# ANNEX B

## PJC 2011 JC 2 H2 End of Year Examination Paper 1

| Qn/No | Topic Set | Answers |
|---|---|---|
| 1 | Integration Techniques<br><br>Applications of Integration | (i) $\frac{1}{2}x^2\tan^{-1}\left(2x^2\right)-\frac{1}{8}\ln\left(1+4x^4\right)+C$<br>(ii) $50.89\,\text{units}^3$ |
| 2 | Binomial Theorem | (i) $\frac{1}{2}-\frac{1}{16}x^2+\frac{3}{256}x^4$<br>(ii) $\frac{1}{2}+\frac{1}{2}x-\frac{1}{16}x^2-\frac{1}{16}x^3$<br>(iii) $-2<x<2$ |
| 3 | AP/GP | (i) $28-24\left(\frac{3}{4}\right)^n$<br>(ii) at least 7 times<br>(iii) $S_\infty=28$ |
| 4 | Summation | (i) $1-\frac{1}{N-2}$<br>(ii) $1-\frac{1}{N-4}$<br>(iii) $\lim_{N\to\infty}\left(1-\frac{1}{N-2}\right)=1$ |
| 5 | Maclaurin Series | $2x+2x^2-\frac{4x^3}{3}$ |
| 6 | Functions | (ii) $\text{f}^{-1}:x\mapsto\frac{1+2x}{x+2},\ x>-2$<br>(iii) $\text{gf}\left(x\right)=\ln\left(\frac{x-5}{x-2}\right),\ \ x<2$ |
| 7 | Parametric Equations | (i) $y=\frac{1}{12}x+\frac{4}{3}a,\ y=-12x+98a$<br>(ii) $\left(-64a,-4a\right)$ |
| 8 | Differential Equations | (i) $x=\frac{1}{2}\left(1+\text{e}^{-0.1t}\right)$<br>(iii) $x\to\frac{1}{2}$ |

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| 9 | Complex Numbers | (i) $z = re^{-i\theta}$ is another root<br>(ii) $\lvert z_2 \rvert = 2$, $\arg(z_2) = \frac{5\pi}{6}$, $z_2$ is an anti-clockwise rotation of $z_1$ about the origin by $\frac{\pi}{2}$.<br>(iii) $\left(z^2 - 2z + 4\right)\left(z^2 + 2\sqrt{3}z + 4\right)$ |
| 10 | Curve Transformations | (b) $\frac{4}{x^2}$ |
| 11 | Curve Sketching | (i) $x = k$, $y = x + k - 4$<br>(ii) $k < 0$ or $k > 2$<br>(iii) $k = 4$<br>(iv) $p > 1$ |
| 12 | Vectors | (ii) $\begin{pmatrix} 0 \\ -1 \\ 7 \end{pmatrix}$<br>(iii) $a = 3, b = 1, c = 0$, $r = \begin{pmatrix} 0 \\ 3 \\ 0 \end{pmatrix} + \lambda \begin{pmatrix} -1 \\ 3 \\ 10 \end{pmatrix}, \lambda \in \mathbb{R}$ |