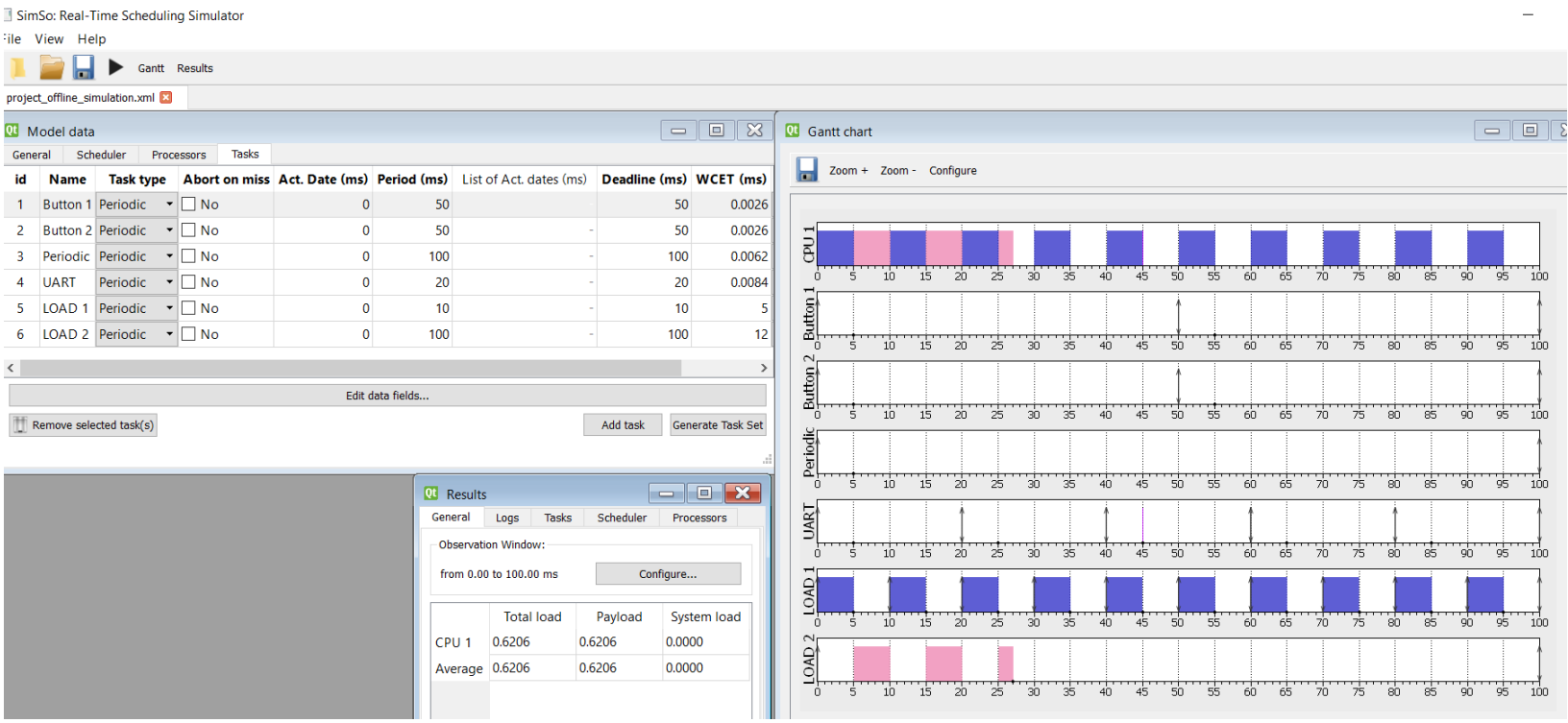
EDF Schedular Analysis Document

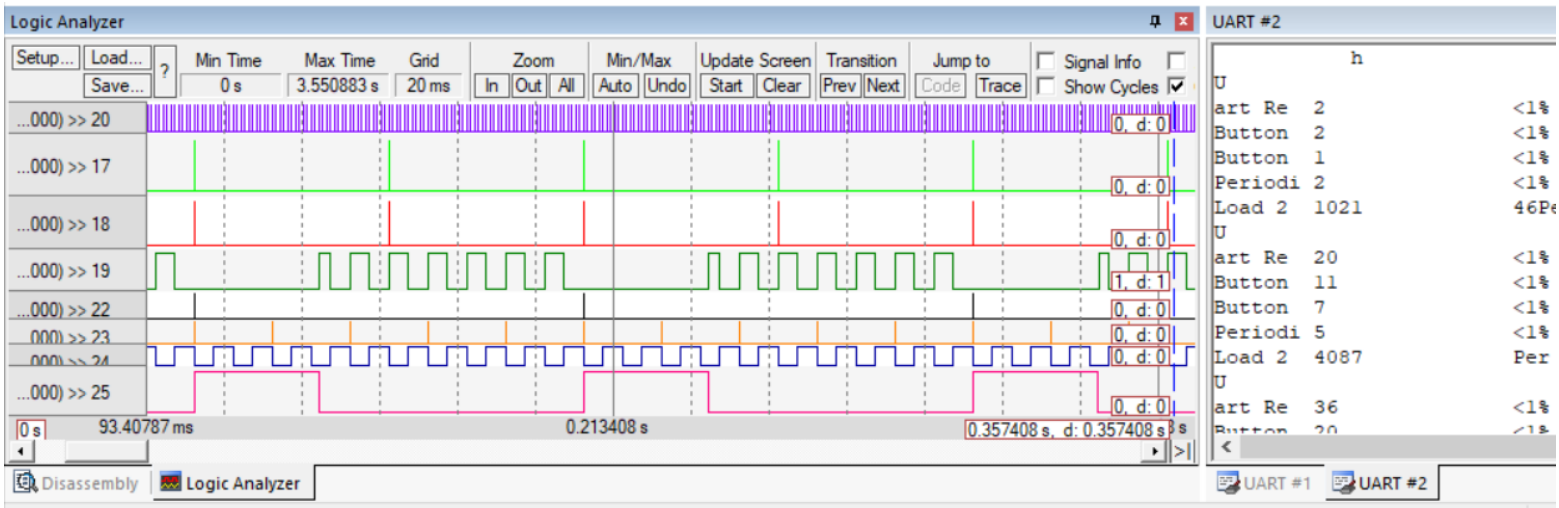
1. Simso Offline Simulation:



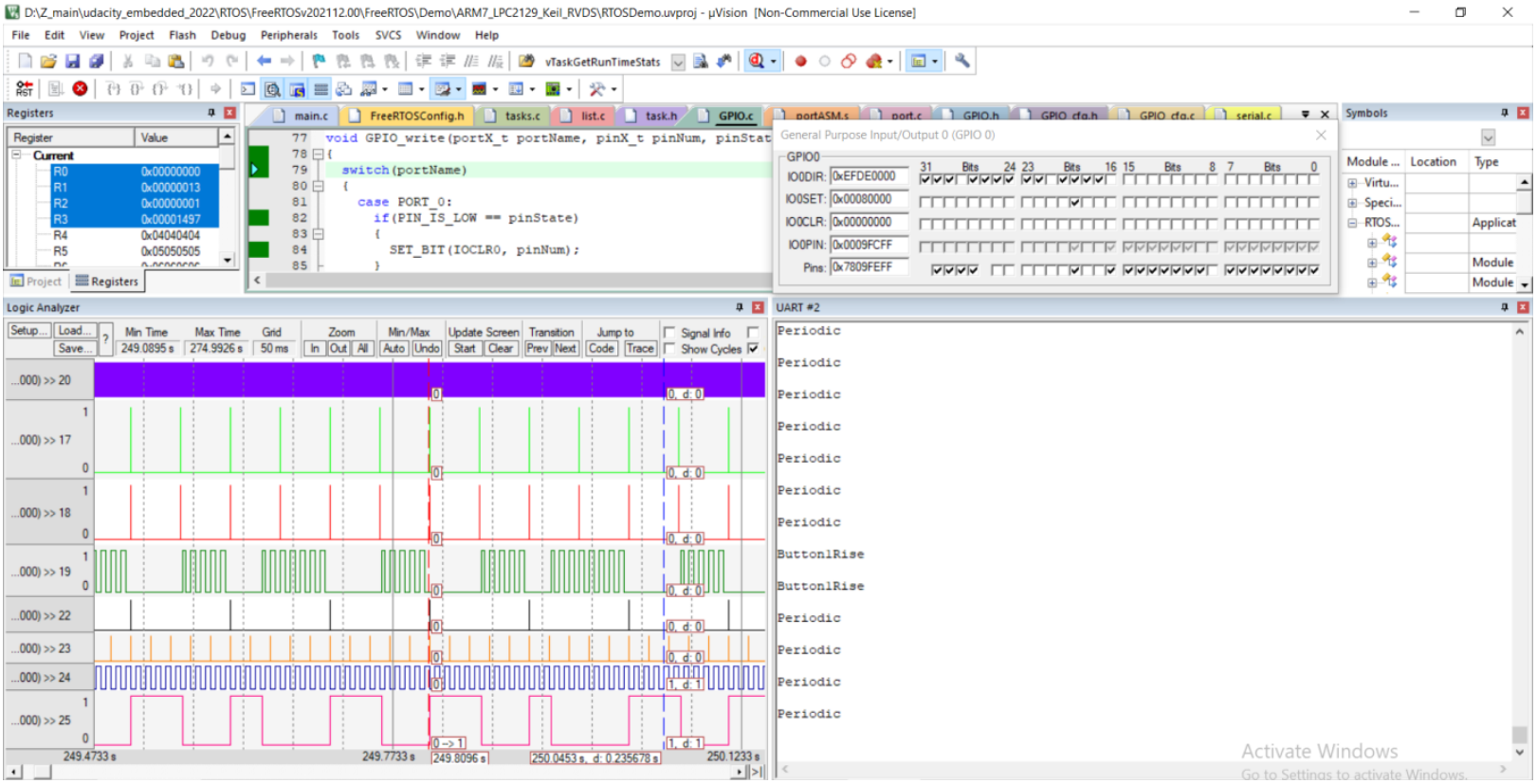
Comment: CPU load matches calculations exactly and all tasks meets their deadline.

2. Kail logic analyser:

trace macros:



GPIO and hooks display:



Pin Configurations:

Pin20:Tick hook

Pin17: button 1 monitor

Pin18:button 2 monitor

Pin19:Idle hook

Pin22:Periodic task

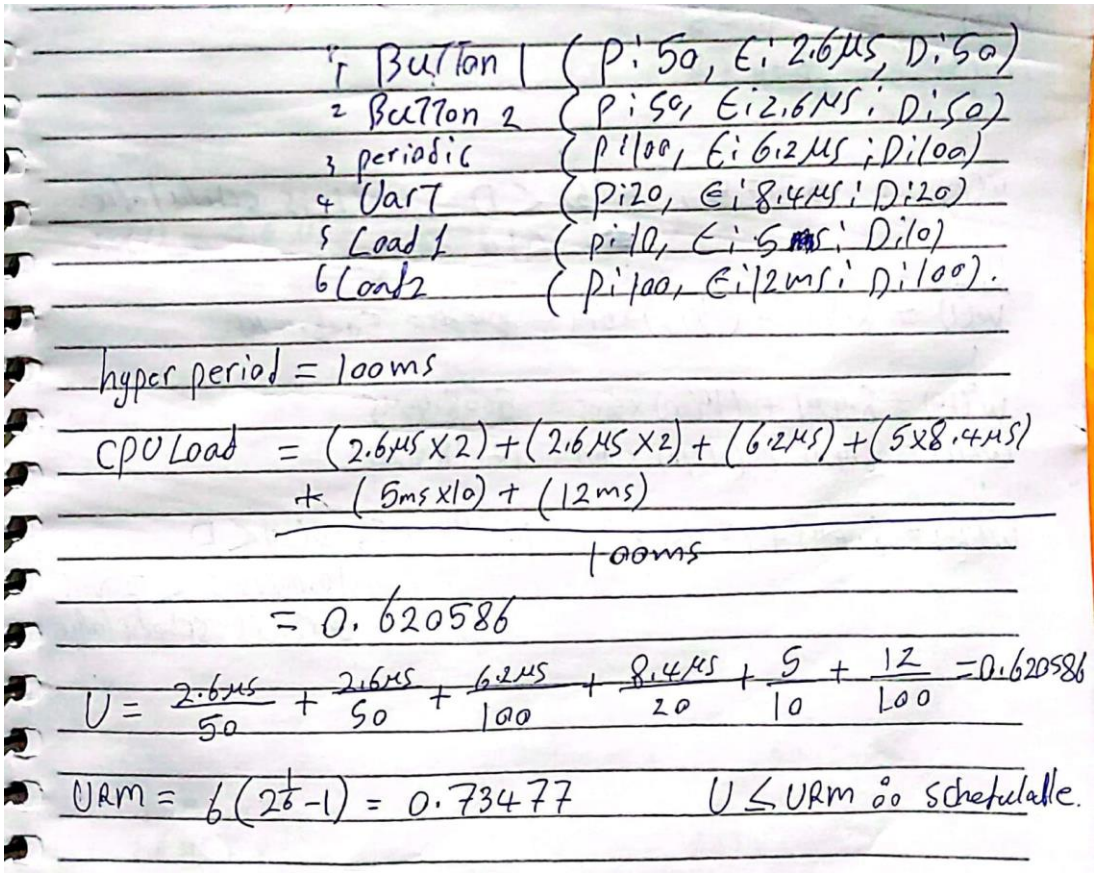
Pin23:UART task

Pin24:Load1

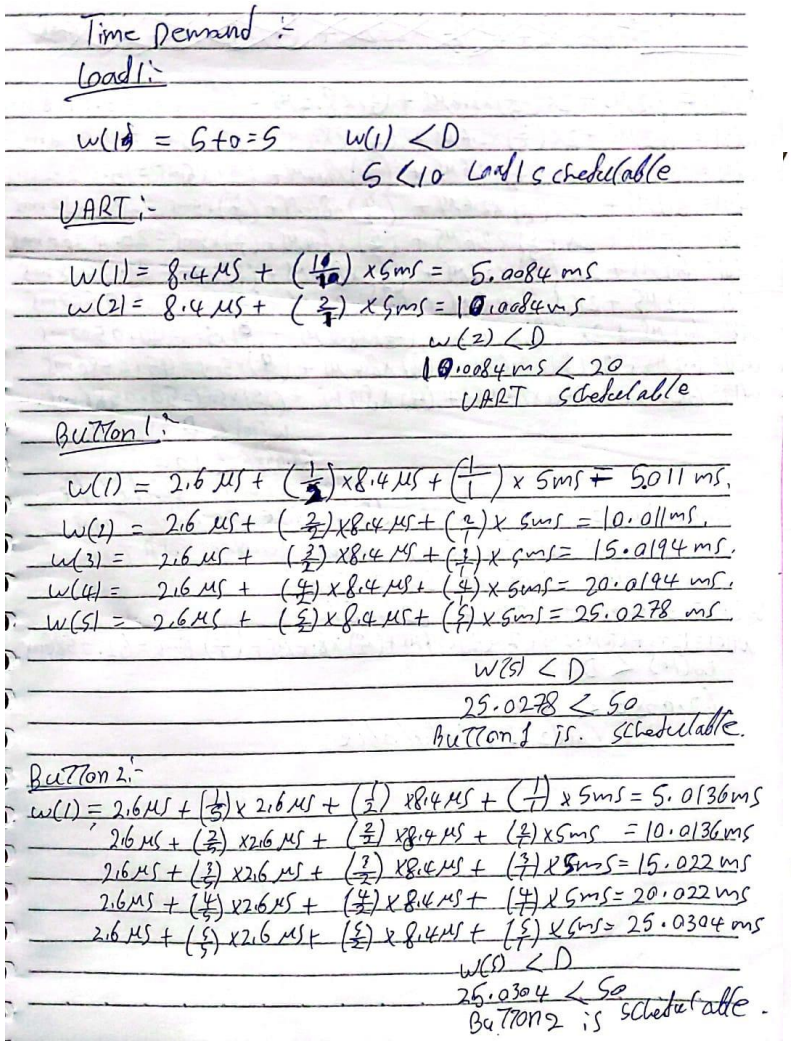
Pin25:Load2

3. **Hand written analysis:**

CPU load, Hyper period and URM calculations:



Time demand calculations:



Time demand :-

Load1:-

$w(1) = 5+0 = 5$ $\quad w(1) < D$

$5 < 10$ Load1 schedulable

UART:-

$w(1) = 8.4\mu s + \left(\frac{10}{10}\right) \times 5ms = 5.0084\ ms$

$w(2) = 8.4\mu s + \left(\frac{2}{1}\right) \times 5ms = 10.0084ms$

$w(2) < D$

$10.0084ms < 20$

UART schedulable

Button1:-

$w(1) = 2.6\ \mu s + \left(\frac{1}{5}\right) \times 8.4\ \mu s + \left(\frac{1}{1}\right) \times 5ms = 5.011\ ms.$

$w(2) = 2.6\ \mu s + \left(\frac{2}{5}\right) \times 8.4\ \mu s + \left(\frac{2}{1}\right) \times 5ms = 10.011ms.$

$w(3) = 2.6\ \mu s + \left(\frac{3}{5}\right) \times 8.4\ \mu s + \left(\frac{3}{1}\right) \times 5ms = 15.0194\ ms.$

$w(4) = 2.6\ \mu s + \left(\frac{4}{5}\right) \times 8.4\ \mu s + \left(\frac{4}{1}\right) \times 5ms = 20.0194\ ms.$

$w(5) = 2.6\ \mu s + \left(\frac{5}{5}\right) \times 8.4\ \mu s + \left(\frac{5}{1}\right) \times 5ms = 25.0278\ ms$

$w(5) < D$

$25.0278 < 50$

Button1 is schedulable.

Button2:-

$w(1) = 2.6\ \mu s + \left(\frac{1}{5}\right) \times 2.6\ \mu s + \left(\frac{1}{2}\right) \times 8.4\ \mu s + \left(\frac{1}{1}\right) \times 5ms = 5.0136ms$

$2.6\ \mu s + \left(\frac{2}{5}\right) \times 2.6\ \mu s + \left(\frac{2}{2}\right) \times 8.4\ \mu s + \left(\frac{2}{1}\right) \times 5ms = 10.0136ms$

$2.6\ \mu s + \left(\frac{3}{5}\right) \times 2.6\ \mu s + \left(\frac{3}{2}\right) \times 8.4\ \mu s + \left(\frac{3}{1}\right) \times 5ms = 15.022\ ms$

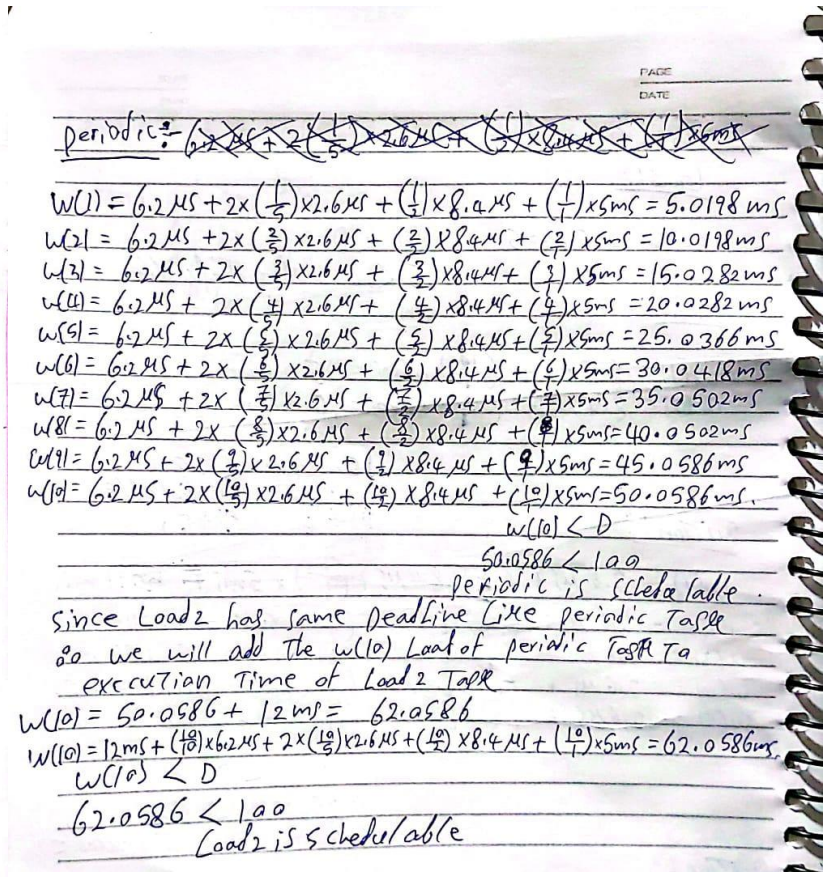
$2.6\ \mu s + \left(\frac{4}{5}\right) \times 2.6\ \mu s + \left(\frac{4}{2}\right) \times 8.4\ \mu s + \left(\frac{4}{1}\right) \times 5ms = 20.022\ ms$

$2.6\ \mu s + \left(\frac{5}{5}\right) \times 2.6\ \mu s + \left(\frac{5}{2}\right) \times 8.4\ \mu s + \left(\frac{5}{1}\right) \times 5ms = 25.0304\ ms$

$w(5) < D$

$25.0304 < 50$

Button2 is schedulable.



periodic:-

$w(1) = 6.2\ \mu s + 2\times\left(\frac{1}{5}\right) \times 2.6\ \mu s + \left(\frac{1}{2}\right) \times 8.4\ \mu s + \left(\frac{1}{1}\right) \times 5ms = 5.0198\ ms$

$w(2) = 6.2\ \mu s + 2\times\left(\frac{2}{5}\right) \times 2.6\ \mu s + \left(\frac{2}{2}\right) \times 8.4\ \mu s + \left(\frac{2}{1}\right) \times 5ms = 10.0198\ ms$

$w(3) = 6.2\ \mu s + 2\times\left(\frac{3}{5}\right) \times 2.6\ \mu s + \left(\frac{3}{2}\right) \times 8.4\ \mu s + \left(\frac{3}{1}\right) \times 5ms = 15.0282\ ms$

$w(4) = 6.2\ \mu s + 2\times\left(\frac{4}{5}\right) \times 2.6\ \mu s + \left(\frac{4}{2}\right) \times 8.4\ \mu s + \left(\frac{4}{1}\right) \times 5ms = 20.0282\ ms$

$w(5) = 6.2\ \mu s + 2\times\left(\frac{5}{5}\right) \times 2.6\ \mu s + \left(\frac{5}{2}\right) \times 8.4\ \mu s + \left(\frac{5}{1}\right) \times 5ms = 25.0366\ ms$

$w(6) = 6.2\ \mu s + 2\times\left(\frac{6}{5}\right) \times 2.6\ \mu s + \left(\frac{6}{2}\right) \times 8.4\ \mu s + \left(\frac{6}{1}\right) \times 5ms = 30.0418\ ms$

$w(7) = 6.2\ \mu s + 2\times\left(\frac{7}{5}\right) \times 2.6\ \mu s + \left(\frac{7}{2}\right) \times 8.4\ \mu s + \left(\frac{7}{1}\right) \times 5ms = 35.0502\ ms$

$w(8) = 6.2\ \mu s + 2\times\left(\frac{8}{5}\right) \times 2.6\ \mu s + \left(\frac{8}{2}\right) \times 8.4\ \mu s + \left(\frac{8}{1}\right) \times 5ms = 40.0502\ ms$

$w(9) = 6.2\ \mu s + 2\times\left(\frac{9}{5}\right) \times 2.6\ \mu s + \left(\frac{9}{2}\right) \times 8.4\ \mu s + \left(\frac{9}{1}\right) \times 5ms = 45.0586\ ms$

$w(10) = 6.2\ \mu s + 2\times\left(\frac{10}{5}\right) \times 2.6\ \mu s + \left(\frac{10}{2}\right) \times 8.4\ \mu s + \left(\frac{10}{1}\right) \times 5ms = 50.0586\ ms.$

$w(10) < D$

$50.0586 < 100$

periodic is schedulable.

Since Load2 has same DeadLine like periodic Task so we will add the w(10) Load of periodic Task To execution Time of Load2 Task

$w(10) = 50.0586 + 12ms = 62.0586$

$w(10) = 12ms + \left(\frac{10}{10}\right) \times 6.2\ \mu s + 2\times\left(\frac{10}{5}\right) \times 2.6\ \mu s + \left(\frac{10}{2}\right) \times 8.4\ \mu s + \left(\frac{10}{1}\right) \times 5ms = 62.0586ms.$

$w(10) < D$

$62.0586 < 100$

Load2 is schedulable

Comments:

the time demand is equal to the cpu load , so this means that the total system load can fit within the hyper period so this is why the time demand equals to the cpu load