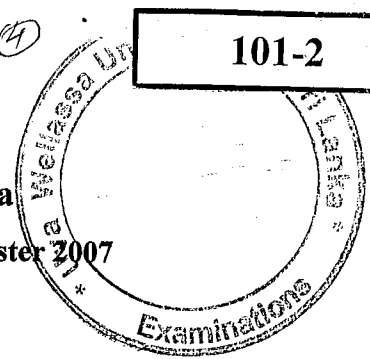




Uva Wellassa University, Sri Lanka  
End of the Semester Examination- Second Semester 2007  
MAT 101-2 Essential Mathematics



Answer for all Questions (4 Questions)  
Time: Two (2) hours

(1) (i) Find  $\sin\left(\frac{8\pi}{3}\right)$  and  $\cos 75^\circ$ .

(ii) Prove the identity  $\frac{\operatorname{cosec}\theta - \cot\theta}{\operatorname{cosec}\theta + \cot\theta} = \left(\frac{1 - \cos\theta}{\sin\theta}\right)^2$ .

(iii) Find the x-range which satisfies the inequality  $|3x + 2| \leq 4 - x$ .

(iv) In the triangular standard notation prove that,

$$\sin\left(\frac{A-B}{2}\right) = \frac{a-b}{c} \cos\left(\frac{C}{2}\right)$$

(2) (i) Solve  $(2x-1)^5 = -32$ .

(ii) For any  $x, y > 0$  prove that

$$\log_a\left(\frac{x}{y}\right) = \log_a x - \log_a y ; \quad \text{where } a > 0 \text{ \& } a \neq 1.$$

(iii) Show that  $\log_u\left(\frac{1}{\sqrt{u}}\right) = -\frac{1}{2}$  ; where  $u > 0$  &  $u \neq 1$ .

(iv) Evaluate  $2^{-3\log_2 5}$ .

(3) (i) Use binomial formula to expand  $(p-2q)^4$ .

(ii) Show that  $\sqrt{x+1} = 1 + \frac{1}{2}x - \frac{1}{8}x^2 + \frac{1}{16}x^3 - \frac{5}{128}x^4 + \dots$

(iii) How many committees of 4 people are possible from a group of 9 people if;

a) There are no restrictions?

b) Both Nimal and Mary must be on the committee?

c) Either Nimal or Mary, but not both, must be on the committee?

(4) (i) Find  $i^6$ . Where  $i$  is imaginary unit.

(ii) Solve the equation  $3x^2 - 2x + 3 = 0$ .

(iii) If  $Z_1 = 2+i$  and  $Z_2 = 2-i$ , then find  $\frac{Z_1}{Z_2}$ .

(iv) For any complex numbers  $Z$  and  $W$ , prove that  $\overline{Z+W} = \overline{Z} + \overline{W}$ .