ANNEX B

2012 NJC H2 Maths Preliminary Examination Paper 1

Qn/No	Topic Set	Answers
1	System of Linear Equations	$\mathrm{f}(x)=\frac{4x^3}{27}-\frac{10x^2}{9}-\frac{56x}{9}+1;\ \ x<2.5$
2	Vectors	(ii) $\lambda=-109$ Since P is on BA produced, $\overrightarrow{AP}=k\overrightarrow{AB}$ for a negative value of k.
3	Maclaurin Series	$1+x+\frac{1}{2}x^2+\frac{3}{2}x^3$ (a) 13 (b) $1-x+\frac{5}{2}x^2$
4	Differential Equation	(ii) $x=\frac{16t^2}{16t+1}$; $\frac{256}{65}$ or 3.94 (iii) The particular solution of the DE suggests that the **amount of bacteria in the Petri dish will grow indefinitely as time passes**.
5	Differentiation and Application of Integration involving Parametric Equations	(ii) $b=-4.5$
6	Vectors	(a) $a=-7$ or $a=-1$ (b) $\overrightarrow{ON}=\begin{pmatrix}1/3\\2/3\\1/3\end{pmatrix}$ or $\begin{pmatrix}-1/3\\-2/3\\-1/3\end{pmatrix}$ (c) $a=\frac{1}{2}, b\neq 7$
7	Arithmetic and Geometric Progressions	(a)(ii) $\frac{125}{3}a$ (b)(i) $p=-5,\ q=305$ (ii) $n=9$
8	Complex Numbers	$m=-1$ (i) $z_1=2-\mathrm{i},\ \ z_2=2+\mathrm{i},\ \ z_3=-3$ (iii) Since $\lvert z_1\rvert=\sqrt{5}, \lvert z_3\rvert=3, \lvert z_1\rvert\neq\lvert z_3\rvert$. The locus of complex numbers satisfying the

		equation $\lvert w\rvert = a$, for some positive constant a, will not pass through all the points representing the complex numbers z_1, z_2 and z_3.
9	Sequences and Series/ Method of Difference/ Mathematical Induction	(ii) $\frac{1}{2}\left(\frac{1}{2} - \frac{1}{(N+1)(N+2)}\right)$ (iv) $\frac{1}{144} - \frac{1}{2N(N-1)}$
10	Curve Sketching/ Graph Transformations	(a) (i) Vertical asymptotes: $x = -a$ or $x = a$ Horizontal asymptote: $y = 2$ $h \geq 3$
11	Functions/ Inequalities	(i) $x = \frac{\sqrt{2}}{2}$ (ii) $k = (1 - e^{9/8})/2$ or -1.04 (iii) $\frac{1}{4} \leq x \leq 1$ or $2.5 \leq x < 3$