Topic: Polynomials

| Question 1 [2008 EOY, Q11] | marks |
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| (i)<br>**(a)** Show that $2x+1$ is a factor of $2x^3+x^2-8x-4$. | [1] |
| (i)<br>**(b)** Solve for *x* if $2x^3+x^2-8x-4=0$. | [4] |
| (ii)<br>The expression $4x^3-20x^2+px+12$ leaves a remainder of $-10x+q$ when divided by $2x^2-3x+1$. Find the values of *p* and *q*. | [5] |

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| Question 2 [2010 EOY, Q12] | marks |
| (a)<br><br>Solve for *x* when $6x^3 + 7x^2 - 14x - 8 = 0$. | [3] |
| (b)<br>It is given that $12x^3 + ax^2 + 15x + b \equiv (2x^2 + 5x - 3)Q(x) + 158x - 83$ where $Q(x)$ is a polynomial.<br><br>(i)<br>State the degree of $Q(x)$. | [1] |
| (ii)<br>Find the values of *a* and *b*. | [3] |

| Question 3 [2011 EOY, Q11] | marks |
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| (i)<br><br>Given that $f(x) = x^3 - 2\sqrt{3}x^2 + 2(A - x)$ has a factor $\left(x + \sqrt{2}\right)$ and the other two roots of the equation $f(x) = 0$ are $\sqrt{2}$ and $k$. Find the value of $A$ and of $k$. | [4] |
| (ii)<br><br>Solve the equation $3x^3 = 2x^2 + 7x + 2.$ | [4] |

| Question 4 [2012 EOY, Q8] | marks |
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| The cubic polynomial $f(x)$ is such that the coefficient of $x^3$ is 2 and the roots of $f(x) = 0$ are −1, $2k$ and $k^2$. It is given that $f(x)$ has a remainder of 168 when divided by $x - 2$.<br><br>(i)<br>Show that $k^3 - k^2 - 2k - 12 = 0$. | [3] |
| (ii)<br><br>Hence find a value for $k$ and show that there are no other real values of $k$ which satisfy this equation. | [4] |

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| (iii)<br><br>Use your answer to part **(ii)** to solve the equation $12e^{-3x} + 2e^{-2x} + e^{-x} - 1 = 0$. | [2] |
| Question 5 [2013 EOY, Q5] | marks |
| Given that $x^2 + x - 6$ is a factor of $2x^4 + x^3 - ax^2 + bx + a + b = 1$, find the value of *a* and of *b*. | [4] |
| Question 6 [2014 EOY, Q7] | marks |
| (i)<br>Solve the equation $2x^3 = 5x^2 - x - 2$. | [4] |

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| (ii)<br><br>Find the remainder when $(x-3)^{200}-(x-2)^{100}$ is divided by $x^2-5x+6$. | [4] |
| Question 7 [2015 EOY, Q9] | marks |
| (i)<br>Solve for $x$ when $2(e^{3x}+2)=e^x(7e^x+5)$. | [5] |

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| (ii)<br><br>Given that $f(x) = 8x^4 + px^3 - 30x^2 + x + q$, where $p$ and $q$ are unknown constants, leaves a remainder of 2 when divided by $x - 2$ and a remainder of 9 when divided by $2x + 3$, find the values of $p$ and $q$ and hence find the remainder when $f(x)$ is divided by $2x^2 - x - 6$. | [6] |