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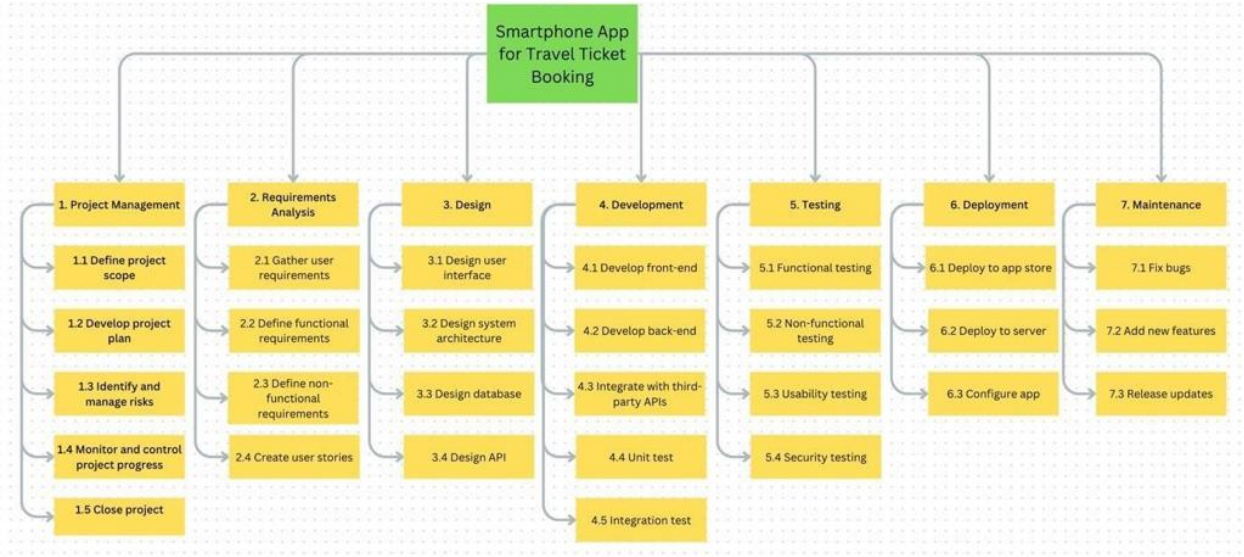
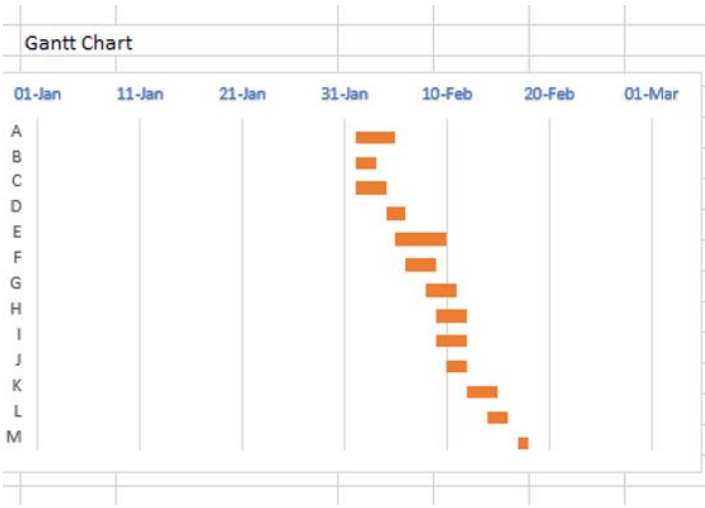
Software Engineering Lab

Q1.) This structure is just a basic outline and may need to be adapted based on the specific requirements and complexity of your Travel Ticket Booking App project. Each of the sub- tasks can be further detailed as needed.

A Work Breakdown Structure is typically organized in a hierarchical fashion, breaking down the project into smaller, more manageable pieces. Here's a textual representation:



Q2.)



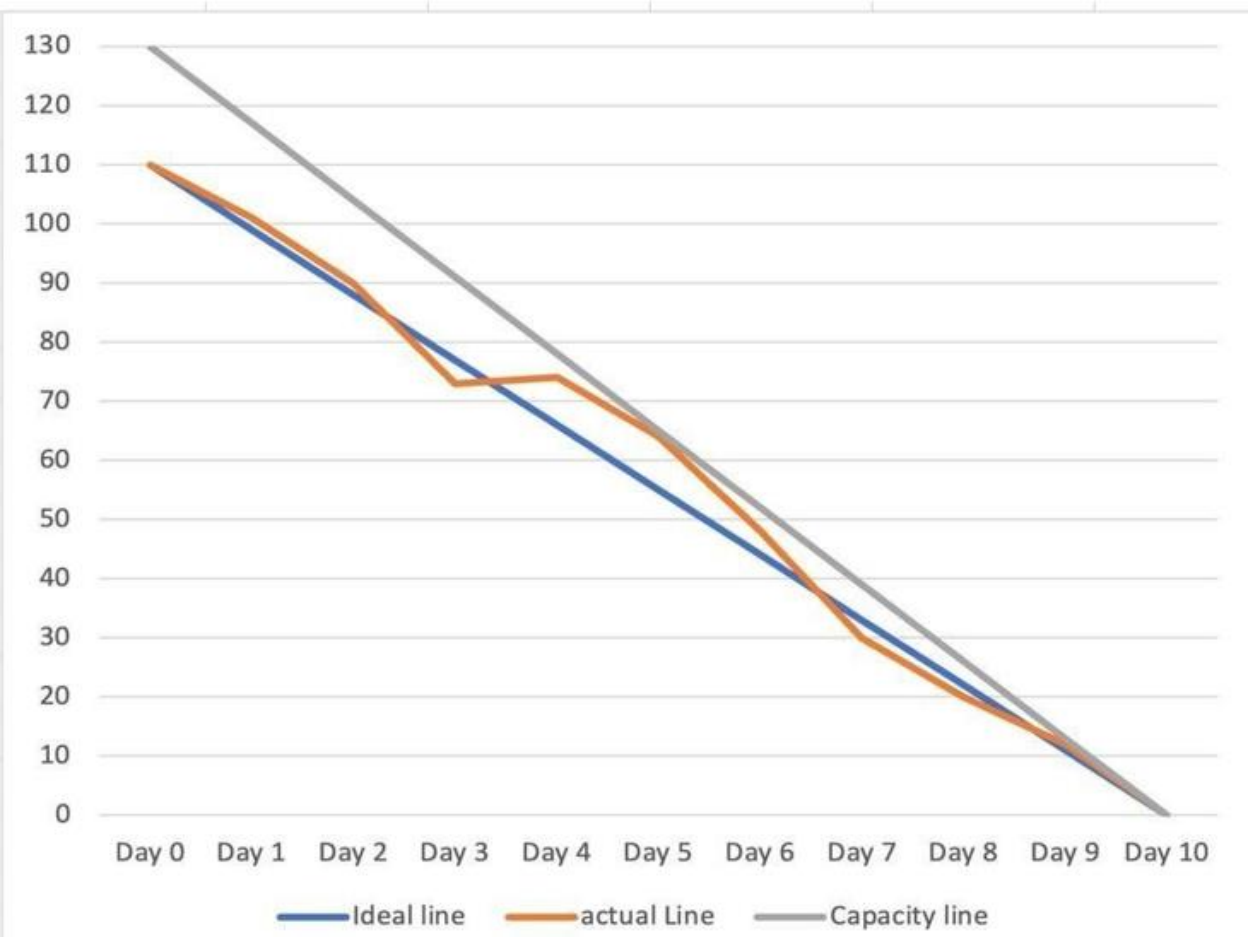
Table

Task	Start Date	End Date	Duration	Preceded By
A	01-Feb	05-Feb	4	
B	01-Feb	03-Feb	2	
C	01-Feb	04-Feb	3	
D	04-Feb	06-Feb	2	
E	05-Feb	10-Feb	5	A
F	06-Feb	09-Feb	3	A B C
G	08-Feb	11-Feb	3	C D
H	09-Feb	12-Feb	3	F G
I	09-Feb	12-Feb	3	G
J	10-Feb	12-Feb	2	E
K	12-Feb	15-Feb	3	H I
L	14-Feb	16-Feb	2	I
M	17-Feb	18-Feb	1	J K L

Q3.) Normal risk scenario 1.

- 10 days is the duration of the sprint.
- 130 hours of sealing time.
- The actual amount of work still to be done: In a more realistic scenario, let's say there are 40 hours left before the sprint begins.Normal risk scenario: Keep an eye on progress and adjust as necessary. Be proactive and tackle any new problems as they arise.

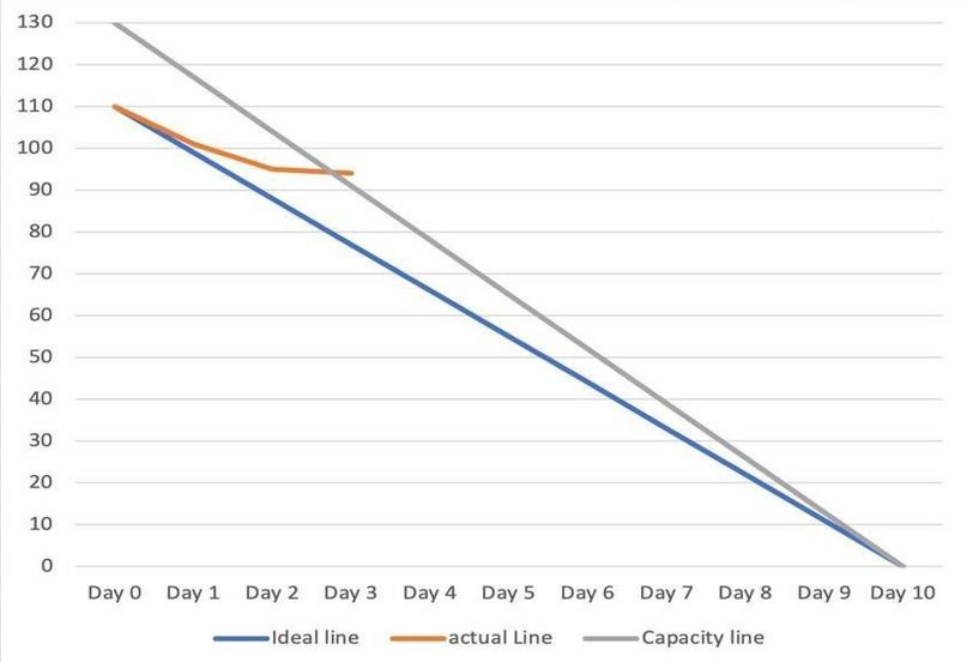
Days	Date	Ideal line	actual Line	Capacity line
Day 0	09/12/24	110	110	130
Day 1	10/12/24	99	101	117
Day 2	11/12/24	88	90	104
Day 3	12/12/24	77	73	91
Day 4	13/12/24	66	74	78
Day 5	14/12/24	55	64	65
Day 6	15/12/24	44	48	52
Day 7	16/12/24	33	30	39
Day 8	17/12/24	22	20	26
Day 9	18/12/24	11	12	13
Day 10	19/12/24	0	0	0



Scenario 2 has a low risk.

- The duration of the Sprint is 10 days.
- The sealing capacity is 130 hours.
- The actual remaining work is estimated to be 20 hours at the commencement of the sprint, assuming a steady and optimistic progress. The scenario with low risk is to continue with the steady progress. It is imperative to ensure that team members are not overwhelmed and that a sustainable pace is maintained.

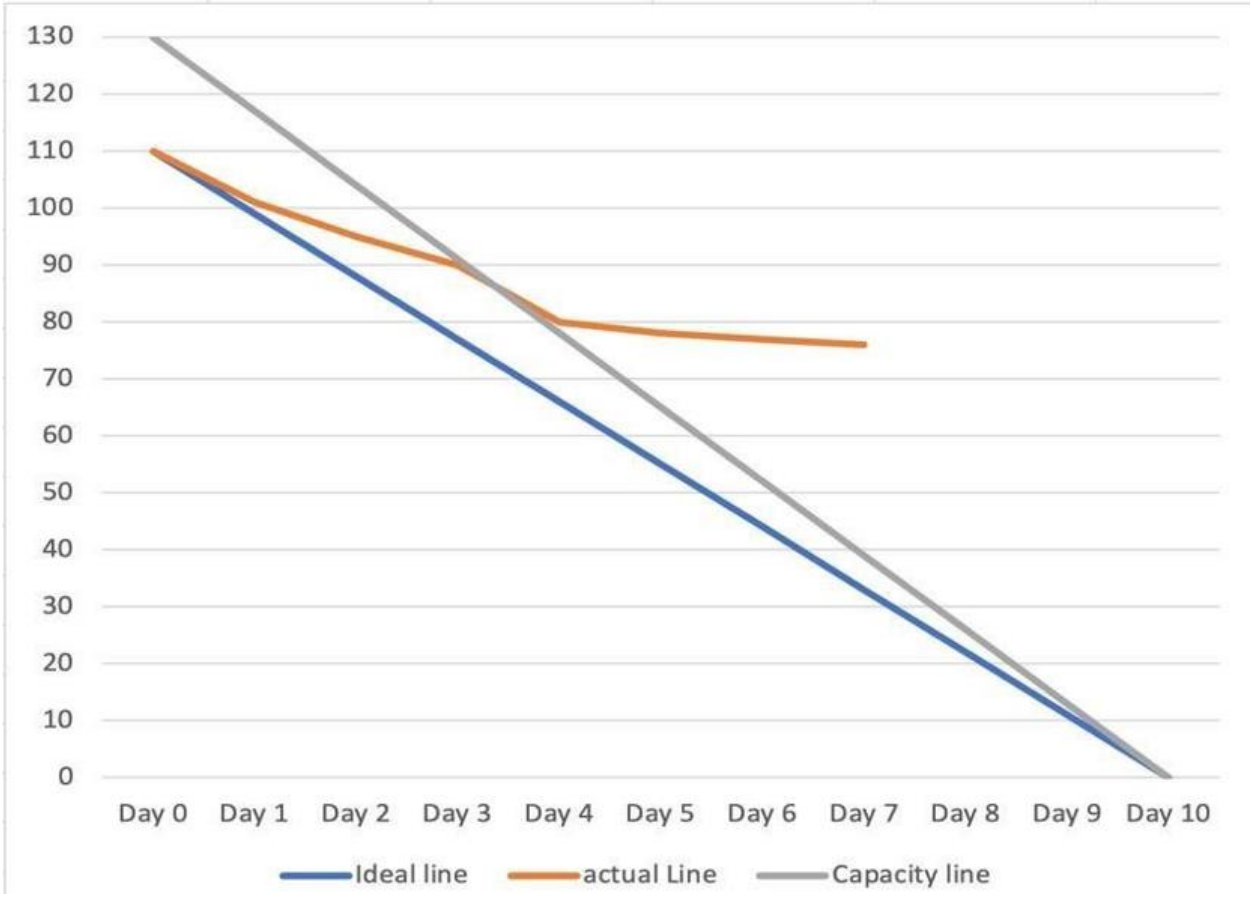
Days	Date	Ideal line	actual Line	Capacity line
Day 0	09/12/24	110	110	130
Day 1	10/12/24	99	101	117
Day 2	11/12/24	88	95	104
Day 3	12/12/24	77	94	91
Day 4	13/12/24	66		78
Day 5	14/12/24	55		65
Day 6	15/12/24	44		52
Day 7	16/12/24	33		39
Day 8	17/12/24	22		26
Day 9	18/12/24	11		13
Day 10	19/12/24	0		0



There is a high risk in scenario 3.

- 10 days is the duration of the sprint.
- The sealing capacity is 130 hours.
- The actual amount of work left is due to unexpected obstacles or complexities, say 70 hours remain at the start of the sprint. High-risk scenario: Identify obstacles early and tackle them as soon as possible. Encourage teamwork and communication to overcome obstacles.

Days	Date	Ideal line	actual Line	Capacity line
Day 0	09/12/24	110	110	130
Day 1	10/12/24	99	101	117
Day 2	11/12/24	88	95	104
Day 3	12/12/24	77	90	91
Day 4	13/12/24	66	80	78
Day 5	14/12/24	55	78	65
Day 6	15/12/24	44	77	52
Day 7	16/12/24	33	76	39
Day 8	17/12/24	22		26
Day 9	18/12/24	11		13
Day 10	19/12/24	0		0



Q4

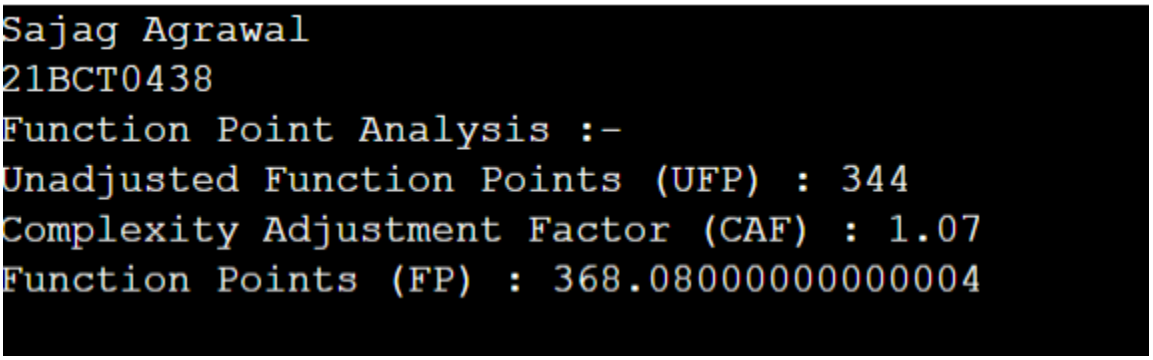
Code-

```
import java.util.*;
public class Main {
   public static void calfp(int[][] frates, int fac_rate) {
      String[] funUnits = {
            "External Inputs",
            "External Outputs",
            "External Inquiries",
            "Internal Logical Files",
            "External Interface Files"};
      String[] wtRates = {"Simple", "Average", "Complex"};
      int[][] wtFactors = {
            {3, 4, 6},
            {4, 5, 7},
            {3, 4, 6},
            {7, 10, 15},
            {5, 7, 10},
      };
      int UFP = 0;
      for (int i = 0; i < 5; i++) {
         for (int j = 0; j < 3; j++) {
            int freq = frates[i][j];
            UFP += freq * wtFactors[i][j];
         }
      }
      String[] aspects = {
            "reliable backup and recovery required ?",
            "data communication required ?",
```

```
            "are there distributed processing functions ?",
            "is performance critical ?",
            "will the system run in an existing heavily utilized operational environment ?",
            "on line data entry required ?",
            "does the on line data entry require the input transaction to be built over multiple screens or
operations ?",
            "are the master files updated on line ?",
            "is the inputs, outputs, files or inquiries complex ?",
            "is the internal processing complex ?",
            "is the code designed to be reusable ?",
            "are the conversion and installation included in the design ?",
            "is the system designed for multiple installations in different organizations ?",
            "is the application designed to facilitate change and ease of use by the user ?"
        };
        int sumF = 0;
        for (int i = 0; i < 14; i++) {
           int rate = fac_rate;
           sumF += rate;
        }
        double CAF = 0.65 + 0.01 * sumF;
        double FP = UFP * CAF;
        System.out.println("Function Point Analysis :-");
        System.out.println("Unadjusted Function Points (UFP) : " + UFP);
        System.out.println("Complexity Adjustment Factor (CAF) : " + CAF);
        System.out.println("Function Points (FP) : " + FP);
    }
    public static void main(String[] args) {
        System.out.println("Sajag Agrawal\n21BCT0438");
        int[][] frates = {
```

```
            // EI, EO, EQ
            {24, 0, 0}, // Average
            {0, 16, 0}, // Simple
            {0, 0, 22}, // Average
            {0, 4, 0},  // Average
            {0, 0, 2}   // Complex
        };
        int fac_rate = 3;
        calfp(frates, fac_rate);
    }
}
```

Output-



Parameter	Organic	Semi detached	Embedded
A	3.2	3.0	2.8
B	1.05	1.12	1.20
C	2.5	2.5	2.5
D	0.38	0.35	0.32

EAF = 0.82 × 1.14 × 0.70
= 0.84

a) Effort = $3.0 \times (350)^{1.12} \times 0.84$
= 1731.38 PM

b) Time = $2.5 \times (1781.33)^{0.35}$
= 34.33 months

c) Average Engineers = $(1781.38)^{0.35}$
= 34.33 months

d) No. of LOC per engineer per month = $\frac{350}{1781.38}$ KLOC/PM
= 196 LOC

Q5.)

FUNCTION TYPE	ESTIMATED COUNT	WEIGHT
EI	24	(Average)
EO	16	Simple
EQ	22	(Average)
ILF	4	(Average)
ELF	2	Complex

Functional Unit	Weighting factor Simple	Avg	Complex
EI	3	[4]	6
EO	[4]	5	7
EQ	3	[7]	6
ILF	7	[10]	15
EIF	3	7	[10]

EI $24 \times 4 = 96$ Avg
EO $16 \times 4 = 64$ Simple
EQ $22 \times 4 = 88$ Avg
ILF $4 \times 10 = 40$ Avg
EIF $2 \times 10 = 20$ Complex
UFP → 308

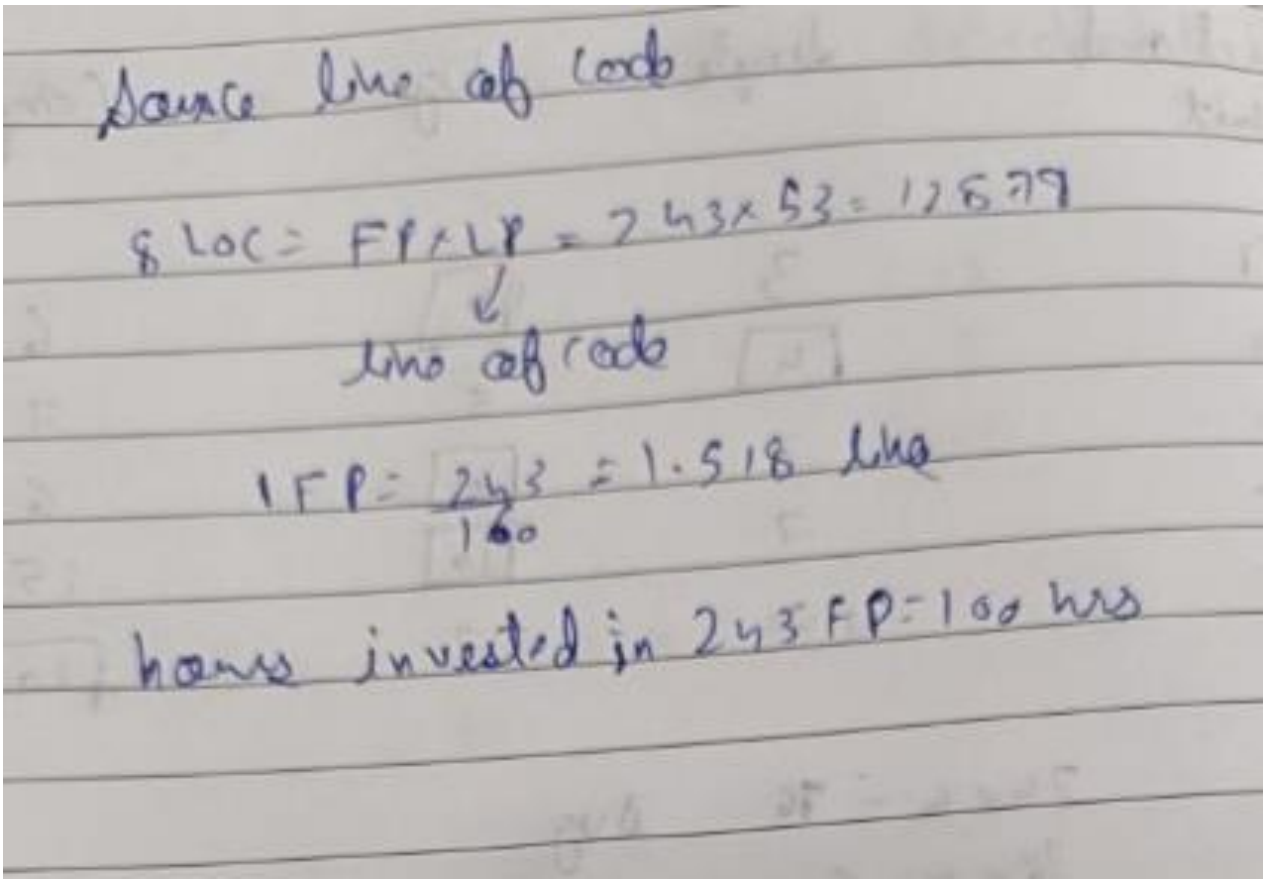
Factors	DOI
Outline data entry	Significant (4)
Performance	Avg (3)
Reusability	Moderate (2)
Operational use	Essential (5)
	14

$CAF = (0.65 + 0.02 \times 14) = 0.79$

$FP = UFP \times VAF$

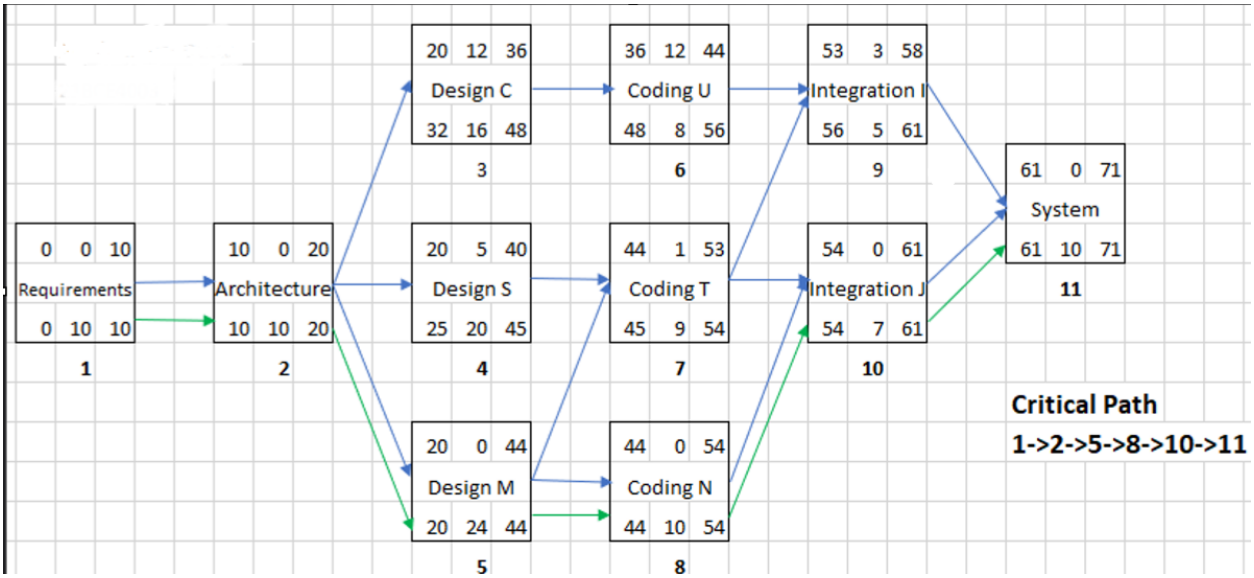
$= 308 \times 0.79$

$= 243.32$



Q6.) a.)

Activity (ID)	Description	Preceding Activity	Activity Time (DUR) (days)
1	Requirements	None	10
2	Architecture	1	10
3	Design C	2	16
4	Design S	2	20
5	Design M	2	24
6	Coding U	3	8
7	Coding T	4,5	9
8	Coding N	5	10
9	Integration I	6,7	5
10	Integration J	7,8	7
11	System	9,10	10



b.) List the network paths

1 -> 2 -> 3 -> 6 -> 9 -> 11
1 -> 2 -> 4 -> 7 -> 9 -> 11
1 -> 2 -> 4 -> 7 -> 10 -> 11
1 -> 2 -> 5 -> 7 -> 9 -> 11
1 -> 2 -> 5 -> 7 -> 10 ->11
1 -> 2 -> 5 -> 8 -> 10 -
>11

c.) 1 -> 2 -> 5 -> 8 -> 10 -> 11

Requirements -> Architecture -> Design M -> Coding N -> Integration J -> System