Practicing exercises for exam

**Part 1: Labor turnover**

**1.**

We know the following data about a company. In 2012 there were 100 people employed (on average). During the year the total number of the new hires was 12, while the total number of separations was 19.

***a) Calculate the labor turnover index for 2012.***

We also that another 14 people hired on 1st January 2013. Two of them left the company during 2013, three during 2014, three during 2015, and one during 2016.

***b) Calculate the 1 year survival rate, the 2 year survival rate and also the 3 year survival rate for the above mentioned 14 hires.***

***c) Identify the half-life index for the above mentioned 14 hires.***

In 2016 the total number of employees is 200, 50 of them have more than 2 year experience at the firm, another 70 have 1-2 years of service time, and 80 have less than 1 year. We also know that in 2015 the total headcount at the company was 180.

***d) Calculate the stability index.***

Write your answers on the dots below (expected solution time is 8 minutes).

1. *labor turnover in 2012: ………………..*(2 pts)
2. *1 yr survival rate: ……………………; 2 yr survival rate: ……………………; 3 yr survival rate: ……………………*
3. half-life index: ……………………
4. stability index: …………………….

Solution:

1. *labor turnover in 2012 = 19/100 = 19.00%* (2 pts)
2. *1 yr survival rate = (14-2)/14 = 85.71% 2 yr survival rate = (14-2-3)/14 = 64.29% 3 yr survival rate = (14-2-3-3)/14 = 42.86%*
3. half-life index = 3 years
4. stability index = (50+70)/180 = 66.67%

**2.**

We know the following data about a company. In 2012 there were 150 people employed (on average). During the year the total number of the new hires was 30, while the total number of separations was 24.

***a) Calculate the labor turnover index for 2012.***

We also that another 40 people hired on 1st January 2013. 6 of them left the company during 2013, 9 during 2014, 4 during 2015, and 7 during 2016.

***b) Calculate the 1 year survival rate, the 2 year survival rate and also the 3 year survival rate for the above mentioned 40 hires.***

***c) Identify the half-life index for the above mentioned 40 hires.***

In 2016 the total number of employees is 300, 100 of them have more than 2 year experience at the firm, another 110 have 1-2 years of service time, and 90 have less than 1 year. We also know that in 2015 the total headcount at the company was 320.

***d) Calculate the stability index.***

Write your answers on the dots below (expected solution time is 8 minutes).

1. *labor turnover in 2012: ………………..*(2 pts)
2. *1 yr survival rate: ……………………; 2 yr survival rate: ……………………; 3 yr survival rate: ……………………*
3. half-life index: ……………………
4. stability index: …………………….

Solution:

1. *labor turnover in 2012: 16.00%* (2 pts)
2. *1 yr survival rate: 85.00 % 2 yr survival rate: 62.50% 3 yr survival rate: 52.50%*
3. half-life index: 4 years
4. stability index: 65.63%

**Part 2: Workforce planning**

**1.**

There is a small shop with 2 jobs: J1 (manager), and J2 (sales person). The shop is open on every weekday from 9:00 to 18:00, and on Saturdays from 8:00 to 12:00. The manager has to perform its duties 8 hours a day on every weekday and 4 hours on Saturdays, independently of the opening hours. The sales staff has to start its work 0.5 hours before the shop opens and finish it 0.5 hour after closing. In a year there are 255 weekdays and 50 Saturdays (when are no public holidays). All employees are identical. Two sales people have to work simultaneously. They have 22 regular leave days (allowance) per year and they are expected to be on sick leave for 9 days per year. According to the work contracts everyone has to work 8 hours a day.

1. ***Calculate the annual workforce demand in man-hours in every job.***
2. ***Calculate the labor-hour supply provided by one employee.***
3. ***How many employees should be hired in each jobs?***

Write your answers on the dots below (expected solution time is 8 minutes).

1. ***annual workforce demand for* J1*:* ……………………………… man-hours per year** (2 pts) ***annual workforce demand for* J2*:* ……………………………… man-hours per year** (2 pts)
2. ***annual work supply:* ……………………………… man-hours** **per year** (2 pts)
3. **……………………………… employee(s) should be hired for J1** (2 pts) **……………………………… employee(s) should be hired for J2** (2 pts)

Solution:

1. ***annual workforce demand for* J1*:*** 255(8)+50(4)=2240 **working hours per year**(2 pts) ***annual workforce demand for* J2*:*** 2[255(9+0.5+0.5)+50(4+0.5+0.5)]=2(2800)=5600 **working hours per year**(2 pts)
2. ***annual work supply:*** 8(255-22-9)=1792 **working hours per year** (2 pts)
3. 2240/1792=1.25 **employee(s) should be hired for J1** (2 pts)5600/1792=3.13 **employee(s) should be hired for J2** (2 pts)

**2.**

There is a small factory plant with 13 permanent employees (workers). They are working 8 hours a day according to their work-contract. The average attendance rate is 0.85, the average performance is 90%. The maximum number of workers who can simultaneously work in the plant is 15. The plant is running 1 shift only.

***a) Calculate the earliest possible deadline that the plant can accept for an order that needs 500 labor-hours to complete.***

***b) What is the earliest acceptable deadline if the employer hires new employees up to the limit, and the performance rate of the new hires is 0.75, their attendance rate 0.95? Attendance and performance of the ‘original’ workers are not changed.***

***c) What is the earliest acceptable deadline if the employer – instead of hiring new employees – order 1 hour overwork per day? The performance rate during the overtime is expected to be only 80%, and 1 of the workers will not perform the overtime work (only the regular 8 hours per day)? Attendance rate is expected to be 0.70 during overtime. Attendance and performance during the regular work-time will not change.***

***d) What is the earliest acceptable deadline if the employer – instead of hiring new employees or increasing the daily working hours – introduces a new incentive system to increase the average performance level up to 100%?***

Write your answers on the dots below (expected solution time is 8 minutes for a+b or a+c or a+d).

1. **Daily labor supply of the plant: …………………………… labor-hours (2 pts)  
   Acceptable deadline: …………………………….. days (3 pts)**
2. **Daily labor supply of the plant: …………………………… labor-hours (2 pts)  
   Acceptable deadline: …………………………….. days (3 pts)**
3. **Daily labor supply of the plant: …………………………… labor-hours (2 pts)  
   Acceptable deadline: …………………………….. days (3 pts)**
4. **Daily labor supply of the plant: …………………………… labor-hours (2 pts)  
   Acceptable deadline: …………………………….. days (3 pts)**

Solution:

1. ***daily work supply:*** 13(8)(0.85)(0.90)= 79.56 **working hours per year** (2 pts)  
   **Acceptable deadline:** 500/79.56=6.28=7 **days**
2. **Daily labor supply of the plant:** 79.56+[(15-13)(8)(0.95)(0.75)]=79.56+11.4=90.96 **working hours (2 pts)  
   Acceptable deadline:** 500/90.96=5.50=6 **days (3 pts)**
3. **Daily labor supply of the plant:** 79.56+[(13-1)(1)(0.70)(0.80)]=79.56+6.72=86.28 **working hours (2 pts)  
   Acceptable deadline:** 500/86.28=5.80=6 **days (3 pts)**
4. **Daily labor supply of the plant:** 13(8)(0.85)(1.00)= 88.40 **working hours (2 pts)  
   Acceptable deadline:** 500/88.4=5.66=6 **days (3 pts)**

**Part 3: Selection**

***Rank the candidates according to their combined standardized performance, if interviews and tests are equally weighted, and A, B and C are interviewed by a different interviewer than D, E and F.***

|  |  |  |
| --- | --- | --- |
| Candidate | Interview score (1-15) | Written test score (0-150) |
| A | 10 | 80 |
| B | 15 | 100 |
| C | 12 | 110 |

Write your answers into the table below (expected solution time is 8 minutes).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Candidate | Standardized interview score | Standardized written test score | Combined standardized test score | Rank (1.25 pt) |
| A | (0.75 pt) | (0.75 pt) | (0.75 pt) |  |
| B | (0.75 pt) | (0.75 pt) | (0.75 pt) |  |
| C | (0.75 pt) | (0.75 pt) | (0.75 pt) |  |
| Mean | (0.5 pt) | (0.5 pt) |  |  |
| Standard deviation | (0.5 pt) | (0.5 pt) |  |  |

**Solution**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Candidate | Standardized interview score | Standardized written test score | Combined standardized test score | Rank (1.25 pt) |
| A | (10-12.33)/ 2.52=-0.92 | (80-96.67)/15.28= -1.09 | (-0.92)+(-1.09)= -2.01 | 3 |
| B | (15-12.33)/ 2.52=+1.06 | (100-96.67)/15.28=+0.22 | 1.06+0.22=+1.28 | 1 |
| C | (12-12.33)/ 2.52=-0.13 | (110-96.67)/15.28=+0.87 | -0.13+0.87=+0.74 | 2 |
| Mean | (10+15+12)/3=12.33 | (80+100+110)/3=96.67 |  |  |
| Standard deviation | {[(10-12.33)2+ (15-12.33)2+ (12-12.33)2]/(3-1)} 0.5=6.330.5=2.52 | {[(80-96.67)2+ (100-96.67)2+ (110-96.67)2]/(3-1)} 0.5=233.330.5=15.28 |  |  |

**Part 4: Normal time, standard time**

**Exercise 1**

5 workers are employed in an office. The average time that is needed to perform a given task by a given individual worker is reported below.

1st worker: 2 minutes; 2nd worker: 3.5 minutes; 3rd worker 3.0 minutes; 4th worker: 2.5 minutes; 5th worker: 2 minutes. The performance of the 1st worker is considered to be 125%.

***a) Determine the normal time (Tn) of the task.***

***b) Compute the performance rate for all the workers (Pi) based on the normal time.***

***c) Calculate the standard time (Tstd) if the personal time allowance is 5%, the fatigue time allowance is 8% and the delay allowance is 2%.***

***d) How many times will it take to repeat the task 10 times for a worker with 110% performance?***

Write your answers on the dots below (expected solution time is 8 minutes).

*a) T*n*: ……………………* (2 pts)

*b) P*1*: ……………………, P*2*: ……………………, P*3*: ……………………, P*4*: ……………………, P*5*: ……………………* (4 pts)

*c) T*STD*: ……………………* (2 pts)

*d) …………………… mins* (2 pts)

Solution:

*a) Tn = Tobs(P) = 2.0(1.25) = 2.5 minutes* (2 pts)

*b) P*1*: 125.00% P*2*: 71.43%, P*3*: 83.33%, P*4*: 100.00%, P*5*: 125.00%* (4 pts)

*c) T*STD *= 2.5(1+0.15) = 2.875 minutes* (2 pts)

*d) (10)(2.5/1.1)(1.15)= 26.14 mins* (2 pts)

**Exercise 2**

4 workers are employed in a workshop. The time need for a given task is measured for all of them.

1st worker: 150 mins; 2nd worker: 160 mins; 3rd worker 155 mins; 4th worker: 147 mins. The average performance of the four workers is considered to be the 100% performance.

***a) Determine the normal time (Tn) of the task.***

***b) Compute the performance rate for all the workers (Pi) based on the normal time.***

***c) Calculate the standard time (Tstd) if the personal time allowance is 5%, the fatigue time allowance is 9% and the delay allowance is 10%.***

***d) How many times will it take to repeat the task 30 times for a worker with 100% performance?***

Write your answers on the dots below (expected solution time is 8 minutes).

*a) T*n*: ……………………* (2 pts)

*b) P*1*: ……………………, P*2*: ……………………, P*3*: ……………………, P*4*: ……………………* (4 pts)

*c) T*STD*: ……………………* (2 pts)

*d) …………………… mins* (2 pts)

Solution:

*a) Tn = (150+160+155+147)/4 = 153 minutes* (2 pts)

*b) P*1*: 102.00% P*2*: 95.625%, P*3*: 98.71%, P*4*: 100.00%, P*5*: 104.08%* (4 pts)

*c) T*STD *= 153 (1+0.24) = 198.72 minutes* (2 pts)

*d) (30)(153)(1.24)= 5691.6 minutes* (2 pts)

**Part 5: Remuneration**

**1.**

**Assuming that there is 10% tax on the employer after the gross wages…**

1. ***…what will be the maximum gross salary in a job that is generating a net revenue of 5000 euros for the employer?***
2. ***If the employee also has to pay a tax based on its earnings (tax rate is 15%) than what is the minimum gross salary and the minimum total labor cost of employing a worker whose net reservation wage is 3000 euros?***

Write your answers on the dots below (expected solution time is 8 minutes).

1. maximum gross salary: ……………………………………... euros (4 pts)
2. minimum gross salary: ……………………………………... euros (4 pts)  
   total labor cost of the employer: ……………………………………... euros (2 pts)

Solution:

1. maximum gross salary: 4545.45 euros  
   Calculation:  
   net revenue created in the given job ≥ total cost of employment in the given job  
   net revenue in the job ≥ (gross salary) + (employer tax)  
   5000 euros ≥ (gross salary) + (0.1)(gross salary)  
   5000 euros ≥ (1.1)(gross salary)  
   (5000 euros)/(1.1) ≥ (gross salary)  
   4545.45 ≥ (gross salary)
2. minimum gross salary: 3529.42 euros  
   Calculation:  
   (gross salary) – (employee tax) ≥ net reservation salary   
   (gross salary) – (0.15)(gross salary) ≥ 3000 euros  
   (0.85)(gross salary) ≥ 3000 euros  
   (gross salary) ≥ (3000 euros)(0.85)  
   (gross salary) ≥ 3529.42 euros  
   total labor cost of the employer: 3882.36 euros  
   Calculation: (gross salary)+(employer tax)= 3529.42 + (0.1)(3529.42) = 3882.36 euros

**2.**

Let the personal base hourly wage rate be 160 euros. ***Calculate the earned wage in the following wage systems for an employee with 90% performance and another one with 110%:***

***a) linear variable pay,***

***b) 40% fixed and 60% linear variable pay,***

***c) fixed pay.***

Write your answers on the dots below (expected solution time is 8 minutes).

1. linear variable pay:  
   If P = 90%: …………………………………………… euros (2pts)  
   If P = 110%: …………………………………………… euros (2pts)
2. 40% fixed and 60% linear variable pay:  
   If P = 90%: …………………………………………… euros (2pts)  
   If P = 110%: …………………………………………… euros (2pts)
3. 100% fixed pay system:  
   If P = 90%: …………………………………………… euros (1pts)  
   If P = 110%: …………………………………………… euros (1pts)

Solution:

1. linear variable pay:  
   If P = 90%: (0.9)(160 euros) = 144 euros  
   If P = 110%: (1.1)(160 euros) = 176 euros
2. 40% fixed and 60% linear variable pay:  
   If P = 90%: (0.4)(160)+(0.6)(0.9)(160)=150.4 euros  
   If P = 110%: (0.4)(160)+(0.6)(1.1)(160)=169.6 euros
3. 100% fixed pay system:  
   If P = 90%: 160 euros  
   If P = 110%: 160 euros

3.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Identify the efficiency wage if the following data are known:**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **wage** | **2** | **3** | **4** | **5** | | ***MRP*L** | **1** | **2.5** | **4** | **4.5** | | 1. Efficiency wage is 2. 2. Efficiency wage is 3. 3. Efficiency wage is 4. 4. Efficiency wage is 5. |
|  | **Identify the efficiency wage if the following data are known:**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **wage** | **2** | **3** | **4** | **5** | | ***MRP*L** | **5** | **5.5** | **6** | **6.5** | | 1. Efficiency wage is 2. 2. Efficiency wage is 3. 3. Efficiency wage is 4. 4. Efficiency wage is 5. |
|  | **Identify the efficiency wage if the following data are known:**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **wage** | **1** | **2** | **3** | **4** | | ***MRP*L** | **10** | **14** | **17** | **19** | | 1. Efficiency wage is 1. 2. Efficiency wage is 2. 3. Efficiency wage is 3. 4. Efficiency wage is 4. |

Solution:

One has to choose the wage that is maximizing the (*MRP*L – wage) formula.

c); a); d)