ASSIGNMENT 3

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Course Title: Development of Real-Time System

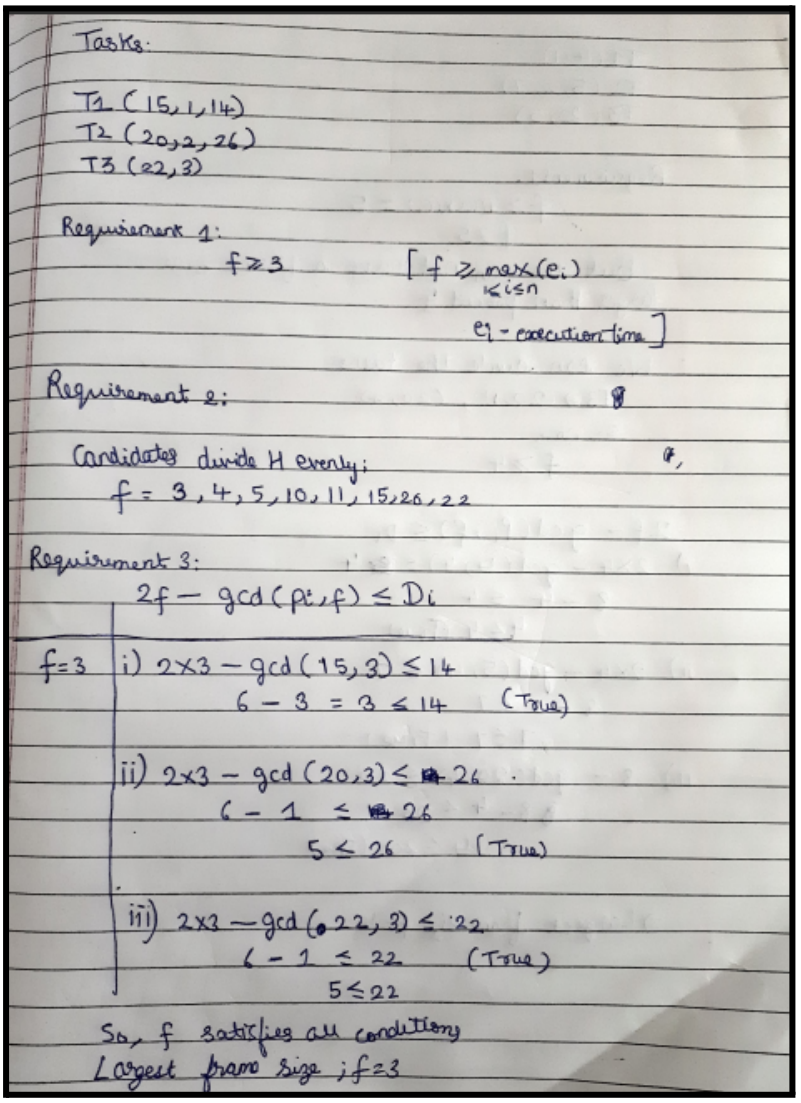
Date: 20-06-2022

Assignment:

The task is to find the largest possible frame size for the cyclic structured scheduler by following requirements 1,2 and 3 for finding the largest frame size. The following three task sets should be used:

1. T1(15, 1, 14) T2(20, 2, 26) T3(22, 3)
2. T1(4, 1) T2(5, 2, 7) T3(20, 5)
3. T1(5, 0.1) T2(7, 1) T3(12, 6) T4(45, 9)

Solution:



T1 (4, 1)
T2 (5, 2, 7)
T3 (20, 5)

Requirement 1:

$f \geq \max(e_i) = 5$

$f \geq 5$

But we can not have a frame size larger than period 4

We can divide the tasks:

T3 ⇒ (20, 1), (20, 4)

So, now,

$f \geq 4$

$2f - \gcd(P_i, f) \leq D_i$

i) $2 \times 4 - \gcd(4, 4) \leq 4$

$8 - 4 \leq 4$

$4 \leq 4$ (True)

ii) $2 \times 4 - \gcd(5, 4) \leq 7$

$8 - 1 \leq 7$

$7 \leq 7$ (True)

iii) $8 - \gcd(20, 4) \leq 20$

$8 - 4 \leq 20$

$4 \leq 20$ (True)

⇒ Largest frame size $f = 4$

$T_1(5, 0.1)$
$T_2(7, 1)$
$T_3(12, 6)$
$T_4(45, 9)$

$f \geq \max(e_i)$

$f \geq 9$

But we cannot have a frame size larger than 5 and 7

So,

$T_3 \rightarrow (12, 3), (12, 3)$

$T_4 \rightarrow (45, 3), (45, 3), (45, 3)$

$[f \geq 3]$

$f = 3, 4, 5, 6, 7, 9, 12, 15, 45$

At $f = 3$,

$2f - \gcd(P_i, f) \leq D_i$

i) $2 \times 3 - \gcd(5, 3) \leq 5$

$6 - 1 \leq 5$

$5 \leq 5$ (True)

ii) $2 \times 3 - \gcd(7, 3) \leq 7$

$6 - 1 \leq 7$

$5 \leq 7$ (True)

iii) $2 \times 3 - \gcd(12, 3) \leq 12$

$6 - 3 \leq 12$

$3 \leq 12$ (True)

iv) $2 \times 3 - \gcd(45, 3) \leq 45$

$6 - 3 \leq 45$