Försättsblad Prov Original

Kurskod						Provkod				Tentamensdatum							
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Kursnamn	Miljöteknik AV, Klimatförändringar, påverkan och åtgärdss...
Provnamn	Tentamen
Ort	Östersund
Termin	V18
Ämne	Miljöteknik

Mittuniversitetet
MID SWEDEN UNIVERSITY

Course examination

Course name:	**Climate change, impact and action strategies, 7,5 ECTS**
Subject:	Environmental engineering
Date and duration:	2018-03-06 , 5 hours
Course director:	Anders Jonsson
Support:	English dictionary allowed. No other books, calculators or other support are allowed during the examination.
Please note:	Your personal code must be written on each sheet of paper. Clearly state the number of each question!

1) Give a brief description of the global climate system. For full score your description should include the **five main components** of the climate system and you should give examples of significant external forcing factors, both natural and anthropogenic, which influences the climate system. Some forcing factors are natural only and some may be both natural and anthropogenic, please comment! (15p)

2) Successful implementation of urban climate change mitigation strategies can provide co-benefits. Mention 2 of them. (4p)

3) Explain what is meant by climate feedback mechanisms and give one example each of a positive and a negative climate feedback mechanism. (4p)

4) Give two examples of factors with a negative influence (forcing) on the climate system. For each factor give a brief explanation of the effect of the climate system. (4p)

5) Give 3 examples of the effects global warming can have on flora and fauna. (3p)

6) Name the five most significant greenhouse gasses (in terms of Radiative forcing). (5p)

7) Projected impacts of climate change differ significantly in different regions of the world. For each of the region below briefly discuss vulnerability to climate change and projected impacts.
   a) Africa
   b) Asia
   c) Europe
   d) Latin America
   e) North America
   f) Polar regions
   g) Small islands (28p)

8) Forestry can be used to mitigate climate change but it can also be a driver of climate change. Explain the effects of land use and land use change in the forest sector on the climate system! (8p)

9) Name a maximum of nine key climate variables which has been used by the IPCC to track changes in the climate system. (9 p)

10) On climate modeling (10p).
   a) Describe the structure of a climate model? (4p)
   b) Which parameters are most difficult to forecast, why (3p)
   c) Where do you think we have the best/worst precision for climate and NWP-models (3p)

11) On air-water gas exchange (10p).
   a) In climate models the air-water flux of greenhouse gases are usually described with the bulk flux equation. Explain what the three terms on the right hand side in this equation stands for

$$F = kK_0(pCO_2^{water} - pCO_2^{air})$$

(3p)

   b) Explain how wind speed can affect the magnitude of k (3p)

   c) You would like to improve a climate model by introducing an additional process affecting k e.g. the impact of water-side convection. What things are there to consider before introducing this process in to the numerical (4p)

Good luck!

Anders and Andreas