PRATICAL EXERCISES N°3

MTBF, MTTR, GANTT, FMECA....

Exercise No. 1:

1. Name the industrial maintenance functions.
2. What are the regulatory aspects of maintenance?
3. Complete the following sentence giving the definition of a product.
   "A……., this is what is put at the ……of a…… for …… to a……."
4. What are the two main purposes of value analysis.
5. Quote maintenance services.

Exercise No. 2:

The following tables bring together data concerning an "M" machine recorded over a period of one year.

Opening time over one year	5280 hours
Theoretical production capacity	40 products/hour
Products manufacturedover 5280	80,000 products
Rejected productsover 5280 hours	2000 products

Causes of shutdown	Number	Total
Corrective maintenance	**12**	**1098**
Waitingof raw material	**2**	**28**
Planned cleanings	**18**	**36**

Based on the data presented in the tables above:

1. Calculate MTBF, λ, MTTR, and μ (mentioning the unit of each indicator);
2. Calculate the OEE of this machine over the observation period (Using the simplest method)

Exercise No. 3: Here is the list of tasks necessary to create the sports catalog. Draw the Gantt chart, specifying the previous tasks.

Tasks	Description	Duration	Tasks	Description	Duration
HAS	Creation of pages 1, 2, 3, and 4 of the catalog	5	G	Layout	2
B	Searching for photos	6	H	Model of files and texts	4
VS	Preparation of sports technical sheets	4	1	Test composition	5
D	Preparation of general information sheets	3	J	Impression	3
E	Writing texts	6	K	Diffusion	7
F	Proofreading of texts, technical sheets and information sheets				3

Exercise No. 4: Carry out a failure analysis by completing the following FMECA table

Element	Function	Failure mode	Cause	Effect	Corrective action
Compressor					
Cooler					

Solution #3

Ground. Exercise No. 1

1. **The maintenance functions are:**
   - Improve the availability of means of production or service.
   - Improve the security of property and people.
   - Integrate new means into the production or service system.

2. **Regulatory aspects of maintenance**
   - The materials used must comply or be brought into compliance;
   - Situations relating to maintenance operations must be considered dangerous by nature.
   - The hierarchy is held criminally liable for any work accident resulting from a maintenance operation or failure of a device subject to regulation.

3. **Complete the sentence**

   A product is what is made available to a user to meet a need.

4. **The objectives of Value Analysis:**
   - Reduce the costs of a product/service or an organization,
   - Design a solution adapted to the needs of its user and, at the lowest cost.

5. **The maintenance services are:**

   Study / Preparation / Scheduling / Realiation / Management

Ground. Exercise No. 2

MTBF:

MTBF = UT/Number of failures

UT = To – TTR = 5280 hours – 1098 hours = 4182 hours

Number of failures = 12

MTBF = 4182/12 = 348.5 hours

Parameter λ:

λ = 1/MTBF = 1/348.5 = 0.002869 failures/h

MTTR:

MTTR = TTR/number of failures

MTTR = 1098 h /12 = 91.5 h

Parameter μ:

μ = 1/MTTR = 1/91.5h = 0.010928 intervention/h

TRS: Synthetic rate of return:

Method 1: The simplest

TT = 1 year

To = 5280 h

Tr = To – Planned downtime = 5280 – 36 = 5244 h

Number of products that could have been produced in a required time of 5244 hours (theoretical production): 5244 x 40 = 209760 products

- Number of products actually produced (Actual production): 80,000 – 2000 = 78,000 products. With 2000 = Number of products rejected

TRS = Actual production/Theoretical production

TRS = 78000/209760 = 0.37185 = 37.185%.

Exercise 3

Tasks	**Duration**	Background	Tasks	Duration	Background	Tasks	Duration	Background	Tasks	Duration	Background
HAS	3	B	D	1	/	G	1	H	J	1	I
B	4	/	E	4	VS	H	2	F	K	5	J
VS	2	/	F	1	OF	I	3	G--A			

Tasks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HAS																				
B																				
VS																				
D																				
E																				
F																				
G																				
H																				
I																				
J																				
K																				

Exercise No. 4

Element	Function	Failure mode	Cause	Effect	Corrective action
Compressor	Suction and compress air	Compressor does not start	No power	Production shutdown	Turn on the power
		Compressed air flow too low or no	Damaged fuse		Change the fuse
Oil filter	Circulate the oil	Oil filter heating	Lack of maintenance	Contaminated air	Changing the oil filter
			Poorly sized filter		