

### Module 3F3 Answers – Part IIA 2003

- 1 (a)  $\log_2(N)$  stages;  $N/2$  butterflies per stage  
(b) 2016 real operations, compared with 18336 for full 48 point DFT
- 2 (a) Low pass, linear phase  
(b) Equiripple, hence relative weighting in each band is 1.0  
(c) Modified coefficients:  $[0.1340, -0.4641, 0.4641, -0.3440]$ . Coefficients are antisymmetric, hence strictly not linear phase  
(d)  $L = 3$ .  $r[0] = 1.4$ ,  $r[+/-1] = 1.02$ ,  $r[+/-2] = 0.37$ ,  $r[+/-3] = 0.05$
- 3.
- 4.