda + 106}}$

June 2009 Intake (P4)

1. 4.47 m/s
2. 1.61N; 0.6 kg
3. (i) 2400 N; (ii) 0.48 m/s^2
4. 2m/s^2; 200 m; sketch
5. $\mu < 0.0600$
6. (i) 12 ½ m/s; (ii) $37\frac{1}{3}$ m; (iii) $2\frac{2}{3}$m
7. (i) 4N, 11N; (ii) 6N, 22N

January 2009 Intake(P3)

1. a = 2, b = -5
2. 0.65
3. 2.21
4. $y = 10\sqrt{x} + 3$
5. Show
6. a) R =13, $\alpha = 67.4°$
   b) $\theta = 94.7°$, $310.5°$
   c) $\frac{1}{7}, 202.6°$
7. u = -1
8. i) A =-3, B = 2, C = 0 ii) -1.09
9. i) $2x - 3y + 7z = -5$
   ii) $r = \begin{pmatrix} 130 \\ -40 \\ 20 \end{pmatrix} + t\begin{pmatrix} -40 \\ 20 \\ -5 \end{pmatrix}$
   iii) $\overrightarrow{OF} = \begin{pmatrix} 10 \\ 20 \\ 5 \end{pmatrix}$
   iv) 135
10. a) 2 - i 3
    b)
    $z_1 = -3 + 2i$ $z_2 =$
    $-3 - 2i$ $2\sqrt{2}$, $\frac{3}{4}\pi$, $1 + 2i$

January 2009 Intake(P4)

1. 40500 J/s; 8000 J/s; 48500W
2. 11.5 N; 5.73 N
3. 20 s; 50 m/s
4. 132N; 194N; 0.618
5. (i) Acc, const. vel., dec, const. vel.;
   (ii) 30, 70, 107.5, 140, 170
   (iii) sketch
   (iv) 16 N
6. (a) 4s, 48 m/s, -8 m/s
   (b)$x_a = t^3 - 72t + 288$
7. 10.1 m/s; 40.4 m

June 2008 Intake(P3)

1. $68m^2$
2. $x < -\frac{2}{3}$ or $x > 0$
3. $-2xe^{-2x} - e^{-2x} + c$
4. $y = \left[\frac{tan3x}{6} + 1\right]^2$
5. $\theta = 1.374$
6. $a)\ \theta = 60°$ b) $r = \begin{pmatrix} 4 \\ -2 \\ 0 \end{pmatrix} + t\begin{pmatrix} 1 \\ -1 \\ 5 \end{pmatrix}$
7. (i) Show
   (ii) Sketch
   (iii) Show
8. ii) $R = 10.82 \quad \propto = 33.69°$
   iii) $x = 11.3°,\ 56.1°$
9. i) $y = y_0$ ii) ln2 iii) 3.19 pm iv) 32 ln2
10. $\frac{1}{2} + \frac{3}{4}x + \frac{9}{8}x^2$
11. a) circle, centre (3,4), radius 2 i) 7, ii) 0.761
    b) i) 2, $\frac{\pi}{3}$

June 2008 Intake(P4)

1. 7.8N
2. 5.53 ms^{-1}
3. (i) 159 J
   (ii) 80 J
   (iii) 207 J
4. (i) 20m
   (ii) $s(t) = 0.01t^3 - 0.15t + 2t + 5$
   (iii) 35m
5. 22.5 ms^{-1}
6. (i) Show
   (ii) $T + 15sin21° - 11.2 = 1.5a$-----1
   $12 - T = 1.2a$---------- 2
   (iii) Show
7. (i) Show
   (ii) Show. $T = 0.7072\ N$
   (iii) 1.88 ms^{-1}

January 2008 Intake(P3)

1. $x < \frac{1}{2}$
2. $\alpha = 2.095$
3. 3e – 6
4. i) $-\frac{3cost}{4sint}$
5. ii) $\theta = 0,\ \frac{3}{2}\pi,\ 2\pi$
6. ii) $\frac{4}{21}\pi$
7. 745
8. i) Quotient = 2x +3 , Remainder = x ;
   ii) A = 2, B = 3, C = 1, D = 0
9. i) a) $|z| = \frac{1}{2}$,
   $(1-z)^* = \left(1 - \frac{1}{2}cos\theta\right) + i(\frac{1}{2}sin\theta)$;
   b) $\frac{2sin\theta}{5-4cos\theta}$ ii) $\frac{2}{3}\pi$
10. i) $68.5°$ ii) -3 iii) $x + 3y + 2z = -2$ iv) $\sqrt{14}$

January 2008 Intake(P4)

1. 2.56N, 179.4°
2. (i) 560 J
   (ii) 4200 J
   (iii) 54m
3. (i) 137.5 N
   (ii) 42.4 ms^{-1}
4. 15m
5. (i) 0.64 ms^{-1}
   (ii) 0.8 ms^{-1}
   (iii) 10s
6. (i) 0.06
   (ii) Show
7. $0 \le m \le \frac{3}{25}$

June 2007 Intake(P3)

1. x = 1.47
2. Show
3. $\alpha = 22.6°,\ R = 13;\ \theta = 86.3°, 229.5°$
4. $ii) -7, 1\ ;\ iii)\ -7 < x < 1$
5. $\frac{1}{4}(5e^4 - 1)$
6. (i) $|z_1| = 1, |z_2| = 1,$

$$\arg(z_1) = \frac{\pi}{4}, \arg(z_2) = \frac{-3\pi}{4}$$

(ii)Sketch

7. (i) Show(ii) Show
8. $i)\ \frac{dx}{dt} = kx\ ; iii)\ 6837.7\ ; iv)\ 12\ days$
9. (i) $\begin{pmatrix} -4 \\ 4 \\ -1 \end{pmatrix} + t\begin{pmatrix} 3 \\ -2 \\ 4 \end{pmatrix}$ (ii) $r \bullet \begin{pmatrix} 13 \\ 17 \\ 16 \end{pmatrix} = 0$

(iii) $\cos\theta = \left|\frac{21}{\sqrt{35}\sqrt{33}}\right|$

$3x - 2y + 4z = 5$

10. $i)\ A = -1, B = 6, C = -8$

$ii)\ \frac{1}{2}ln2\ ;\ iii)\ \frac{\pi}{8}\ ; iv)\ 2ln2 - \pi$

June 2007 Intake(P4)

1. (i) 325000 J
   (ii) 226605 J
2. 1.37 N
3. (a) 30.5 N
   (b) 1.9 ms^{-2}
4. (i) Show
   (ii) 9 m
5. (i) 0.897
   (ii) 0.268 mg
6. (i) Sketch
   (ii) Show
7. (i) 1.67 ms^{-2}
   (ii) 11.7m N
   (iii) 16.7m N

January 2007 Intake(P3)

1. $4 < x < 5$
2. $x = \frac{a}{2}, x = 3a$
3. $\frac{dy}{dx} = \frac{-5}{8}$
4. $\alpha = -2.643$
5. $\alpha = 63.43°,\ R = \sqrt{45};\ 3\sqrt{5} - 2;\ -3\sqrt{5} - 2$
6. ii) 1.597
7. $a)\ a = -19, b = 32;$

$b)(x + 2)(x - 1)(2x - 3)(3x - 2)$

8. $4x + y - 2z = 1$
9. (i) $|wx| = 2\sqrt{2}$, $\arg(wz) = \frac{11}{12}\pi$

(ii) $z = 2\sqrt{2} + i(2 + 2\sqrt{2})$

10. $i)\ \frac{1}{1-2x} + \frac{2-x}{1+x^2}\ ; iii)\ \frac{-1}{2} < x < \frac{1}{2}$
11. $ii)\ t = 16000 - 800\sqrt{x}\ ;$

$iii)\ 4.5hours;\ \ iv)\ 121cm$

January 2007 Intake(P4)

1. $\theta = 38.5°$

$Y = 4.56N$

2. $a = \frac{10}{3}ms^{-2}$

0.15m

3. $\mu = \frac{3}{4}$,

$a = 7.49ms^{-2}$

4. Distance = 4m,

$F = -1.2\ N$

5. (i) 108 m
   (ii) 8s
   (iii) 16m
6. (i) 25 J
   (ii) 4.59 m
   (iii) 2.63ms^{-1}
7. $A = \frac{17}{6}, B = \frac{11}{60}$

June 2006 Intake(P3)

1. $\frac{8}{3} < x < 4$
2. $2 + \frac{x^2}{4} - \frac{x^4}{64}$
3. 1.282
4. Show
5. $k = e^{-8} \quad n = 2$
6. $\propto = 18.43° \quad R = \sqrt{10}$; $16°, 145°, 196°, 325°$
7. $-4, -2, -1$
8. $i)\ \frac{1}{y-1} - \frac{1}{y} \quad ii)\ y = \frac{2}{2-e^{x^2}}$
9. Show
10. All Show – (2.218)
11. (i) $\sqrt{2}, \frac{-3\pi}{4}. 2, \frac{\pi}{2}$
    (ii) Sketch
12. (2, -3, 1). (5, -2, -1). $\begin{pmatrix} 2 \\ -3 \\ 1 \end{pmatrix} + t\begin{pmatrix} 3 \\ 1 \\ -2 \end{pmatrix}$. 53°

June 2006 Intake(P4)

1. Show
2. 2 m/s
3. (i) $\frac{4}{7}$; (ii) $\frac{4}{13}$
4. (i) sketch; (ii) show
5. (i) 20J; (ii) 48J; (iii) 28J; (iv) $2\frac{1}{3}$N
6. (i) $10\sqrt{3}$N; (ii) $5\sqrt{6}$N, 0.366 kg
7. (i) $16666\frac{2}{3}$W; (ii) 0.06 m/s^2; (iii) 18256 W

January 2006 Intake(P3)

1. 0.186
2. $y = 19x - 14$
3. a = 1 b = -5 $(x+2)(2x-1)(x-1)$
4. $\propto = 68.2° \quad R = \sqrt{29}$; $116.2°, 200.2°$
5. $\frac{1}{5}(2e^{\pi} + 1)$
6. (i) Sign change.
   (ii) $\alpha = 1.67$
7. $\frac{8}{2-3x} + \frac{5}{(1+2x)^2}$;
   $9 - 14x + 69x^2 - \frac{293x^3}{2} + \cdots$; $|x| > \frac{1}{2}$
8. $|z| = \sqrt{2}$, Locus of arg with 0.405rad
9. (ii) $4x + y - 2z = 1$
10. $2\sqrt{h} = -Bt + 2; \ B = 2$
    $i)\ 2\left[2 - \sqrt{h} - 2\ln\left(2 - \sqrt{h}\right)\right] + c$;
    $ii)\ 0.773hr$

January 2006 Intake(P4)

1. 2.08 m
2. 25 ms^{-1}
3. (i) 5s
   (ii) 15 m
4. $P = 8N, R = 24\sqrt{3}N$
5. (i) $\frac{D}{m+m_1}$
   (ii) $\frac{D\,m_1}{m+m_1}$
6. (i) $m = \frac{1}{2}$
   (ii) $P = 1\frac{5}{11}$
7. (i) 101.25 s
   (ii) 1054.7 m