Exp 3 - Regular Expression to NFA

Aim: To convert a given regular expression (RE) into NFA.

Program:

```c
#include <stdio.h>
#include<conio.h>
#include<string.h>
#include <ctype.h>
int main()
{
    char m[20], t[10][10];
    int n, i, j, r = 0, c = 0;
    printf("REGULAR EXPRESSION TO NFA");
    for (i = 0; i < 10; i++)
    {
        for (j = 0; j < 10; j++)
        {
            t[i][j] = ' ';
        }
    }
    printf("\nEnter a regular expression:");
    scanf("%s", m);
    n = strlen(m);
    for (i = 0; i < n; i++)
    {
        switch (m[i])
        {
        case '|':
        {
            t[r][r + 1] = 'E';
            t[r + 1][r + 2] = m[i - 1];
            t[r + 2][r + 5] = 'E';
            t[r][r + 3] = 'E';
            t[r + 4][r + 5] = 'E';
            t[r + 3][r + 4] = m[i + 1];
            r = r + 5;
            break;
        }
        case '*':
        {
            t[r - 1][r] = 'E';

            t[r][r + 1] = 'E';
            t[r][r + 3] = 'E';
```

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```
            t[r + 1][r + 2] = m[i - 1];
            t[r + 2][r + 1] = 'E';
            t[r + 2][r + 3] = 'E';
            r = r + 3;
            break;
        }
        case '+':
        {
            t[r][r + 1] = m[i - 1];
            t[r + 1][r] = 'E';
            r = r + 1;
            break;
        }
        default:
        {
            if (c == 0)
            {
                if ((isalpha(m[i])) && (isalpha(m[i + 1])))
                {
                    t[r][r + 1] = m[i];
                    t[r + 1][r + 2] = m[i + 1];
                    r = r + 2;
                    c = 1;
                }
                c = 1;
            }
            else if (c == 1)
            {
                if (isalpha(m[i + 1]))
                {
                    t[r][r + 1] = m[i + 1];
                    r = r + 1;
                    c = 2;
                }
            }
            else
            {
                if (isalpha(m[i + 1]))
                {
                    t[r][r + 1] = m[i + 1];
                    r = r + 1;
                    c = 3;
                }
            }
        }
        break;
        }
    }
    printf("\n");
    for (j = 0; j <= r; j++)
        printf(" %d", j);
    printf("\n \n");
    printf("\n");
    for (i = 0; i <= r; i++)
    {
        for (j = 0; j <= r; j++)
```

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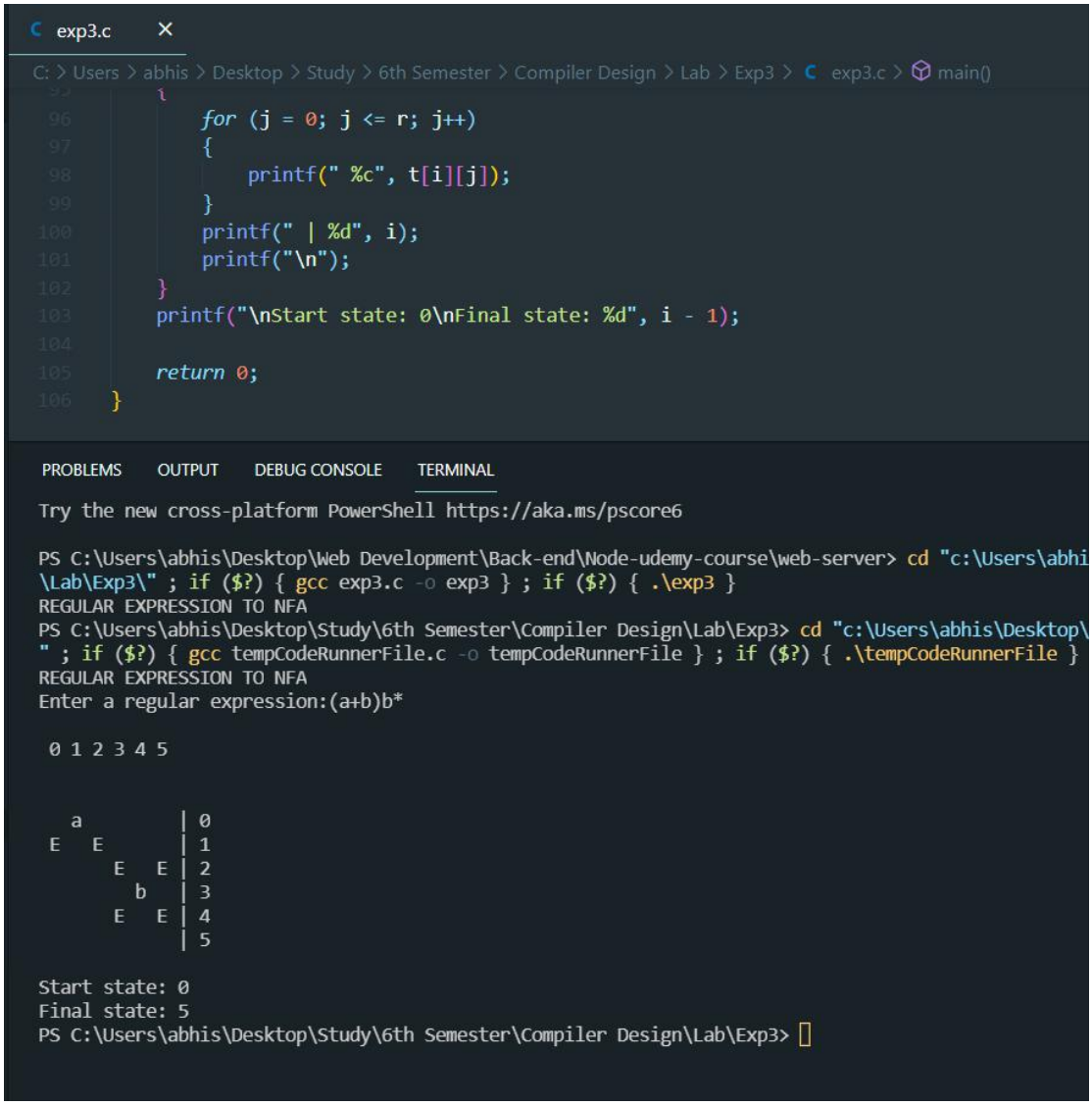
```
        {
            printf(" %c", t[i][j]);
        }
        printf(" | %d", i);
        printf("\n");
    }
    printf("\nStart state: 0\nFinal state: %d", i - 1);
```

```
    return 0;
}
```

Output:



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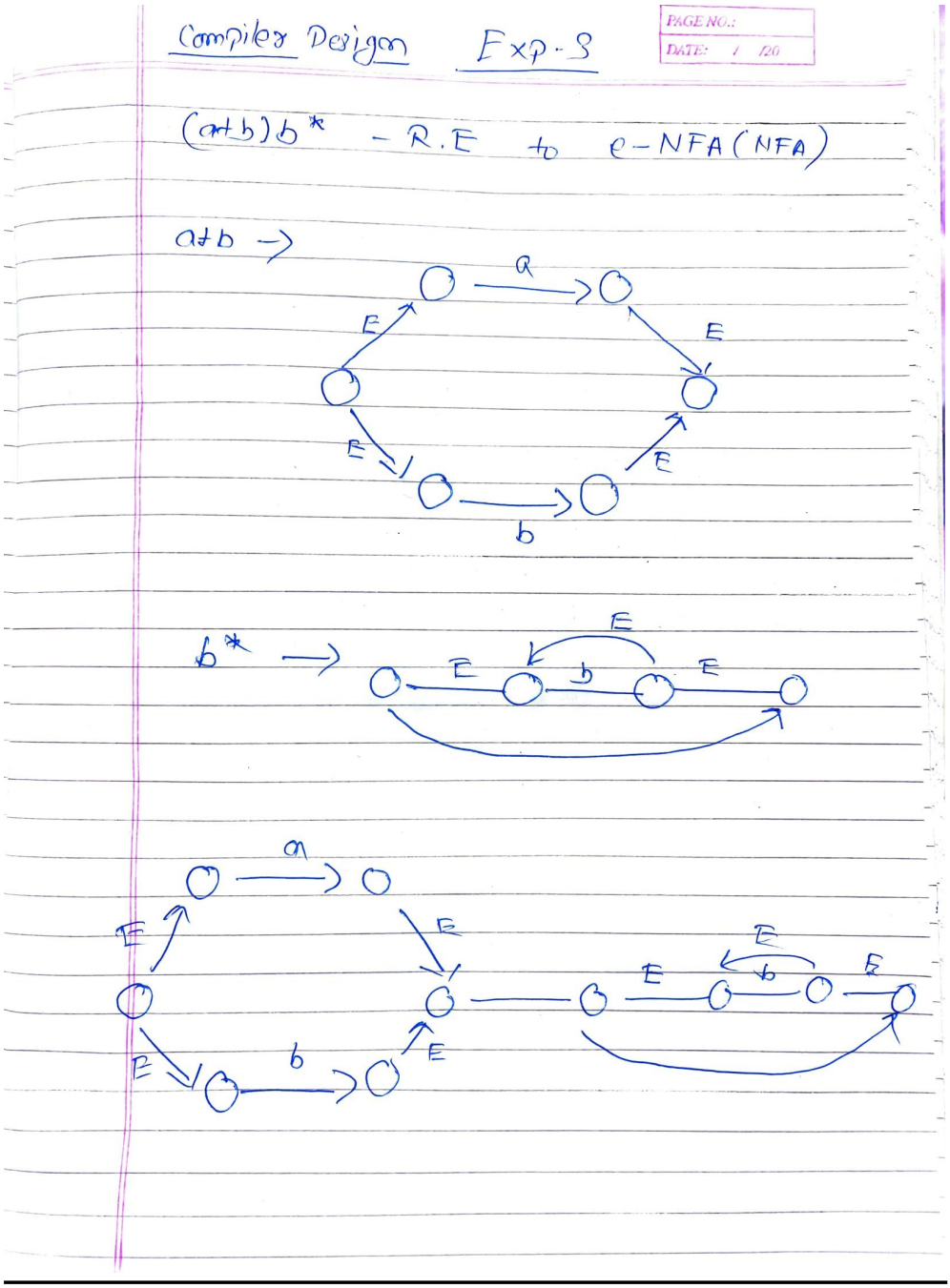
Manual Calculation:



Result: Program to convert RE to NFA was written and executed successfully.