1. **شاخص‌ها**

| **ردیف** | **شرح** | **شاخص** |
| --- | --- | --- |
| 1 | پروژه | *i,j* | *i,j=1,…,24 ;* |
| 2 | هدف استراتژیک | *t* | *t=1,…,9 ;* |
| 3 | پروژه پس‌نیاز | *g* |  |
| 4 | پروژه پیش ‌نیاز | *h* |  |
| 5 | منبع | *k* | *k=1,…,12 ;* |
| 6 | تکنولوژی | *f* | *f=1,…,5 ;* |

1. $γ\_{i}$

| **ردیف** | **پروژه (*i*)** | **میزان هم‌افزایی ناشی از تعاملات فنی (**$γ\_{i}$**)** |
| --- | --- | --- |
| 1 | $$P\_{1}$$ | 75/0 |
| 2 | $$P\_{2}$$ | 5/0 |
| 3 | $$P\_{3}$$ | 1 |
| 4 | $$P\_{4}$$ | 5/0 |
| 5 | $$P\_{5}$$ | 5/0 |
| 6 | $$P\_{6}$$ | 5/0 |
| 7 | $$P\_{7}$$ | 1 |
| 8 | $$P\_{8}$$ | 25/0 |
| 9 | $$P\_{9}$$ | 1 |
| 10 | $$P\_{10}$$ | 25/0 |
| 11 | $$P\_{11}$$ | 75/0 |
| 12 | $$P\_{12}$$ | 1 |
| 13 | $$P\_{13}$$ | 5/0 |
| 14 | $$P\_{14}$$ | 25/0 |
| 15 | $$P\_{15}$$ | 5/0 |
| 16 | $$P\_{16}$$ | 1 |
| 17 | $$P\_{17}$$ | 1 |
| 18 | $$P\_{18}$$ | 5/0 |
| 19 | $$P\_{19}$$ | 1 |
| 20 | $$P\_{20}$$ | 75/0 |
| 21 | $$P\_{21}$$ | 1 |
| 22 | $$P\_{22}$$ | 5/0 |
| 23 | $$P\_{23}$$ | 1 |
| 24 | $$P\_{24}$$ | 1 |

1. $r\_{i}$ **و** $A\_{i}$

| **کد پروژه** | **امتیاز پروژه (**$A\_{i}$**)** | **ریسک پروژه (**$r\_{i}$**)** | **کد پروژه** | **امتیاز پروژه (**$A\_{i}$**)** | **ریسک پروژه (**$r\_{i}$**)** |
| --- | --- | --- | --- | --- | --- |
| $$P\_{1}$$ | 3 | 3/0 | $$P\_{13}$$ | 2 | 4/0 |
| $$P\_{2}$$ | 2 | 15/0 | $$P\_{14}$$ | 4 | 05/0 |
| $$P\_{3}$$ | 5 | 4/0 | $$P\_{15}$$ | 4 | 15/0 |
| $$P\_{4}$$ | 2 | 5/0 | $$P\_{16}$$ | 2 | 3/0 |
| $$P\_{5}$$ | 3 | 4/0 | $$P\_{17}$$ | 4 | 1/0 |
| $$P\_{6}$$ | 4 | 08/0 | $$P\_{18}$$ | 3 | 25/0 |
| $$P\_{7}$$ | 5 | 2/0 | $$P\_{19}$$ | 5 | 55/0 |
| $$P\_{8}$$ | 3 | 35/0 | $$P\_{20}$$ | 2 | 05/0 |
| $$P\_{9}$$ | 2 | 1/0 | $$P\_{21}$$ | 5 | 35/0 |
| $$P\_{10}$$ | 2 | 15/0 | $$P\_{22}$$ | 3 | 2/0 |
| $$P\_{11}$$ | 5 | 2/0 | $$P\_{23}$$ | 2 | 1/0 |
| $$P\_{12}$$ | 5 | 35/0 | $$P\_{24}$$ | 4 | 3/0 |

1. $NPV\_{i}$

|  |  |  |  |
| --- | --- | --- | --- |
| **کد پروژه** | **ارزش خالص فعلی پروژه (میلیارد تومان)** | **کد پروژه** | **ارزش خالص فعلی پروژه (میلیارد تومان)** |
| $$P\_{1}$$ | 15 | $$P\_{13}$$ | 120 |
| $$P\_{2}$$ | 10 | $$P\_{14}$$ | 8 |
| $$P\_{3}$$ | 5/11 | $$P\_{15}$$ | 10 |
| $$P\_{4}$$ | 23 | $$P\_{16}$$ | 6/28 |
| $$P\_{5}$$ | 100 | $$P\_{17}$$ | 23 |
| $$P\_{6}$$ | 25/30 | $$P\_{18}$$ | 62 |
| $$P\_{7}$$ | 18 | $$P\_{19}$$ | 5/12 |
| $$P\_{8}$$ | 25 | $$P\_{20}$$ | 7/79 |
| $$P\_{9}$$ | 5/31 | $$P\_{21}$$ | 11 |
| $$P\_{10}$$ | 56 | $$P\_{22}$$ | 45/8 |
| $$P\_{11}$$ | 55 | $$P\_{23}$$ | 4 |
| $$P\_{12}$$ | 3 | $$P\_{24}$$ | 45 |

1. $w\_{t}$

|  |  |
| --- | --- |
| **t** | $$w\_{t}$$ |
| 1 | 1392/0 |
| 2 | 0544/0 |
| 3 | 1433/0 |
| 4 | 1152/0 |
| 5 | 1192/0 |
| 6 | 0828/0 |
| 7 | 1132/0 |
| 8 | 1096/0 |
| 9 | 1231/0 |

1. $D\_{it}$

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **هم‌راستایی پروژه‌ها با اهداف استراتژیک سازمان** | $$G\_{1}$$ | $$G\_{2}$$ | $$G\_{3}$$ | $$G\_{4}$$ | $$G\_{5}$$ | $$G\_{6}$$ | $$G\_{7}$$ | $$G\_{8}$$ | $$G\_{9}$$ |
| $$P\_{1}$$ | 2 | 2 | 3 | 3 | 1 | 1 | 2 | 2 | 1 |
| $$P\_{2}$$ | 3 | 4 | 4 | 4 | 3 | 2 | 2 | 3 | 2 |
| $$P\_{3}$$ | 4 | 4 | 4 | 3 | 4 | 2 | 4 | 4 | 1 |
| $$P\_{4}$$ | 3 | 2 | 3 | 3 | 3 | 2 | 4 | 2 | 3 |
| $$P\_{5}$$ | 4 | 4 | 4 | 4 | 4 | 2 | 3 | 4 | 3 |
| $$P\_{6}$$ | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 |
| $$P\_{7}$$ | 3 | 4 | 3 | 5 | 3 | 4 | 3 | 3 | 2 |
| $$P\_{8}$$ | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| $$P\_{9}$$ | 3 | 3 | 2 | 3 | 2 | 2 | 3 | 2 | 2 |
| $$P\_{10}$$ | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 |
| $$P\_{11}$$ | 4 | 4 | 4 | 5 | 5 | 4 | 3 | 4 | 4 |
| $$P\_{12}$$ | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 |
| $$P\_{13}$$ | 4 | 4 | 5 | 5 | 5 | 4 | 4 | 4 | 3 |
| $$P\_{14}$$ | 4 | 4 | 5 | 5 | 5 | 4 | 4 | 4 | 4 |
| $$P\_{15}$$ | 4 | 4 | 5 | 5 | 5 | 4 | 4 | 4 | 4 |
| $$P\_{16}$$ | 4 | 4 | 5 | 5 | 5 | 4 | 4 | 4 | 3 |
| $$P\_{17}$$ | 4 | 4 | 5 | 5 | 5 | 4 | 4 | 4 | 2 |
| $$P\_{18}$$ | 4 | 3 | 5 | 4 | 4 | 4 | 4 | 4 | 4 |
| $$P\_{19}$$ | 4 | 4 | 5 | 4 | 4 | 4 | 4 | 3 | 3 |
| $$P\_{20}$$ | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 |
| $$P\_{21}$$ | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| $$P\_{22}$$ | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 3 |
| $$P\_{23}$$ | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| $$P\_{24}$$ | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 3 |

1. $α\_{i}$

| **ردیف** | **پروژه (*i*)** | **میزان هم‌افزایی ناشی از تعاملات منابع (**$α\_{i}$**)** |
| --- | --- | --- |
| 1 | $$P\_{1}$$ | 269/0 |
| 2 | $$P\_{2}$$ | 275/0 |
| 3 | $$P\_{3}$$ | 4015/0 |
| 4 | $$P\_{4}$$ | 43375/0 |
| 5 | $$P\_{5}$$ | 29/25 |
| 6 | $$P\_{6}$$ | 125/13 |
| 7 | $$P\_{7}$$ | 32/1 |
| 8 | $$P\_{8}$$ | 625/11 |
| 9 | $$P\_{9}$$ | 744/5 |
| 10 | $$P\_{10}$$ | 25/31 |
| 11 | $$P\_{11}$$ | 495/20 |
| 12 | $$P\_{12}$$ | 36/0 |
| 13 | $$P\_{13}$$ | 25/32 |
| 14 | $$P\_{14}$$ | 3/0 |
| 15 | $$P\_{15}$$ | 71575/0 |
| 16 | $$P\_{16}$$ | 835/7 |
| 17 | $$P\_{17}$$ | 175/8 |
| 18 | $$P\_{18}$$ | 15/25 |
| 19 | $$P\_{19}$$ | 79/4 |
| 20 | $$P\_{20}$$ | 625/34 |
| 21 | $$P\_{21}$$ | 275/1 |
| 22 | $$P\_{22}$$ | 34/1 |
| 23 | $$P\_{23}$$ | 264/0 |
| 24 | $$P\_{24}$$ | 41/0 |

1. $β\_{i}$

| **ردیف** | **پروژه (*i*)** | **میزان هم‌افزایی ناشی از تعاملات تکنولوژی (**$β\_{i}$**)** |
| --- | --- | --- |
| 1 | $$P\_{1}$$ | 04/1 |
| 2 | $$P\_{2}$$ | 9/0 |
| 3 | $$P\_{3}$$ | 86/0 |
| 4 | $$P\_{4}$$ | 31/2 |
| 5 | $$P\_{5}$$ | 85/1 |
| 6 | $$P\_{6}$$ | 59/1 |
| 7 | $$P\_{7}$$ | 25/2 |
| 8 | $$P\_{8}$$ | 0 |
| 9 | $$P\_{9}$$ | 05/3 |
| 10 | $$P\_{10}$$ | 71/1 |
| 11 | $$P\_{11}$$ | 92/0 |
| 12 | $$P\_{12}$$ | 0 |
| 13 | $$P\_{13}$$ | 56/0 |
| 14 | $$P\_{14}$$ | 64/0 |
| 15 | $$P\_{15}$$ | 5/1 |
| 16 | $$P\_{16}$$ | 0 |
| 17 | $$P\_{17}$$ | 06/2 |
| 18 | $$P\_{18}$$ | 71/2 |
| 19 | $$P\_{19}$$ | 05/1 |
| 20 | $$P\_{20}$$ | 06/3 |
| 21 | $$P\_{21}$$ | 0 |
| 22 | $$P\_{22}$$ | 0 |
| 23 | $$P\_{23}$$ | 0 |
| 24 | $$P\_{24}$$ | 92/2 |

1. $C\_{i}$

| **ردیف** | **پروژه (*i*)** | **مجموع هزینه‌های مستقیم و غیرمستقیم پروژه (**$C\_{i}$**)** |
| --- | --- | --- |
| 1 | $$P\_{1}$$ | 7/8 |
| 2 | $$P\_{2}$$ | 4 |
| 3 | $$P\_{3}$$ | 5 |
| 4 | $$P\_{4}$$ | 2/10 |
| 5 | $$P\_{5}$$ | 40 |
| 6 | $$P\_{6}$$ | 20 |
| 7 | $$P\_{7}$$ | 10 |
| 8 | $$P\_{8}$$ | 5/16 |
| 9 | $$P\_{9}$$ | 15 |
| 10 | $$P\_{10}$$ | 42 |
| 11 | $$P\_{11}$$ | 36 |
| 12 | $$P\_{12}$$ | 9/0 |
| 13 | $$P\_{13}$$ | 56 |
| 14 | $$P\_{14}$$ | 3 |
| 15 | $$P\_{15}$$ | 4 |
| 16 | $$P\_{16}$$ | 5/15 |
| 17 | $$P\_{17}$$ | 19 |
| 18 | $$P\_{18}$$ | 45 |
| 19 | $$P\_{19}$$ | 8 |
| 20 | $$P\_{20}$$ | 70 |
| 21 | $$P\_{21}$$ | 6/3 |
| 22 | $$P\_{22}$$ | 4 |
| 23 | $$P\_{23}$$ | 1/1 |
| 24 | $$P\_{24}$$ | 5/30 |

1. **B**

B=300

1. $a\_{ik}$

| $$a\_{ik}$$ | $$R\_{1}$$ | $$R\_{2}$$ | $$R\_{3}$$ | $$R\_{4}$$ | $$R\_{5}$$ | $$R\_{6}$$ | $$R\_{7}$$ | $$R\_{8}$$ | $$R\_{9}$$ | $$R\_{10}$$ | $$R\_{11}$$ | $$R\_{12}$$ |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| $$P\_{1}$$ | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $$P\_{2}$$ | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $$P\_{3}$$ | 10 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $$P\_{4}$$ | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 50 |
| $$P\_{5}$$ | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| $$P\_{6}$$ | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| $$P\_{7}$$ | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 20 | 0 |
| $$P\_{8}$$ | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| $$P\_{9}$$ | 15 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| $$P\_{10}$$ | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| $$P\_{11}$$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10000 | 25 | 0 |
| $$P\_{12}$$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30 | 0 |
| $$P\_{13}$$ | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| $$P\_{14}$$ | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| $$P\_{15}$$ | 10 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 15 | 0 |
| $$P\_{16}$$ | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 |
| $$P\_{17}$$ | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| $$P\_{18}$$ | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $$P\_{19}$$ | 0 | 0 | 2 | 0 |  0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| $$P\_{20}$$ | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 8000 | 0 | 0 |
| $$P\_{21}$$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 40 |
| $$P\_{22}$$ | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 |
| $$P\_{23}$$ | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 0 |
| $$P\_{24}$$ | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 40 |

1. $a\_{ijk}$

|  |  |
| --- | --- |
| $$S\_{k=1}$$ | *j* |
| 1 | 3 | 9 | 15 | 23 |
| *i* | 1 | 0 | 5 | 4 | 3 | 5 |
| 3 | 5 | 0 | 6 | 6 | 5 |
| 9 | 4 | 6 | 0 | 6 | 1 |
| 15 | 3 | 6 | 6 | 0 | 1 |
| 23 | 5 | 5 | 1 | 1 | 0 |

|  |  |
| --- | --- |
| $$S\_{k=2}$$ | *j* |
| 1 | 2 | 3 | 7 | 18 | 24 |
| *i* | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| 2 | 1 | 0 | 1 | 1 | 1 | 1 |
| 3 | 1 | 1 | 0 | 2 | 1 | 1 |
| 7 | 1 | 1 | 2 | 0 | 1 | 1 |
| 18 | 1 | 1 | 1 | 1 | 0 | 1 |
| 24 | 1 | 1 | 1 | 1 | 1 | 0 |

|  |  |
| --- | --- |
| $$S\_{k=3}$$ | *j* |
| 2 | 3 | 4 | 15 | 16 | 19 |
| *i* | 2 | 0 | 1 | 1 | 1 | 1 | 1 |
| 3 | 1 | 0 | 25/0 | 25/0 | 2/0 | 1 |
| 4 | 1 | 25/0 | 0 | 5/0 | 2/0 | 1 |
| 15 | 1 | 25/0 | 5/0 | 0 | 2/0 | 1 |
| 16 | 1 | 2/0 | 2/0 | 2/0 | 0 | 1 |
| 19 | 1 | 1 | 1 | 1 | 1 | 0 |

|  |  |
| --- | --- |
| $$S\_{k=4}$$ | *j* |
| 9 |
| *i* | 9 | 0 |

|  |  |
| --- | --- |
| $$S\_{k=5}$$ | *j* |
| 5 | 10 | 13 | 18 |
| *i* | 5 | 0 | 1 | 5/0 | 1 |
| 10 | 1 | 0 | 5/0 | 1 |
| 13 | 5/0 | 5/0 | 0 | 5/0 |
| 18 | 1 | 1 | 5/0 | 0 |

|  |  |
| --- | --- |
| $$S\_{k=6}$$ | *j* |
| 5 | 14 | 15 | 16 | 19 | 22 |
| *i* | 5 | 0 | 2/0 | 2/0 | 1 | 5/0 | 1 |
| 14 | 2/0 | 0 | 1 | 3/0 | 1 | 5/0 |
| 15 | 2/0 | 1 | 0 | 2/0 | 1 | 2/0 |
| 16 | 1 | 3/0 | 2/0 | 0 | 2/0 | 1 |
| 19 | 5/0 | 1 | 1 | 2/0 | 0 | 2/0 |
| 22 | 1 | 5/0 | 2/0 | 1 | 2/0 | 0 |

|  |  |
| --- | --- |
| $$S\_{k=7}$$ | *j* |
| 6 | 8 | 13 | 17 | 20 |
| *i* | 6 | 0 | 25/0 | 3/0 | 2/0 | 1 |
| 8 | 25/0 | 0 | 1 | 1/0 | 2/0 |
| 13 | 3/0 | 1 | 0 | 5/0 | 5/0 |
| 17 | 2/0 | 1/0 | 5/0 | 0 | 25/0 |
| 20 | 1 | 2/0 | 5/0 | 25/0 | 0 |

|  |  |
| --- | --- |
| $$S\_{k=8}$$ | *j* |
| 9 | 10 | 16 | 19 |
| *i* | 9 | 0 | 1 | 1 | 25/0 |
| 10 | 1 | 0 | 1 | 5/0 |
| 16 | 1 | 1 | 0 | 1 |
| 19 | 25/0 | 5/0 | 1 | 0 |

|  |  |
| --- | --- |
| $$S\_{k=9}$$ | *j* |
| 7 | 17 | 21 | 22 |
| *i* | 7 | 0 | 25/0 | 1 | 1 |
| 17 | 25/0 | 0 | 25/0 | 5/0 |
| 21 | 1 | 25/0 | 0 | 2 |
| 22 | 1 | 5/0 | 2 | 0 |

|  |  |
| --- | --- |
| $$S\_{k=10}$$ | *j* |
| 11 | 20 |
| *i* | 11 | 0 | 2000 |
| 20 | 2000 | 0 |

|  |  |
| --- | --- |
| $$S\_{k=11}$$ | *j* |
| 7 | 11 | 12 | 15 | 23 |
| *i* | 7 | 0 | 1 | 2/0 | 25/0 | 1/0 |
| 11 | 1 | 0 | 5/0 | 1/0 | 05/0 |
| 12 | 2/0 | 5/0 | 0 | 3/0 | 2/0 |
| 15 | 25/0 | 1/0 | 3/0 | 0 | 25/0 |
| 23 | 1/0 | 05/0 | 2/0 | 25/0 | 0 |

|  |  |
| --- | --- |
| $$S\_{k=12}$$ | *j* |
| 4 | 21 | 24 |
| *i* | 4 | 0 | 5/0 | 4/0 |
| 21 | 5/0 | 0 | 25/0 |
| 24 | 4/0 | 25/0 | 0 |

1. $b\_{k}$

| **ردیف** | **منبع (*k*)** | **موجودی منبع (**$b\_{k}$**)** |
| --- | --- | --- |
| 1 | $$R\_{1}$$ | 30 |
| 2 | $$R\_{2}$$ | 4 |
| 3 | $$R\_{3}$$ | 5 |
| 4 | $$R\_{4}$$ | 2 |
| 5 | $$R\_{5}$$ | 5 |
| 6 | $$R\_{6}$$ | 5 |
| 7 | $$R\_{7}$$ | 3 |
| 8 | $$R\_{8}$$ | 2 |
| 9 | $$R\_{9}$$ | 4 |
| 10 | $$R\_{10}$$ | 12500 |
| 11 | $$R\_{11}$$ | 75 |
| 12 | $$R\_{12}$$ | 92 |

1. **مجموعه** $S\_{M}$

پروژه‌های $P\_{7}$ و $P\_{24}$ (*i*=24,7)

1. **مجموعه** $S\_{MC}$

پروژه‌های $P\_{5}$، $P\_{15}$، $P\_{17}$ و $P\_{20}$ (*i*=20,17,15,5)

1. **تقدم و تأخر**

پروژه $P\_{7}$بهپروژه$P\_{17}$ *و پروژه* $P\_{11}$ *به پروژه* $P\_{2}$ *وابسته است.*

*محدودیتش میشه:*

$$X\_{17} - X\_{7} \geq 0$$

$$X\_{2} - X\_{11} \geq 0$$