Further Mathematics 9649 ANNEX

Paper 1		
QN	**TOPIC** (***Pls Select***)	**ANSWERS** (***Exclude graphs and text answers***)
1	Numerical Methods	(a) $k=\frac{1}{3}$ (b) $\frac{1112}{5079}\pi$
2	Mathematical Induction	
3	Apps of Integration (incl. polar)	(a) $y=\left(\tan\frac{\pi}{3}\right)x,\ y=(\tan\pi)x$ and $y=\left(\tan\frac{5\pi}{3}\right)x.$ (b) 4.712 (c) $(2,0),\left(2,\frac{2\pi}{3}\right),\left(2,\frac{4\pi}{3}\right).$
4	Recurrence Relations	(a) $H_n=-146+196(1.025)^n$ (b) year 2024
5	Complex Numbers	
6	Complex Numbers	(a) $\frac{\lvert a\rvert}{\sqrt{2}}$ (b) $\arg(a)-\pi<\arg(z)\le\arg(a)-\frac{\pi}{2}$
7	Numerical Methods	(a) (i) $k>3$ (ii) $0<k<3$ (c) $a_2\approx 0.47$
8	Differential Equations	(c) $a\ln\left(\frac{a+\sqrt{a^2-b^2}}{b}\right)$ (d) $a\ln\left(\frac{a}{b}\right)$
9	Conics	(a) $(x-3)^2-\frac{y^2}{8}=1;\ \alpha=6$ (b) $e=3$ (c) $r=\frac{24}{3-\cos\theta}$ (d) $\angle BOF=\tan^{-1}\left(\frac{4}{3}\right)$; 6.10 km
10	Linear Algebra	(a) (i) $d\neq 2$ (ii) $A^{-1}=\frac{1}{2-d}\begin{pmatrix}-2 & 2 & -1\\ 4-4d & 3d-2 & -2\\ d & -d & 1\end{pmatrix}$ (b) (ii) $y=0$

		(c) $= \begin{pmatrix} 2 & -1 & -1+3(2^{n-1}) \\ 2 & -1 & -1+2^{n+1} \\ 0 & 0 & 2^n \end{pmatrix}$
11	FM P1 Q11 Topic	
12	FM P1 Q12 Topic	
13	FM P1 Q13 Topic	
14	FM P1 Q14 Topic	

Paper 2

QN	TOPIC *(Pls Select)*	ANSWERS (*Exclude graphs and text answers*)
1	Numerical Methods	(a) 2.80 (c) 0.441
2	Recurrence Relations	(a) (i) $u_n = \left[(10000-b)2^{n-1}+b\right]\sqrt{n}$ (b) 1 week
3	FM P2 Q3 Topic	(a) $\begin{pmatrix} d-1 \\ a-1 \end{pmatrix}, \begin{pmatrix} 1 \\ -1 \end{pmatrix}$
4	Apps of Integration (incl. polar)	(b) $a^2\pi + \frac{4a^2\pi^2}{3\sqrt{3}}$ cm^2
5	Differential Equations	(b) $q = -\frac{1}{4}, p = 0$; $y = A\cos 2x + B\sin 2x - \frac{1}{4}x\cos 2x$
6	Chi-square Tests	(a) $15 \le k \le 27$ (b) $p-$value $= 0.00269$
7	Non-parametric Tests	
8	Discrete RV	(a) (i) $p^r(1-p)$ (ii) $1-p^r$ (iii) $p = 0.9$ (b) (i) $(r+1)p^r(1-p)^2$ (ii) $5p^4-4p^5$
9	Continuous RV	(a) $k = n-1$ (b) $\frac{(n-1)}{(n-3)(n-2)^2}$ (c) $\mathrm{F}(x) = \begin{cases} 0, & x<1 \\ 1-\frac{1}{x^3}, & x \ge 1 \end{cases}$ (d) $\frac{125}{343}$
10	Hypo Testing & Confidence Intervals	(b) $(-1.25,\ \ 11.25)$
11	FM P2 Q11 Topic	
12	FM P2 Q12 Topic	

13	FM P2 Q13 Topic	
14	FM P2 Q14 Topic	