Automation and Maintenance of Mining Equipment
EMC 2012

Aalto University

1. The table below contains shift data of a mining company. Calculate the OEE for each shift and also the best of best achievable OEE. (5p)

Item	Shift I	II	III
Shift length [hours]	8	8	8
Cofee breaks [min]	2 x 15	2x15	2x15
Meal break [min]	30	30	30
Down time [min]	37	41	57
Ideal rate [Tons/min]	60	60	60
Tons produced	19281	19353	19392
Tons Rejected	403	461	398

2. What is RCM and how RCM principle is applicable for operation and maintenance? (4p)
3. What is TPM philosophy and what are the pillars of TPM? (3p)
4. How CMMS useful for mine maintenance and which aspects to be considered for CMMS implementation? (3p)
5. What are the challenges in formulating maintenance strategy for a mining company? (3p)
6. How risk is managed in mining and what is RPN number? (3p)
7. How performance indicators are used for benchmarking? Discuss with example. (3p)
8. (a) How LCC concept helps in mine automation & maintenance? (3p)
   (b) How human error effects operation & maintenance effectiveness? (3p)
9. Explain why automation is more difficult in mines than in other industries? (3p)
10. In what way are automation in surface mining different compared to underground mining? (3p)
11. Give two examples of Semi-Autonomous operations for mining equipment? (3p)
12. What does the short form MWD stands for? And which are the main drill parameter used in MWD (4p)
13. What does the short form IREDES stands for? And what is the major advantage with IREDES? (4p)
14. Explain why data communication system in underground mines is an important prerequisite for automation. (3p)
15. Give 3 common arguments for automation of LHD's? and 3 arguments against automation of LHD's in the mining industry (4p)
16. What does the short form GNSS stands for? (2p)
17. Give the correct names of the 4 GNSS systems available or under construction today. (3p)