Control Systems
Assignment 1

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EE19BTECH11012

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Problem Statement

Q14. Use Python to generate the partial-fraction expansion of the following function

$$F(s) = \frac{10^4(s+5)(s+70)}{s(s+45)(s+55)(s^2+7s+110)(s^2+6s+95)} \quad (1.1)$$

Python Code

```
from sympy import *
init_printing(use_unicode=True)

#declaring variable for use of mathematical expression
s = symbols('s')

#given expression
problem = 10**4*(s+5)*(s+70)/(s*(s+45)*(s+55)*(s**2+7*s+110)*(s
    **2+6*s+95))

#apart function returns the partial fraction decomposition of rational
    functions
ans = apart(problem)

pprint(ans)     #prints data in a pretty way
```

The following output we get while we run the above code:

```
sanket@sanket-Lenovo-ideapad-330S-15IKB-D:~/Desktop/IITH$ python3 control_assgn1.py
   200·(15358·s + 27263)          20·(24091·s + 61882)          20              200           2800
- ─────────────────────── + ─────────────────────── - ──────────────── + ──────────────── + ──────
                    ⎛ 2                            ⎞
  1503717·⎝s  + 6·s + 95⎠   253253·⎝s  + 7·s + 110⎠   11253·(s + 55)   30303·(s + 45)   20691·s
```

The above code is given here https://github.com/SanketRanade/Control-Systems/blob/master/Assgn-1/control_assgn1.py