



**THE KENYA POLYTECHNIC**  
**GRAPHIC ARTS DEPARTMENT**  
**DIPLOMA IN PRINTING TECHNOLOGY**  
**DIPLOMA IN GRAPHIC DESIGN**  
**END OF YEAR I SUPPLEMENTARY EXAMINATIONS**  
**JANUARY 2007**  
**(MAIN EXAMINATION SERIES: NOVEMBER 2006)**  
**MATHEMATICS**  
**3 HOURS**

**INSTRUCTIONS TO CANDIDATES:**

Answer any FIVE questions.

All questions carry equal marks and the maximum marks for each part of a question are as shown.

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1. Convert the hexadecimal number  $FFFF.FD_{16}$  into:

- |              |                |            |
|--------------|----------------|------------|
| (a) Base ten | (b) Binary     |            |
| (c) Octal    | (d) Duodecimal | (20 marks) |

2. Convert the base ten number  $4091.875_{10}$  into:

- |                |                 |            |
|----------------|-----------------|------------|
| (a) Binary     | (b) Octal       |            |
| (c) Duodecimal | (d) Hexadecimal | (20 marks) |

3. Evaluate the following:

- |  |  |   |
|--|--|---|
| (a) $(4096)^{-5/12}$                     | (b) $\left(\frac{8}{27}\right)^{-5/3}$ | (c) $\left(\frac{16}{81}\right)^{-3/4}$ |
| (d) $\left(\frac{243}{32}\right)^{-3/5}$ | (e) $\log_3 81$                        | (f) $\log_2 2048$                       |
| (g) $\log_3 243$                         | (h) $\log_5 625$                       | (i) $\left(1\frac{7}{9}\right)^{-3/2}$  |
| (j) $(0.04)^{-3/2}$                      |  |   |

4. Solve the following polynomials:

(a)  $(x^2 + x - 2)(2x^2 - 7x - 4) = 0$  (8 marks)

(b)  $x^3 - 6x^2 - 7x + 60 = 0$  (6 marks)

(c)  $x^3 - 5x^2 - 2x - 24 = 0$  (6 marks)

5. (a) Determine the volume and the total surface area of a cylinder 0.35m diameter and 0.6m high. (5 marks)

(b) Find the volume of a hollow cylinder with an outside diameter of 4m and an inside diameter of 3.5m, if its height is 8m. (5 marks)

(c) Calculate the volume and total surface area of a cone whose height is 5m and base diameter 4m. (6 marks)

(d) Determine the volume and surface area of a sphere whose diameter is 3m. (4 marks)

6. Evaluate the following:

(a)  $\log_{2.4} 6.874$  (b)  $\log_7 83.64$

(c)  $\log_{\pi} e$  (d)  $\log_e \pi$

(e)  $\pi^e$  [Take  $\pi = 3.142$ ,  $e = 2.718$ ] (20 marks)

7. Given the following, make the letter in brackets the subject of the formula:

(a)  $n(E - Ir) = IR$  ( $I$ ) (4 marks)

(b)  $\frac{R^2}{r^2} = \frac{f + P}{f - P}$  ( $f$ ) (5 marks)

(c)  $6V = \pi h(3R^2 + h^2)$  ( $R$ ) (5 marks)

(d)  $ax^2 + bx + c = 0$  where a, b and c are constants. ( $x$ ) (6 marks)