

**S-38.3001 Telecommunications Forum**

Exam book: The Nature of Technology (W. Brian Arthur).

The results of this examination will appear as passed/failed. Each question is worth max 6 point. Answers can be written in English, Finnish, or Swedish. Answers must be short and concise, max 4 pages total per student!

1. Based on the invited lectures answer each of the following questions briefly (max 3 sentences each):
  - a. List the four technology areas that Nokia Research Center has selected to focus on. (by Hannu Kauppinen, s.10)
  - b. What are the three evolutionary phases after the traditional business model in the Communications Service Provider space? (by Hossein Mo'in, s.13)
  - c. How is the population of robots evolving in China? (by Roope Mokka, s.22)
  - d. How does the mobile advertisement channel perform against other channels in each aspect of marketing? (by Juhani Hintikka, s.18)
  - e. List spectrum regulation decisions in which Finland has been an international leader. (by Olli-Pekka Rantala, s.7-8)
  - f. What are the types and levels of innovation? (by Anthony Gyursanszky, s.16-17)
2. Explain the main similarities and differences between Darwin's theory of biological evolution, Schumpeter's theory of economic evolution, and Arthur's theory of technological evolution.
3. What are the key mechanisms in Arthur's theory of technological evolution?
4. Define the concept *autopoiesis*. What is the role of autopoiesis in Arthur's theory of technological evolution?
5. Explain the relationship of digitalization and Arthur's theory of technological evolution.