NAJJANANKUMBI YOUNG CHRISTIAN SCHOOL

SENIOR FIVE END OF 2nd TERM P. 1 MATHS EXAMINATION

(Attempt all questions in A and only five in B)

Time: 3hours.

SECTION A(40 marks)

1. Solve by completing the square:

(a) $x^2 - 3x - 5 = 0$

(b) $3x^2 - 4x - 2 = 0$

2. (a) Prove that $\tan 2A = \frac{2\tan A}{1 - \tan^2 A}$

(b) Solve for x in the range $0 \leq x \leq 360^o$

$2\sec^2 x - 3 + \tan x = 0$

3. If α and β are the roots of the equation $x^2 - x - 3 = 0$

State the values of :

(i) $\alpha + \beta$

(ii) $\alpha\beta$

(iii) $\alpha^2 + \beta^2$

(iv) $(\alpha^2 - \beta^2)$

(v) $\alpha^3 + \beta^3$

4. Solve the equation:

$$1 + \log_2 x = \frac{12}{\log_2 x}$$

5. Solve $3(3^{2x}) + 2(3^{x}) - 1 = 0$

6. Show that $x^3 + x^2 - 13x + 6$ is divisible by $x - 2$ and hence find the other factors of the expression.

7. Given that $2 + i$ is a root equation $z^3 - 11z + 20 = 0$

Find the other roots.

8. Factorize the expression $3x^3 - 11x^2 - 19x - 5$

SECTION B(60 marks)

9(a). Given that $z_1 = 2 - 3i$

$z_2 = 3 + 5i$

Find (i) $\left|\frac{z_1}{z_2}\right|$

(ii) $z_1z_2 + (z_1 + z_2)$

(b) Solve $z^2 + 4z + 13 = 0$

10. (a) Show that $\sin 3\theta = 3\sin\theta - 4\sin^3\theta$. Hence solve the equation $\sin 3\theta + \sin\theta = 0$ for $0^o \le \theta \le 360^o$

(b) Solve $3\sin\theta - \cos\theta = 3$ for $0^o \le \theta \le 360^o$.

11. (a) Find the solution of $3\cot\theta + \operatorname{cosec}\theta = 2$ for $0 \le \theta \le 360^o$

(b) Solve $2\sin x = \sin(x - 60^o)$ for $-180^o \le x \le 180^o$

12. If the expression $ax^4 + bx^3 - x^2 + 2x + 3$ has remainder $3x + 5$ when divided by $x^2 - x - 2$

Find the values of a and b.

13. Prove that if one root of the equation $ax^2 + bx + c = 0$ is twice the other, then

$$2b^2 = 9ac$$

14. If $t = \tan\frac{1}{2}\theta$, Show that $\sin\theta = \frac{2t}{1+t^2}$ and $\cos\theta = \frac{1-t^2}{1+t^2}$

Use the results to solve $7\cos x + 6\sin x = 2$.

15. (a) Find the value of x for which $2^{3x+1} = 3^{x+2}$

(b) Find the maximum value of y if :

$Y = 4\cos x + 3\sin x$ and the value of x for which the maximum occurs.

END