DAA LAB-01

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S.Y computer engineering

AIM: To understand the process of finding SPI and CPI using rule book of UG program and to solve given problem by writing algorithm for it .

THEORY:

→ SPI (Semester Performance Index):

The Semester Performance Index (SPI) is a quantitative measure of a student's academic performance within a specific semester. It reflects the weighted average of grade points earned in all courses registered during that period. A higher SPI indicates superior academic achievement. Formula: SPI = (c1g1 + c2g2 + c3g3 + ... + cn*gn) / (c1 + c2 + c3 + ... + cn) Where: * c1, c2, c3, ... cn are the credits of individual courses. * g1, g2, g3, ... gn are the grade points earned in corresponding courses.

→ CPI (Cumulative Performance Index):

The Cumulative Performance Index (CPI) provides a comprehensive evaluation of a student's academic performance from the time of admission until the end of a particular semester. It is calculated similarly to SPI but encompasses all courses registered towards the degree requirements. A higher CPI denotes better overall academic standing. Formula: CPI = (Σ(Ci * Gi)) / (ΣCi) Where: Σ(Ci * Gi) is the sum of the product of credits (Ci) and grade points (Gi) for all courses taken till the current semester. ΣCi is the sum of the total credits of all courses taken till the current semester.

→ Key Points:

● Both SPI and CPI are calculated based on the credit-weighted average of grade points.

● A higher SPI or CPI generally correlates with better academic performance.

● SPI reflects performance in a single semester, while CPI provides a cumulative overview.

● These indices are crucial for academic evaluation, scholarship eligibility, and placement opportunities.

ALGORITHM:

1)SPI AND CPI USING CREDITS AND GRADEPOINTS :

1. Start

2. Initialize:

   - spi as an empty list/vector to store SPI values for each semester.

   - n as the number of semesters.

   - spisum to accumulate the sum of SPI values for calculating CPI.

3. Input:

   - Prompt user to enter the number of semesters n.

4. For Each Semester (from 1 to n):

   - Call Function getspi(sem):

     - Initialize:

       - product to 0 (to store the weighted sum of grade points).

       - creditsum to 0 (to store the total credits).

     - Input:

       - Prompt user to enter the number of subjects m for the current semester.

     - For Each Subject (from 1 to m):

       - Prompt user to enter the credits for the subject.

       - Prompt user to enter the grade point for the subject.

       - Calculate the contribution of the subject as currcredit,currgradept.

       - Add this contribution to product.

- Add currcredit to creditsum.
- Calculate:
- SPI for the semester as product / (float)creditsum.
- Return SPI value to the calling function.
- Store the returned SPI value in spi list/vector.
- Print the SPI for the current semester.

5. Calculate CPI:
- Initialize:
- spisum to 0.
- Sum:
- For each SPI value in spi, add it to spisum.
- Calculate:
- CPI as spisum / (float)n.

6. Output:
- Print the CPI value.

7. End.

2)CPI USING SPI :

1. Start
2. Input Number of Semesters
- Prompt the user to enter the number of semesters, `n`.
- Read the value of `n`.
3. Initialize Array for SPI

- Create an array (or list) `spi` of size `n` to hold the SPI values for each semester.

4. Input SPI Values

- For each semester from 1 to `n`:

  - Prompt the user to enter the SPI value for the current semester.

  - Read the SPI value and store it in the `spi` array at the current index.

5. Calculate CPI

- Initialize a variable `spisum` to 0.

- For each SPI value in the `spi` array:

  - Add the SPI value to `spisum`.

- Compute the CPI as `spisum / n`.

6. Output CPI

- Print the calculated CPI value.

7. End

SCREENSHOT:

1) SPI AND CPI CALCULATION USING CREDITS AND GRADEPOINTS :

```cpp
#include<iostream>
#include<vector>
using namespace std;

float getspi(int sem)
{
    int product=0;
    int creditsum=0;
cout<<"for sem "<<sem<<endl;
int m;
cout<<"enter no. of subjects :";
cin>>m;
for(int i=1;i<=m;i++)
{
    int currcredit;
    char ch='A'+i-1;
    cout<<"enter credits for subject "<<ch<<":";
    cin>>currcredit;
    int currgradept;
    cout<<"enter gradepoint for subject "<<ch<<":";
    cin>>currgradept;
    product+=currcredit*currgradept;
    creditsum+=currcredit;
    cout<<endl;

}

return product/(float)creditsum;


}
```

```cpp
int main()
{
    vector<float>spi;
    int n;
    cout<<"enter no. of semesters :";
    cin>>n;

    for(int i=1;i<=n;i++)
    {
        float currspi=getspi(i);
        cout<<"SPI for sem "<<i<<" is "<<currspi<<endl;
        spi.push_back(currspi);

    }
    float spisum=0;
    for(int i=0;i<n;i++)
    {
        spisum+=spi[i];
    }
    float cpi=spisum/(float)n;
    cout<<"CPI is "<<cpi;


}
```

OUTPUT :

1)

```
enter no. of semesters :2
for sem 1
enter no. of subjects :3
enter credits for subject A:3
enter gradepoint for subject A:5

enter credits for subject B:4
enter gradepoint for subject B:6

enter credits for subject C:5
enter gradepoint for subject C:7

SPI for sem 1 is 6.16667
for sem 2
enter no. of subjects :2
enter credits for subject A:2
enter gradepoint for subject A:3

enter credits for subject B:4
enter gradepoint for subject B:5

SPI for sem 2 is 4.33333
CPI is 5.25
```

2)

```
enter no. of semesters :1
for sem 1
enter no. of subjects :2
enter credits for subject A:7
enter gradepoint for subject A:8

enter credits for subject B:8
enter gradepoint for subject B:9

SPI for sem 1 is 8.53333
CPI is 8.53333
```

3)

```
enter no. of semesters :3
for sem 1
enter no. of subjects :2
enter credits for subject A:1
enter gradepoint for subject A:2

enter credits for subject B:2
enter gradepoint for subject B:3

SPI for sem 1 is 2.66667
for sem 2
enter no. of subjects :3
enter credits for subject A:3
enter gradepoint for subject A:4

enter credits for subject B:5
enter gradepoint for subject B:6

enter credits for subject C:7
enter gradepoint for subject C:8

SPI for sem 2 is 6.53333
for sem 3
enter no. of subjects :1
enter credits for subject A:5
enter gradepoint for subject A:8

SPI for sem 3 is 8
CPI is 5.73333
```

4)

```
enter no. of semesters :2
for sem 1
enter no. of subjects :1
enter credits for subject A:4
enter gradepoint for subject A:6

SPI for sem 1 is 6
for sem 2
enter no. of subjects :1
enter credits for subject A:6
enter gradepoint for subject A:8

SPI for sem 2 is 8
CPI is 7
```

5)

```
enter no. of semesters :1
for sem 1
enter no. of subjects :5
enter credits for subject A:1
enter gradepoint for subject A:2

enter credits for subject B:2
enter gradepoint for subject B:3

enter credits for subject C:3
enter gradepoint for subject C:4

enter credits for subject D:4
enter gradepoint for subject D:5

enter credits for subject E:5
enter gradepoint for subject E:6

SPI for sem 1 is 4.66667
CPI is 4.66667
```

2)CPI USING SPI :

```
#include<iostream>
using namespace std;

double solve(double spi[],int n)
{
double spisum=0;
for(int i=0;i<n;i++)
{
    spisum+=spi[i];
}

double cpi=spisum/n;
return cpi;
}
int main()
{
    int n;
    cout<<"enter no. of semesters:";
    cin>>n;
    double spi[n];
    for(int i=0;i<n;i++)
    {
        double currspi;
        cout<<"enter spi for semester "<<i+1<<":";
        cin>>currspi;
        spi[i]=currspi;
    }

    double cpi=solve(spi,n);
    cout<<"CPI is "<<cpi;
}
```

1)

```
enter no. of semesters:3
enter spi for semester 1:5
enter spi for semester 2:6
enter spi for semester 3:7
CPI is 6
```

2)

```
enter no. of semesters:5
enter spi for semester 1:5
enter spi for semester 2:6
enter spi for semester 3:7
enter spi for semester 4:8
enter spi for semester 5:9
CPI is 7
```

3)

```
enter no. of semesters:4
enter spi for semester 1:2.1
enter spi for semester 2:3.1
enter spi for semester 3:4.1
enter spi for semester 4:5.1
CPI is 3.6
```

4)

```
enter no. of semesters:5
enter spi for semester 1:1.2
enter spi for semester 2:2.3
enter spi for semester 3:3.4
enter spi for semester 4:4.5
enter spi for semester 5:5.6
CPI is 3.4
```

5)

```
enter no. of semesters:6
enter spi for semester 1:8.5
enter spi for semester 2:8.6
enter spi for semester 3:8.2
enter spi for semester 4:7.4
enter spi for semester 5:7.5
enter spi for semester 6:7.8
CPI is 8
```

Conclusion:

In this way, we understood how to calculate SPI,CPI and also CPI using SPI effectively by writing algorithm and implementing algorithm via program.

THE END