Examination 2006
EMC COURSE ON MINE AUTOMATION AND MAINTENANCE, 2006,
HELSINKI, FINLAND

TOTAL MARKS : 100
PASS MARK 40
Time : 3 hours

QUESTION ON AUTOMATION AND ROBOTICS (40 marks)

1. Discuss the trends in "mining automation" (You can use Caterpillar's vision of mine automation to make your points clear) automation
2. Discuss the role of of ICT in implementation of autonomous mining system
3. Discuss the potential and problems associated with automation and robotization of mining operation.
4. Discuss the different types of underground navigation systems available in navigation system?
5. Discuss with examples software and Human reliability

QUESTIONS- ON MINE MAINTENANCE (60 marks)

1. Define "maintenance" and discuss the statement "maintenance creates added value in the business process"
2. Define 'failure' and the failure development process.
3. List the different basic tools of maintenance analysis that can be used for studying maintenance problem.
4. Define reliability & maintainability and maintenance supportability?.
5. Calculate the mean time to failure of a series system consisting of 2 units with failure times, which are exponentially distributed and have different mean value.
6. A certain unit has R (10) = 0.8 How many units of this type are needed in a parallel system to get $R_p(10) > 0.90$?
7. Demonstrate by an example that Reliability of a parallel system is lower than that of standby system. Assume a case of with two identical units with exponential life distribution and a mean time to failure of 100 hours and 100 hours of operating time.
8. What are the key features in application of RCM and TPM?
9. Describe different types of benchmarking being used by industries.
10. Define condition based maintenance. List 5 most popular condition monitoring method and discuss in brief their application in an automated mine.