常州工学院

教 学 大 纲

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$$i = \frac{\times Ai + \times Bi}{100 \times (Ai + Bi)}$$

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$$i = \frac{\times Ai + \times Bi}{100 \times (Ai + Bi)}$$

Ai= × i

Bi= × i

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Ai= × i

Bi= × i

Ci= × i

1. 1-4 [M]. 1991

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3. 1-3 [M]. 2006

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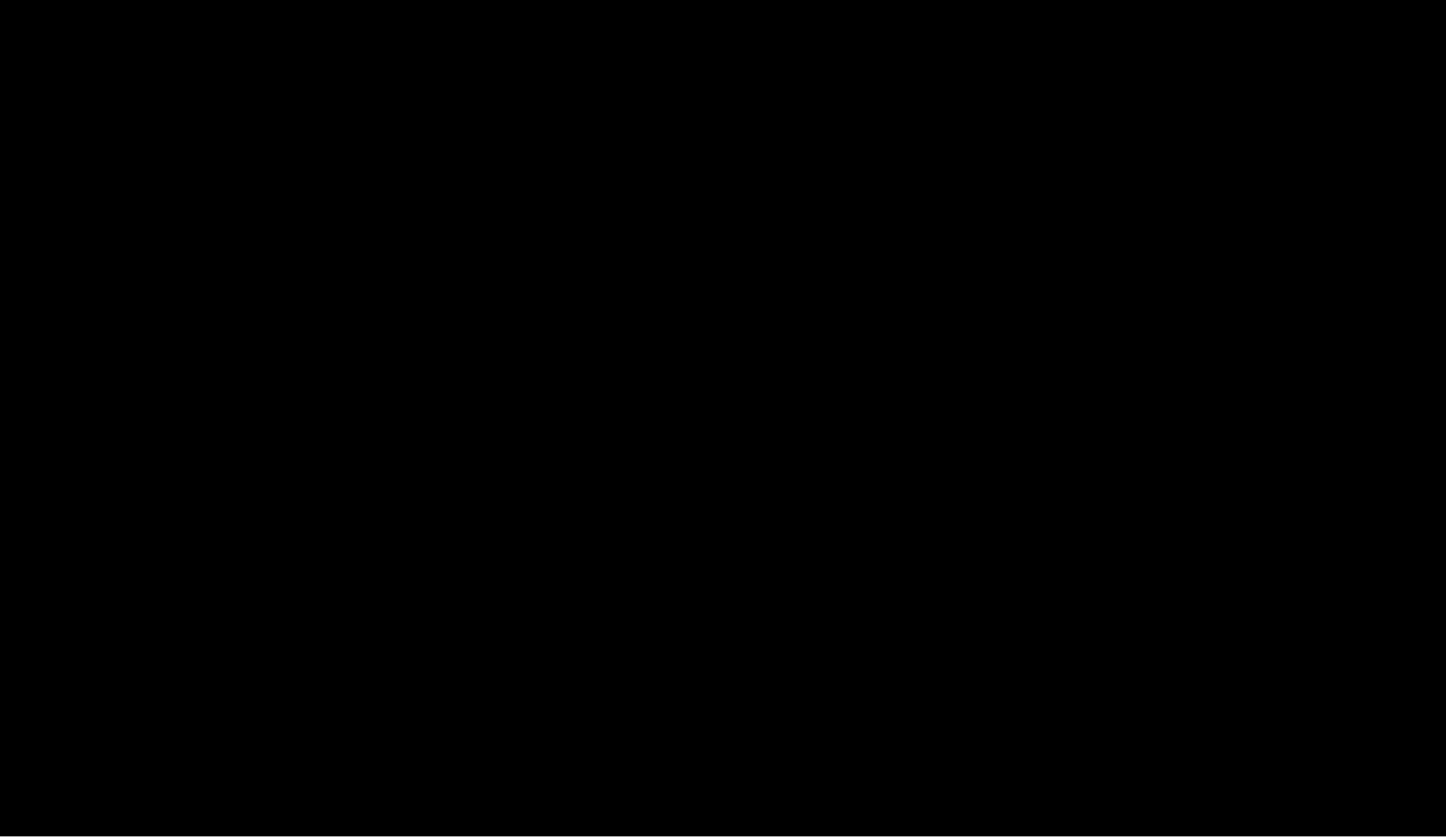

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1 / http://www.icourse163.org/course/CZU-1001755263
2 https://bbclass.czu.cn/webapps/blackboard/content/listContentEditable.jsp?c

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3 - Curriculum Center

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3 - Curriculum Center http://www.jingpinke.com/xpe/portal/35b1a2a2-120d-1000-88a3-254b8298559b

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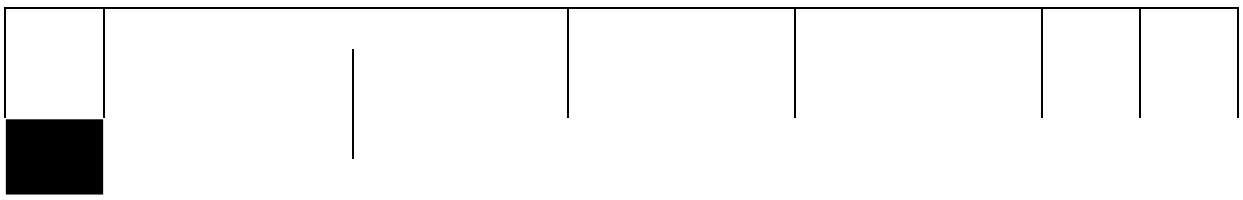

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3		1 2	1-1 2-1	4	0
4		1 2	1-1 2-1	7	0
5		1 2	1-1 2-1	4	0
6		1 2	1-1 2-1	6	0
7		1 2	1-1 2-1	9	0
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		8%	8%	1-1 2-1

		60%	60% 40%	1-1 2-1

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$$i = \frac{\times Ai + \times Bi}{100 \times (Ai + Bi)}$$

Ai= × i

Bi= × i

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3		1 2	1-1 2-1	11	0
4		1 2	1-1 2-1	5	0
5		1 2	1-1 2-1	11	0
6		1 2	1-1 2-1	6	0
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$$i = \frac{\times Ai + \times Bi}{100 \times (Ai + Bi)}$$

Ai=

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Bi= × i

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		0.4	40% 40% 20%	
		0.4	40% 40% 20%	

$$i = \frac{\times Ai + \times Bi + \times Ci}{100 \times (Ai+Bi+Ci)}$$

Ai= × i

Bi= × i

Ci= × i

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Physical experiment B(II)

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1.

	1	2	3
1-1	√		
2-1	√		
4-1	√		
6-1	√		

[ ]

1.

2.

3.

[ ]

[ ]

1

2

3

[ ]

[ ]

1.

2.

3.

[ ]

—

[ ]

1.

2.

3.

[ ]

[ ]

1.

2.

[ ]

JJY 1

[ ]

1.

2.

3.

[ ]

—

[ ]

1.

2.

3.

4.

[ ]

FB201-I FB201-II

[ ]

1.

2.

3.

[ ]

0~50μA 0~2V

0~50mA

3		1. 2. 3. 1. 2.
4		1. 1/3 2. 1/3 3. 0.6
5		1. 2.

20% 40%

40%

= ×60%+ ×40%

		0.2		1

100%			10% 90%	60%

1 . . ,2014.
2 , . . ,2010.
3 , , . .
,2008.
4 . . ,2008.
5 . . ,2006.
6 , . . ,2003.

2019.06

COMPUTER LANGUAGE

0301003

4.0

64 32 32

C 2010

6

C

C

1. C

2.

1-3

5-1

	1	2
1-3	√	√
5-1		√

C

1.

1 C

2.

1 C

2 [main()]

1.

1 C

2

3

4 (float double)

5

6

7

2.

1 C

2

3

4 (float double)

5

1.

1

2 /

3

if

if

switch break

4

for while do…while

break continue

goto

2.

1 C

2 [printf()/scanf()]

3

4

3.

1

1.

1

2

3

2.

1

2

3

3.

1

2

1.

1 return

2

3

4

5

6

7 C

2.

1

2 return

3

4

5

6

7

8

9

10 #include #include

3.

1

2

1.

1

2

3

4

5

2.

1 &

2

3

4

5

6

3.

1

2

3

1.

1

2

3

2.

1

2

3

3.

1

1.

1

getchar(),putchar(),gets(),puts()

2

3

fopen(),fclose(),fprintf(),fscanf() fgetc() fputc() fgets() fputs() feof() rewind()

2.

1

2

3

3.

1

1	C	1	1.3	2	2
2		1	1.3	2	2
3	C	1	1.3	6	6
4		1 2	1.3 5.1	6	6
5		1 2	1.3 5.1	4	4
6		1 2	1.3 5.1	6	6
7		1 2	1.3 5.1	4	4
8		1 2	1.3 5.1	2	2
				32	32

1	C		2	1.3		
2			2	1.3		
3			6	1.3		
4			6	1.3		

				5.1		
5			4	1.3 5.1		

6 6

2		1. 2. 3. 4.
3		1. 2. 1. 2. 3.
4		
5		1. 1/3 2. 1/3 3. 0.6
6		

		1. 2. 3. 3.

= ×20%+ ×20%+

×60%

	/		/	

30%

10 5 4

3

1.3

20%

5.1

			10%	

1. C 2010 6

2019.12

$$i \qquad = \frac{\times Ai + \qquad \times Bi}{100 \times (Ai + Bi)}$$

2020.08

2201002

$$\mathbf{i} \qquad = \frac{\times \mathrm{Ai} + \qquad \times \mathrm{Bi} + \qquad \times C\,\mathrm{i}}{100 \times (\mathrm{Ai} + \mathrm{Bi} + \mathrm{Ci})}$$

2020.11

0000002

2

36 28 0 8

2019

2019 8

“ ”

1.
2.
3.
4.
5.

1.

1

2

3

4

5

2.

1

2

3

4

1.

1

2

3

2.

1

2

3

1.

1

2

3

4

2.

1

2

3

4

1.

1

2

3

4

2.

1

2

3

4

1.

1

2

3

4

2.

1

2

3

4

1		1 2 3		6	0

2		1 4 5		6	0
3		2 3 4		6	0
4		1 5		5	0
5		1 2 5		5	0
				28	0

= × 30 % + ×70 %

	/		/	
		30 %		
		0 %		
		70%		

2019.08

College Students' mental health education

0000004

16

8-1	√				√

1.

1

2

3

4

2.

1

2

3

1.

1

2

3

2.

1

2

3

1.

1

2

3

4

5

2.

1

2

3

1.

1

2

3

4

2.

1

2

3

1.

1

2

3

4

5

2.

1

2

1		1 2 3 5	3-1 6-2 6-3 8-1	2
2		1 2 3 5	3-1 6-2 6-3 8-1	2

3		1 2 3 5	3-1 6-2 6-3 8-1	2
4		4	3-1 6-2 6-3 8-1	2
5		4	3-1 6-2 6-3 8-1	2
6		1 2 3	3-1 6-2 6-3 8-1	2
7		1 2 3 5	3-1 6-2 6-3 8-1	2
8		1 2 3	3-1 6-2 6-3 8-1	2
				16

1			4		
2		A3	4		
3			4		

3

1

2

3

4

1		1 2 3
2		1 2 3 4
3		
4		
5		

= ×50%+ ×50%

	/		/	
		30%		3-1 3-2

		5%	2	3-4 6-2
		15%		6-2 6-3 8-1 8-2
		50%	40 30 50%	3-1

1.

2.

3.

1. 2018

2

2007

. 2004

2005

2007

2004

2006

2005

2019.12

0107010

2.5

40 36 4

2016

1.

2.

3.

4.

5.

6.

1-3 5-1 12-2

	1	2	3	4	5	6
1-3	√	√	√	√	√	√
5-1				√		√
12-2		√	√	√		√

1.

2.

1.

1

2

3

4

2.

1

3

4

2.

1

2

3

1.

1

2

3

4

2.

1

2

1		1 2 4 5	1-3 5-1 12-2	4
2		1 2 5	1-3	10
3		1 3 5	1-3 5-1	10
4		1 3 4 5	1-3 5-1	10
5		2 3 5	1-3 5-1	2
				36

1		A3	2	1-3		

2		A3	2	1-3		

A 0107010 40

/2.5

1		1 2 3
2		1 2 3

		4
3		1 2 3
4		
5		1 1/3 2 1/3

= ×30%+ ×70%

	/		/	

0107011

3.5

56 36 20

A

2016

1.

2.

3.

4.

5.

6.

1-3 5-1 12-2

	1	2	3	4	5	6
1-3	√	√	√	√	√	√
5-1				√		√
12-2		√	√	√		√

1.

1

2

3

4

5

2.

1.

1

2

3

1.

1

2

3

4

5

6

7

8

9

10

11

2.

1

2

3

1.

1 AutoCAD

2

3

4

5

6

7

2.

1 AutoCAD

AutoCAD

AutoCAD

AutoCAD

2

3 AutoCAD

AutoCAD

AutoCAD

AutoCAD

1		1 2 3 4	1-3 5-1 12-2	8
2		1 2 6	1-3 12-2	6

3		2 3 4 5 6	1-3 5-1 12-2	8
4		2 3 4 5 6	1-3 5-1	6
5		1 4	1-3 5-1 12-2	8
				36

1		A3	2	1-3		
2		A3	2	1-3		
3		A3	2	1-3		
4		A3	4	1-3		
5			10	5-1		

3.5

1		1 2 3
2		1 2 3 4
3		1 2 3
4		

5		1 1/3 2 1/3

= ×20%+ ×20%+ ×60%

	/		/	
		20%	20% AutoCad	1-3 5-1

20%

			20% 20% 15%	

0.6

[1] . . .2016

[2] . . .2015

[3] . .2010

[4] · . .2012

[5] 2 2017

2019.12

0102003

2

32 28 4

2014.1

1.2 3.2 4.1

(1)	1-2	1	+
(3) /	3-2	2	+

(4)	4-1	3	+

( ) ( )

( )

( ) ( )

( ) ( )

( ) ( )

( )

( )

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( )

( )

( )

(　　)　　(　　)

(　　)

(　　)

(　　)

1		3		3
2		3		3
3		8		8
4		5		5
5			2	2
6		4		4
7			2	2
8		2		2
9		2		2
10		1		1
		28	4	32

1		45	2

2		20 45 60 T8 T12	2
			4

100		1-2 10 3-1 10	
		1-2 5 3-1 10 4-2 10	
		1-2 10 4-2 5	
		3-1 5 4-2 10	
		1-2 5 3-1 5 4-2 10	
	( )	5	5 0.5 1 5 1 1~2 1 1 1 1

			2~5 1~5
100		1-2 20 4-2 30	
		1-2 10 4-2 40	
100		1-2 6 3-1 9 1-2 10 3-1 5 3-1 15 4-2 20 1-2 15 3-1 10 4-2 10	“ ” “ ”
= ×30%+ ×10%+ ×60%			

20%	A B C D E
15%	A B C D E

20%	A B C D E
40%	

A 90-100 B 80-89 C 70-79 D 60-69 E <60

50%	A B , C D E
50%	A B C D E

A 90-100 B 80-89 C 70-79 D 60-69 E <60

1

2

3

[1] 2014.6

[2] 2012.2

[3] 2013.8

2019.12

0107020

4.5

72 68 4

2014.1

I

I

1.

2.

3.

1-2 2-1 4-1

	1	2	3
1-2	√		
2-1		√	
4-1			√

1.1

1.2

1.3

2.1

2.2

2.2.1

2.2.2

2.2.3

2.3

2.4

2.4.1

2.4.2

2.5

2.6

2.6.1

2.6.2

2.7

2.7.1

2.7.2

2.7.3

2.8

2.9

2.10

3			1	4-1		
4			1	4-1		

1		1 2

		3
2		1 2 3 4
3		1 2 3 1 2 3
4		

5	1	1/3	
	2		1/3

	/		/	
		15%	5 10%	1-2 2-1
		15%	1-3 10%	2-1
		10%	4 4 20%	4-1
		60%	60% 50% 20% 30% 50% 30% 20%	1-2 2-1 4-1

0.6

$$i = \frac{\times Ai + \times Bi + \times Ci}{100 \times Ai + Bi + Ci}$$

Ai= × i

0107021

2

32 32

I

2014.1

II

I

1.

2.

3. I

1-2 2-1 4-1

	1	2	3
1-2	√		
2-1		√	

1		1	1-2	2	
2		1	1-2 2-1	6	
3		1 2	1-2 2-1	6	
4		1 3	1-2 2-1 4-1	12	
5		2 3	2-1 4-1	4	
6		2	2-1	2	
				32	

I

1		1 2 3
2		1

		2 3 4
3		1 2 3 1 2 3
4		
5		1 1/3 2 1/3 3 0.6

= ×30%+ ×70%

	/		/	
		15%	5 10%	1-2 2-1

		15%	1-3 10%	2-1
		60%	60% 50% 20% 30% 50% 30% 20%	1-2 2-1 4-1

0.6

$$i = \frac{\times Ai + \times Bi}{100 \times (Ai + Bi)}$$

Ai= × i

Bi= × i

[1] . : 2011.7.

[2] . : 2015.9.

2018.10

1 60%

	1	2	3	4	5	6	7	
1-2	√	√	√					
4-1				√	√	√		

1.

1

2

3

2.

1

2

3

3.

1

2

3

1.

1

2

3

4

5

6

2.

1

2

3

4

5

6

3.

1

2

3

1.

1

2

3

2.

1

2

3

3.

1

2

1.
    1
    2
    3
    4
    5
2.
    1
    2
    3

3.
    1
    2

1.
    1
    2
    3
    4
2.
    1
    2
    3

3.
    1

8	
16	
8	

3.

5		1 1/3 2 1/3 3 0.6

= × 30% + × 70%

80% 20%

	/		/	
		30%	20-30 80%	1-2 4-1
			20%	
		70%	70%	1-2 4-1

0.6

Ai= × i

Bi= × i

Ci= × i

I

II

2019.12

0107032

4

64 62 2

201

8.3

1.

2.

3.

4.

5.

6.

7.

8.

1-3 20%

2-3 30% 3-1 3

0% 4-3 20%

	1	2	3	4	5	6	7	8
1-3		√			√			
2-3	√		√				√	
3-1				√				
4-3						√		√

1.

1

2

3

4

2.

“ ”

1.

1

2

3

4

2.

1

2

3

1.

1

2

3

2.

1

2

1.

1

2

3

4

2.

1

2

3

1.

1

2

3

4

5

2.

1

2

3

4

1.

1

2

2.

1

2

3

1.

1

2

2.

1

2

3

1.

1

2

3

2.

1

2

3

1.

1

2

3

2.

1

2

3

1.

1

2

3

2.

1

2

3

1.

1

2

3

2.

1

2

3

1		1 2	1-3 3-1	4	
2		2	2-3 4-3	8	
3		3 5	1-3 3-1	8	
4		1 8	3-1 4-3	4	1
5		3 7	1-3 2-3	6	
6		7			

1

2

1

	/		/	
		10%	20-30 10%	1-3
		10%	1-3 10%	1-3
		20%	3 3 20%	2-3 3-1
		60%	60% 30% 20% 10%	1-3 2-3 3-1 4-3

			30% 40%	

0.6

$$i = \frac{\times Ai + \times Bi + \times Ci}{100 \times Ai + Bi + Ci}$$

Ai= × i

Bi= × i

Ci= × i

2019.12

( )

1

2

3

1

2

3

4

5

6

7

1

2

3

4

5

6

1

2

3

4

5

1.

2.

3.

4.

1

2

3

1

2

3

4

1

2

1

2

3

4

1

2

1

2 ——

:

1		2		2
2		6	2	8
3		2		2
4		8	2	10
5		2		2
6		2		2
7		2		2
8		2		2
9		2		2
		32		

1				2
2				2

2202201

2.0

32

2011.06

1

2

3

4

5 Bode

Bode

6

PID

1-1 13% 2-1 6% 3-1 12% 4-1 9%

	1	2	3	4	5	6
1-1		√	√			√
2-1	√			√		√
3-1			√		√	√
4-1					√	√

1				2	/	1 2
2				6	/	

	PID		PID)		

3		1 2 3 1 2 3
4		
5		1 1/3 2 1/3 3 0.6

= ×50%+ ×50%

	/		/	
		15%	10-20 15%	1-1 2-1
		35%	1-3 35%	3-2 4-1

		50	6-8 5 20%	1-1 2-1 3-	

0.6

Ai= × i

Bi= × i

.09

2017.08

2020.11

0101201

2

32 32 0 0

2015.4

/

1-2	√	√	√	√	
2-2		√	√		√

1.

1

2

3

2.

1

2

3

1.

1

2

3

2.

1

2

3

1.

1

2

2.

1

p-v T-s

2

1.

1

2

2.

1

2

1.

1

2

3

4

2.

1

2

3

4

-

1.

1

2

2.

1

2

1		1 4	1-2	1	0
2		1	1-2	9	0
3		2 3	1-2 2-2	8	0
4		3	1-2 2-2	4	0
5		4	1-2	8	0

1		1 2 3
2		1 2 3 4
3		1 2 3 1 2 3

4		
5		1 1/3 2 1/3 3 0.6

= ×40% + ×60%

	/		/	

10-15

1-2 2-2

30%

30%

2015.9.

2016.3.

2016.8.

2019.12

2202103

2

32 32 0 0

3 2018.1

1.

2.

3.

1-2 2-3 12-1

	1	2	3
1-2	√	√	√
2-3	√	√	√
12-1			√

1				4		1
2				5		1
3				5		1
4				6		1 2 3

5				6		2 3
6				3		2 3
7				3		2 3

1		1 2 3
2		1 2

		3 4
3		1 2 3 1 2 3
4		
5		1 1/3 2 1/3 3 0.6

= ×30% + ×70%

	/		/	
			10-15 20% 20%	1-2

0.6

$$= \frac{\times \quad + \qquad \times}{\times \left(\quad + \quad \right)}$$

Ai= × i

Bi= × i

[1] . 2010.

[2] . : 2012.

[3] . (2) : 2013.

[4] . : 2014.

[5] . (3) : 2015.

[6] . (2) : 2018.

2020.11

6.

2-3 3-1 4-1 7-2

	1	2	3	4	5	6
2-3		√	√			
3-1	√			√		
4-1			√		√	
7-2					√	√

1				2	/	1 2
2	MCS-51 CPU MCS-51 MCS-51 MCS-51 CPU MCS-51 MCS-51 MCS-51 /		/ MCS-51 RAM ROM MCS-51	4	/	1 2 4
3	MCS-51		7	2	/	2 5

	MCS-51					6
4	C51 C51 C51 C51 C51 C51 C51 / C51 C51		C51 ANSI C C51 C51 C51 C51 MCS-51 C51 C51 C51	6	/	3 5 6 7

5 51 2 / / 3 6

MCS-51

2		MCS-51	3	2-3 3-1 4-1 7-2		

1		1 2 3
2		1 2 3 4
3		1 2 3 1 2 3

4		
5		1 1/3 2 1/3 3 0.6

= ×20%+ ×20%+ ×60%

	/		/	
		10%	10-20 10%	2-3 3-1
		10%	1-3 10%	4-1 7-2
		20%	3 3 20%	2-3 3-1 4-2
		60%	60% 30% 30% C51 40%	2-3 3-1 4-2 7-2

0.6

Ai= × i

Bi= × i

Ci= × i

2010.08

2011.08

2020.11

0101204

3

48 42 6

A

2017.6

1.

2.

3.

4.

5.

1-4 4-3 10-2

	1	2	3	4	5
1-4	√	√	√		

1		2		2
2		6		6
3		6		6
4		6	2	8
5		2		2
6		4	2	6
7		16	2	18
		42	6	48

1			2
2			2

3	CA6140		2
			6

		1 2 3
		1 2

3

4

		1.4 5 4.3 5 10.2 5	
		1.4 5 4.3 5 10.2 5	
		4.3 5 10.2 5	
		1.4 5 4.3 5 10.2 5	
		1.4 5 4.3 5 10.2 5	
100		1.4 10 4.3 10 10.2 10	30 1 3 30 1 5 1 3 5 5 2 5 1 5
100		1.4 10 4.3 10 10.2 10	
		1.4 10 4.3 10 10.2 10	

		1.4 15 4.3 15 10.2 10	
100		1.4 15 10.2 15	“ ” “ ”
		1.4 5 4.3 5	
		1.4 10 4.3 10 10.2 10	
		4.3 4 10.2 2	
		4.3 4 10.2 2	
		4.3 6 10.2 3	
		4.3 6 10.2 3	
= ×30%+ ×10%+ ×60%			

	A 90-100	B 80-89	C 70-79	D 60-69	E <60
30%					

70%	90%	80%	70%	60%	60%

90 -100	1 2 3
80 -89	1 2 3
70 -79	1 2 3
60 -69	1 2 3
< 60	1

	2 3

0.6

$$= \frac{\times \quad + \quad \times \quad + \quad \times}{\times \left(\quad + \quad + \quad \right)}$$

Ai= × i

Bi= × i

Ci= × i

1 2013.

2 . ,2012.

3. 2010

4. 1990

5. 1985

6. 1985

7. 2010

2019.12

2202001

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64 64

3 2017

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3-1	√							
4-2		√						
12-2			√					

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CNG LPG

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1 CNG

2 LPG

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3 ABS ARS

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4 ABS ARS

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1		1	3-1	2	
2		1 2 3	3-1 4-2 12-2	4	
3		1 2 3	3-1 4-2 12-2	4	
4		1	3-1	4	
5		1 2 3	3-1 4-2 12-2	4	
6		1	3-1	4	
7		1	3-1	2	
8		1	3-1	2	
9		11	3-1	6	
10		1 3	3-1 12-2	2	
11		1	3-1	8	
12		1	3-1	8	
13		1	3-1	6	
14		1 2 3	3-1 4-2 12-2	6	
15		1	3-1		

1		1 2 3
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4		
5		1 1/3 2 3 3

= ×30%+ ×10%+ ×50%

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10%

10

2202002

3.0

48	42	6	0

2018.06

ÄAê · Å

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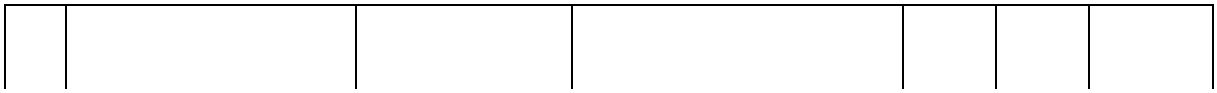
	1	2	3	4	5			
1-2	√	√		√				
2-1		√	√					
3-1				√				
4-3		√	√		√			
5-1			√					
5-3			√		√			

1	1 2 3 4 5		1 2 3	9	/	1 2 3
2	1 2 3		1 2 3	6	/ /	1 2 3

	3 4		3			
4	1 2 3 4 5		1 2 3 I r f	9	/ /	1 2 4
5	1 2 3 4 5		1 2 3	6	/ /	1 2 3 5
6	1 2 3 4		1 2 3	6	/ /	1 2 4



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7 1 3 / /

		4
3		1 2 3 1 2 3
4		
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= ×35%+ ×15%+ ×50%

	/		/	
		5%	5%	1-2
		20%	4~5 20~30 20%	2-1 3-1 4-3 5-1 5-3
		10%	2~3 1~2 10%	2-1 3-1

		15%		3-1 4-3 5-1 5-3
		50%	50%	1-2 2-1

0.6

$$i = \frac{\times Ai + \times Bi}{100 \times (Ai + Bi)}$$

Ai= × i

Bi= × i

1 [M]. 2009.

2 [M]. 2009.

3 [M]. 2016.

4 [M]. 2017.

2020.11

2201010

	1	2	3	4	5			
3-1								
4-1								
6-1								

1	1 2 3		1 2 3	2	/ 	1
2	1 2 3 (ECU) 4		1 2 3 4	8	/ /	2 5
3	1 2 3 4 5		1 2 3 4	6	/ /	2 5
4	1 (ISC) 2 3 4		1 2	3	/	2 5

	5 6		3			
5	1 ABS 2 ABS		1 ABS 2 ABS	6	/ /	3 5
6	1 ASR 2 ASR 3		1 ASR 2 ASR 3	2	/	3 5
7	1 2 3 4 5 6 7 8 9 CVT 10 DSG		1 2 3 4 5 6 7 8 9 10 11 12 13 DSG	10	/ /	3 5
8	A/D D/A		1 M E 2 3	2	/	4 5
9			1	2	/	

	1 2 3		ECU 2			4 5
10	1 2		1 2	4	/	3 5
11	1 2		1 2	3	/	3 4 5

1			2	3-1 4-1		
2			2	3-1 4-1		
3			2	3-1 4-1		

4			2	3-1 4-1		

1		1 2 3
2		1 2

		3 4
3		1 2 3 1 2 3
4		

5

		60%	60%	3-1 4-1 6-1

0.6

Ai= × i

Bi= × i

	1	2	3	4	5			
1-2	√							
3-1		√						
5-2			√					
6-1				√				
7-2					√			

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ABS ASR EBD

1		1 4	1-2 6-1	2	
2		2 3 5	3-1 5-2 7-2	8	
3		2 3 5	3-1 5-2 7-2	4	
4		2 3 5	3-1 5-2 7-2	8	
5		2 3 5	3-1 5-2 7-2	2	
6		2 3 5	3-1 5-2 7-2	6	
7		2 3 5	3-1 5-2 7-2	6	
8		2 3 5	3-1 5-2 7-2	6	
9		2 3 5	3-1 5-2 7-2	6	
				48	

1		1 2 3
2		1 2 3 4
3		1 2 3 1 2
4		
5		1 1/3 2 1/3 3 0.6

= ×30%+ ×20%+ ×50%

	/		/	
		20%	4 20%	1-2
		10%	100 10% 10	6-1 7-2
		20%	3-4 20%	3-1 5-2
		50%	50%	1-2 3-1 6-1

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2020.11

2202004

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32 28 4 0

2016.08

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	1	2	3	4				

4-1

	1 2		1 2 3	5	/ /	3
	1 2		1 2 3	5	/ /	3
	1 2 3 4 5 6 7 8 9 10 11		1 2	6	/ /	1 4

	1 2 3		1 2	2	/ / /	1 4

1			2	4-2 10-1		
2	HIL		2	4-2 10-1		

1		1 2 3
2		1 2 3 4

3		1 2 3 1 2 3
4		
5		1 1/3 2 1/3 3 1/3 4 0.6

= ×40% + ×20%+ ×40%

	/		/	
		5%	5%	4-2
		20%	4~5 20~30 20%	4-2
		15%	PPT 15%	4-1

		20%	15%	6-1
		40%	40%	10-1

0.6

Ai= × i

Bi= × i

1 [M]. 2013.

2 [M]. 2010.

3 [M]. 2015.

4

2202203

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32 26 6

2017

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1-1 1-2 2-1 2-2 3-1 3-3 4-1 5-1 6-1 6-2

	1	2	3	4				

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1-2	√	√						
2-1				√				
2-2		√		√				
3-1		√						
3-3				√				
4-1		√	√					
5-1			√					
6-1	√			√				
6-2	√							

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5	1. 1 2 3 4		1 2 3	6	/ /	3 4 5
6	1 2 3 4		1 2 3 4	4	/	3 6
7	1 2 3		1 2 3	4	/ /	1 2

8

	2					

1			2	4-1 5-1		
2			2	4-1 5-1		
3			2	1-2 2-2		

1		1 2 3
2		1 2 3 4

3		1 2 3 1 2 3
4		
5		1 1/3 2 1/3 3 0.6

= ×20%+ ×20%+

×60%

	/		/	
		10%	10%	1-2
		10%	3~4 20~30 10%	1-1 1-2 5-1
		20%	3 3	4-1 5-1

			20%	
		60%	60%	1-1 1-2 5-1

0.6

Ai= × i

Bi= × i

Ci= × i

1 . . .2018.

2 . . .2018.

3 5 . . .2018.06.

2020.11

Engine Principle

2201016

2.0

33

3 2019.09

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3-1 4-2 7-2

	1	2	3	4
3-1	√	√	√	
4-2		√	√	

7-2	√	√	√	√

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1 HCCI

2 HCCI

3 HCCI

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4 ISG

1. OBD-II

2.

3. HCCI HCCI

4.

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CAI

1		1	3-1 7-2	3
2		2 4	4-2 7-2	5
3		2	3-1 7-2	4
4		2 3	3-1 7-2	3
5		2 3	3-1 4-2 7-2	3
6		2 3	3-1 7-2	3
7		2 3	3-1 7-2	3
8		3	3-1 4-2 7-2	3
9		2 3	3-1 4-2 7-2	3
10		4	7-2	3
				33

1		1 2 3
2		1 2 3 4
3		1 2 3 1 2 3
4		

5		1 1/3 2 1/3

= ×30%+ ×70%

	/		/	
		15%	15%	3-1 4-2
		15%	3~4 15~25 15%	4-2 7-2
		70%	70%	3-1 4-2 7-2

0.6

$$= \frac{\times \quad + \quad \times}{\times(\quad + \quad)}$$

Ai= × i

Bi = × i

1 2 . . .2019.11.

2 4 . . .2019.02.

2020.11

2202205

2.0

32

C

STM32

2014.05

STM32

51

1 ARM

STM32

2 Cortex-M3

Thumb Thumb2

STM32

3 STM32

STM32

4 C STM32

STM32

5 STM32 GPIO

UART DMA

1-2 2-3 3-1

5-2 6-1

	1	2	3	4	5
1-2	√		√	√	√
2-3	√				
3-1		√		√	√
5-2			√		√
6-1		√			√

1	ARM STM32		ARM STM32	2	/	1
2	CM3 CM3 CM3 Thumb Thumb-2		CM3 Thumb Thumb-2 STM32 CM3	4	/	2

	USART USART		STM32 USART USART			
8	STM32 TIMx TIMx RTC SysTick	“ ” “ ”	TIMx TIMx TIMx PWM RTC SysTick	4	/	1 2 5
9	DMA DMA DMA		DMA DMA DMA	4	/	1 2 5

STM32

1		1 2 3
2		1 2 3 4
3		1 2 3 1 2 3
4		
5		1 1/3 2 1/3 3 0.6

= ×50%+ ×50%

	/		/	
		15%	10-20 15%	1-2 2-3
		35%	1-3 35%	3-1 5-2
		50%	50% CM3 30% 20% 50%	1-2 2-3 3-1 5-2 6-1

0.6

$$i = \frac{\times A_i + \times B_i}{100 \times (A_i + B_i)}$$

Ai= × i

Bi= × i

C

2019.04

STM32

2019.06

2020.11

2202208

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32 32 0 0

2017 08

1.

2.

3.

1-2 2-3 12-1

	1	2	3
1-2	√	√	√
2-3	√	√	√
12-1			√

1				4		1
2				8		1 2 3
3				4		1 3

4				5		1 3
5				6		2 3
6	CFD N S		CFD N S N S	5		2 3

1		1 2 3

2		1 2 3 4
3		1 2 3 1 2 3
4		
5		1 1/3 2 1/3 3 0.6

= ×30%+ ×70%

	/		/	
		20%	10-15 20%	1-2 2-3
		10%	10%	1-2 12-1

		70%	70%	1-2 2-3 12-1

0.6

$$= \frac{\times \quad + \quad \times}{\times \left(\quad + \quad \right)}$$

Ai= × i

Bi= × i

[1] : 2017.

[2] : 2014.

[3] : 2005.

2020.10

2202207

2.0

32 28 4

2017.6

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3.

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1-2 4-1 4-2

5-1

	1	2	3	4
1-2	√	√	√	
4-1		√		√
4-2			√	√
5-1			√	

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80%

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	28	4

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2			2	4-1 4-2 5-1		

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		2 3
2		1 2 3 4
3		 1 2 3 1 2 3
4		
5		 1 1/3 2 1/3

= ×20%+ ×20%+ ×60%

	/		/	
		10%	10%	1-2
		10%	3~4 15~20 10%	4-1 5-1
		20%	2 2 20%	1-2 4-1 4-2 5-1
		60%	70%	1-2 4-1 4-2

0.6

$$= \frac{\times + \times}{\times(+)}$$

Ai= × i

Bi = × i

1 . . .2017.06.

2 . . .2013.08.

2020.11

	1	2	3	4	5
10-3	√	√	√	√	√

1				2		1 2 3 4
2				2		1 2 3 4
3	+		+ URL	2		1 2 3 4

EI EV

EI EI

EI EI

4 EV EI EI 4

EI

EI

SCI SSCI

5 SCI SSCI 4

NKI

KDN

CNKI KDN

CNKI KDN

4

8	EBSCOhost SpringerLink ScienceDirect Emerald IEEE Xplore IEL		EBSCOhost SpringerLink ScienceDirect Emerald IEEE Xplore IEL	2		1 2 3 4
9						

1		1 2 3
2		1 2 3 4
3		1 2 3 1 2 3
4		
5		1 1/3 2 1/3 3 0.6

= ×30%+ ×70%

	/		/	
		20%	3-5 20%	1-2 2-3
		10%	10%	1-2 12-1
		70%	70%	1-2 2-3 12-1

0.6

$$= \frac{\times \quad + \quad \times}{\times (\quad + \quad)}$$

Ai= × i

Bi= × i

[1]

[2] : 2013.

[3] : 2010.

2020.11

2202204

2.0

32 28 4

2

2018.1

1.

2.

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2-1 3-1 4-3 5-2 6-1

	1	2	3	4
2-1	√			
3-1		√	√	√
4-3		√	√	
5-2		√		√
6-1			√	√

1.

2.

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NVH 2008

NVH NVH

NVH

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2.

1		1 2	2-1 3-1 4-3 5-2	4	
2		1 2	2-1 3-1 4-3 5-2	8	
3		1 2	2-1 3-1 4-3 5-2	2	
4		1 2 3	2-1 3-1 4-3 5-2 6-1	8	2
5		2 3 4	3-1 4-3 5-2 6-1	4	
6		2 3	3-1 4-3 5-2 6-1	2	2
				28	4

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2			2	3-1 4-3		

NVH

“ ” “

”

(LMS 2)

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1

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		10%		2-1

10%

3~4 15~20

2-1 U

10%

10%

1 . . .2016.09.

2 ( ) . . .2014.01.

2020.11

2201018

2.0

32 32 0 0

3 2020.8

1.

2. /

3.

4.

5-2 6-2 7-2

	1	2	3	4				
5-2	√	√	√					
6-2	√			√				
7-2	√			√				

1	1 2 3 4		1 2 3	4	/	1

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2 2
3 4

	2 3 4		2 3			
5	1 2 3		1 2	2	/	2
6	1 2 3 4 5 6		1 2 3	6	/ 2 4	
7	1 2 3		1 2 3	6	/	3

1		1 2 3
2		1 2 3 4
3		1 2 3 1 2 3
4		
5		1 1/3 2 1/3 3 0.6

= ×40% + ×60%

	/		/	
		10%	10%	6-2 7-2
		10%	4~5 20~30 10%	5-2 6-2
		20%	PPT 20%	7-2
		60%	60%	5-2 6-2 7-2

0.6

$$i = \frac{\times Ai + \times Bi}{100 \times (Ai + Bi)}$$

Ai= × i

Bi= × i

1 ——

2 . Mehrdad Ehsani . .2020.5.

2 . , . .2020.11.

3 . . .2019.11.

2020.11

2202301

1

1

1.

2.

3.

4.

5-3 7-1 8-3

10-1

	1	2	3	4				
5-3	√		√					
7-1		√						
8-3			√					

10-1	√			√				

1.

1

2

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1

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4

5

1		2 3	7-1 8-3	0.5
2		1 2	5-3 7-1	0.5
3		1 2 3 4	5-3 7-1 8-3 10-1	4
				5

1		1 2
2		1 2 3 4

3

		40%	60%	5-3 7-1 10-1

2020.11

0107013

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013

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“ ”

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5-1 12-1

	1	2					

5-1	√	√					
12-1		√					

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1 1 A3

2 3-4 A3

3 1

CAD

4 3-4

CAD

1	.	0.25	
2		1.5	
3		1.75	
4		1	
5		0.5	

	5	

	1.	
	2.	
	3.	
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	2.	
	3.	
	4.	

100	1	5.1 16 12.1 4
	2	5.1 16 12.1 4
	3	5.1 48 12.1 12
	=	+ +

0.6

	A 90-100	B 80-89	C 70-79	D 60-69	E <60
20%					

20%					

4.

5.

6-1

30% 8-2 30% 9-1

30% 9-2 10%

	1	2	3	4	5
6-1	√	√	√	√	√
8-2	√	√	√	√	
9-1	√	√	√	√	
9-2	√				

1

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2-3

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1		4	6-1 8-2 9-1	2.5	0.5 2
2		3	6-1 8-2 9-1	2.5	0.5 2
3		2	6-1 8-2 9-1	1	0.3 0.7
4		1	6-1 8-2 9-1 9-2	2	9 1.5
5		4	6-1 8-2 9-1	1	0.3 0.7
6		4	6-1 8-2 9-1	0.5	0.2 0.3
7		5	6-1	0.5	0.2 0.3
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2 10

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	/		/	

		10%	2 5	8-2 9-1
		80%		6-1 8-2 9-1 9-2
		10%		6-1

2

1

25% 30% 10% 10% 15% 5%

5%

2

2018.11

0210701

1

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2015

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2-2 5-1

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1. A

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5 3

1		1 2	2-2 5-1	1	
2		1 2	2-2 5-1	1	

3		1 2	2-2 5-1	1	
4	-	1 2	2-2 5-1	1	
5		1 2	2-2 5-1	1	
				5	

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	1.	
	2.	
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1. 3

2. 1

= ×20% + ×50%+ ×30%

		20%		2-2 5-1

		50%		2-2 5-1
		30%		2-2 5-1

0.6

$$i = \frac{\times Ai + \times Bi + \times Ci}{100 \times (Ai + Bi + Ci)}$$

Ai= × i

Bi= × i

Ci= × i

A

1. . . .2017
2. . . .2014
3. . /
. . 2012

2019.12

2202302

2.0

2

/ /

1.

2.

3.

4.

1		1 4	1-2 6-1
2		2 3	6-1 8-2
3		4 5	1-2 6-1 9-2 10-2

1		1 2 3 4
2		1 2 3 3 5

= 30%+ 60%+ 10%

	/		/	
		30%	30%	9-1
		60%	60%	1-2 6-1

8-2
9-2

2201022

1

2

/ /

4S

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4-3 5-3 7-1

8-3 10-1

	1	2	3	4	5			
4-3			√					
5-3			√		√			
7-1		√						
8-3	√			√				
10-1					√			

1.

1

2

3

2.

1

2

3

	/		/	
		25%	25%	10-1
		45%	45%	4-3 5-3 10-1
		10%	10%	7-1
		10%	3 10%	8-3
		10%	10%	8-3

2020.11

3-2 4-3 5-3

7-1 8-3 10-1

	1	2	3	4	5			
3-2	√			√				
4-3			√					
5-3			√		√			
7-1		√						
8-3	√			√				
10-1					√			

1.

1

2

3

2.

1

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3

4 /

5 /

6

1			2 3	8-3

2			3 4	4-3 5-3 8-3
3			1 3 4 5	4 5 8

= 25%+ 45%+ 10%+

10%+ 10%

	/		/	
		25%	25%	10-1
		45%	45%	3-2 4-3 5-3 10-1
		10%	10%	7-1
		10%	3 10%	8-3
		10%	10%	8-3

2020.11

2 2

1

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4

3

1 . . 2014

2 . . 2004

3 . . 2006

30%( )

70%

2019.12

2202306

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C

51

2016.2

C

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3-2 6.25%

4-4 25% 5-3 33%

9-2 8% 10-1 14.3%

	1	2	3	4	5	6
3-2	√	√	√			
4-4			√	√		√
5-3	√	√	√			
9-2		√		√	√	
10-1					√	√

1. 1

2. 2 PC

3.

8

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1 50%

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PPT

7.

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

	1.	
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1. 1
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5. PPT1

= ×10% + ×50%+ ×20%+ ×20%

	/		/	

10%

5-3

2020.11

2202304

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2016.7

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2-3 3-3 5-1

6-1 9-2 10-1

	1	2	3	4	5	6		
2-3	√							
3-3		√						
5-1			√					
6-1				√				
9-2					√			
10-1						√		

1.

1

2

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4 6000-8000

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6000-8000

3.

6 6000-8000

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1

2 $\varphi = 0.7$

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4

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AutoCAD Pro/E UG

ADMAS CarSim Matlab

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4

1 2 3 4 5

6 7

5

3 15 7

				/	
1		1 6	2-3 9-2	0.5	
2		2 4 5	3-3 6-1 5-3	1	
3		2 4 5	3-3 6-1 5-3	1	
4		1 6 7	2-3 9-2 10-1	1.5	
5		3 6 7	5-1 9-2 10-1	1	
6		1 3 5	2-3 5-1 9-2	4	
9		4 6	6-1 10-1	0.5	
10		5 6	9-2 10-1	0.5	
				10	

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	2.	
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	4.	
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5. PPT1

= ×10% + ×50%+ ×20%+ ×20%

	/		/	

		10%		2-3 9-2 10-1
		50%		2-3 3-3 5-1 6-1
		20%		10-11
		20%		10-1

2202305

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14

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8-3 9-2 9-3

10-1 10-2 11-1 11-2 12-2

	1	2	3	4	5
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9-2	√	√	√		
9-3	√	√	√		
10-1	√	√	√	√	
10-2				√	√
11-1				√	√
11-2				√	√
12-2	√	√	√	√	√

1.

1

2

3

2.

SpringerLink

EBSCO

1.

2.

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1

Matlab CATIA

2

3 VB VC

4 AutoCAD

1.

2. AUTOCAD Excel

Word WPS

15000

1. PPT

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14 8

				/
1		1 5	8-3 9-2 9-3 10-1 10-2 11-1 11-2 12-2	2
2		1 2 3	9-2 9-3 10-1 12-2	2
3		2 3 4	8-3 9-2 9-3 10-1 10-2 11-1 11-2 12-2	6
4		4 5	8-3 10-1 10-2 11-1 11-2 12-2	5
5		4	8-3 10-1 10-2 11-1 11-2 12-2	1
				16

1.

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30% 20% 50%

2.

( ) 90

( ) 89-80

( ) 79-70

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( ) = ×30% +

×20%+ ×50%

	/		/	
		30%	( )	8-3 9-2 9-3 10-1 10-2 11-1 11-2 12-2
		20%		8-3 9-2 9-3 10-1 10-2 11-1 11-2 12-2
		50%		8-3 9-2 9-3 10-1 10-2 11-1 11-2 12-2

0.6

Ai= × i

Bi= × i

Ci= × i

( )

( ) ( )