1. Solve the equation: $9^{x+1} - 3^{x+3} - 3^x + 3 = 0$. (5 marks)

16a)

2. Solve the equation $3\sec^2 2x = \tan 2x + 5$ for $-90^0 \leq x \leq 90^0$. (5 marks)

3. Find the locus of a point which moves so that its distance from the line $x + y - 2 = 0$ is equal to the distance from the point $(-1, -1)$. (5 marks)

4. Evaluate: $\int_6^7 \dfrac{x-3}{\left(x^2 - 6x + 5\right)^2}\,dx$. (5 marks)

5. Find the coordinates of the point of intersection of the lines
$l_1 = \dfrac{x-1}{2} = \dfrac{y-2}{3} = \dfrac{z-3}{4}$ and $l_2 = \dfrac{x-4}{5} = \dfrac{y-1}{2} = z$. (5 marks)

6. Solve: $\dfrac{24}{x^2 + 5x} + 10 = -5x - x^2$. (5 marks)

7. Differentiate from first principles: $y = 5x - 3x^3$ (5 marks)

8. Evaluate: $\int_0^{\frac{\pi}{2}} x\sin 2x\,dx$. (5 marks)

SECTION B: 60 MARKS

ATTEMPT ONLY 5 QUESTIONS IN THIS SECTION

9a) Expand $f(x) = e^{2x+1}$ using Maclaurin's expansion as far as the term in x^3. (5 marks)

b) Given $x = t + In2t$ and $y = t - In2t$, find $\dfrac{dy}{dx}$ and $\dfrac{d^2y}{dx^2}$ in terms of t in the simplest form. (7 marks)

10. Show that the curve whose parametric equations are $x = 5 + \sqrt{3}\cos\theta$, $y = -2 + \sqrt{3}\sin\theta$, is a circle, hence, find the center and radius. (5 marks)

16a) Solve the differential equation: $(1 + \cos x)\dfrac{dy}{dx} = 1$, given $x = \dfrac{\pi}{2}$, $y = \dfrac{\pi}{2}$ $y = 1$

(6 marks)

b) Solve the differential equation given $\dfrac{dy}{dx} + 2y\tan x = \sin x$, for $y = 0$ and

$x = \dfrac{\pi}{3}$.

(6 marks)

GOOD LUCK