6. Use Lagrange's formula to find the form of $f(x)$, given :

$$x \quad : \quad 0 \quad 2 \quad 3 \quad 6$$
$$f(x) : \quad 648 \quad 704 \quad 729 \quad 792$$

Module 4

17. Evaluate $\int_0^6 \dfrac{dx}{1+x^2}$ by using (i) trapezoidal rule ; (ii) Simpson's 1/3rd rule ; and (iii) Simpson's 3/8th rule. Compare their accuracies.

Or

18. Find the first and second derivatives of the function from the following table at point $x = 1.1$:

$$x \quad : \quad 1.0 \quad 1.2 \quad 1.4 \quad 1.6 \quad 1.8 \quad 2.0$$
$$f(x) : \quad 0.0 \quad 0.128 \quad 0.544 \quad 1.296 \quad 2.423 \quad 4.01$$

Module 5

19. (a) If $\bar{u}(z) = \dfrac{2z^2 + 5z + 14}{(z-1)^4}$, evaluate u_2 and u_3. (6 marks)

(b) Using the z-transform, solve $u_{n+2} + 4u_{n+1} + 3u_n = 2^n$ with $u_0 = 0$, $u_1 = 1$. (6 marks)

Or

20. (a) Show that $z\left(\dfrac{1}{n+1}\right) = z \log\left(\dfrac{z}{z+1}\right)$. (6 marks)

(b) Using Convolution theorem, evaluate $z^{-1}\left[\dfrac{z^2}{(z-1)(z-3)}\right]$. (6 marks)

$$[5 \times 12 = 60 \text{ marks}]$$