

**UNIVERSITY COLLEGE LONDON**

University of London

**EXAMINATION FOR INTERNAL STUDENTS**

For The Following Qualification:–

*M.Sc.*

**ESGE1: The Built Environment: The Energy Context**

**COURSE CODE : ENVSGE01**

**DATE : 03–MAY–05**

**TIME : 14.30**

**TIME ALLOWED : 2 Hours**

**UNIVERSITY OF LONDON**

**MSc DEGREE in SCIENCE in BUILT ENVIRONMENT 2005**

**for Internal Students of University College London**

**Module ENVS GE 01: BUILT ENVIRONMENT: The Energy Context**

**Answer TWO questions only. Answer all parts of the questions chosen.**

1. (a) Explain the “greenhouse effect” in the context of climate change. *(10 marks)*
  - (b) What evidence is there that climate change is already occurring? Discuss the reliability of this evidence. *(10 marks)*
  - (c) List the main greenhouse gases, and explain what their primary sources are. *(10 marks)*
  - (d) What factors, other than CO<sub>2</sub> emissions due to a building’s energy consumption in use, will contribute to climate change and the environmental friendliness of the building. *(10 marks)*
  - (e) A domestic building, which was designed to have very low CO<sub>2</sub> emissions, is later found to be performing badly in this respect. Discuss the factors which could have caused this. *(10 marks)*
  
2. (a) Explain and compare the following two methods of economic analysis,
  - simple payback
  - discounted cash flow analysis. *(15 marks)*
  - (b) Explain why discounted cash flow analysis may be an appropriate method of analysis when deciding whether to invest in a solar heating system compared to a conventional gas heating system, but less important when deciding between, say, installing a solar heating system and installing additional insulation. *(10 marks)*
  - (c) If discounted cash flow analysis (with a discount rate of, say, 10%) is used instead of un-discounted cash flow analysis (with a discount rate of 0%), discuss whether a solar heating system will appear more or less favourable than a conventional heating system. Clearly explain your answer. *(10 marks)*
  - (d) Two consultants are discussing an energy efficiency technology with a 20 year payback with a client. One consultant claims, using discounted cash flow analysis in support, that the technology is cost-effective, while another, also using discounted cash flow analysis, claims it is **not**. Explain what factors in the analysis may have resulted in the different views, and discuss how these factors would have affected their recommendations. *(15 marks)*

**TURN OVER**

3. (a) BIPV stands for *building integrated photovoltaics*. Explain the concept and explain why it appears so attractive to architects interested in the sustainable design of buildings. (10 marks)
- (b) An architect is considering using BIPV on a commercial building in an urban setting in the south of England. Discuss in detail the factors the architect needs to take into consideration to maximise the amount of electricity generated by the system throughout the year. (20 marks)
- (c) Describe a building which has successfully integrated photovoltaic arrays into its structure or cladding. Comment on the likelihood of the arrangement being replicated successfully in other buildings which are attempting to minimise their carbon emissions. (10 marks)
- (d) Photovoltaic arrays are often used in non-building applications. Suggest three possible applications and explain the benefits of using photovoltaics in each. (10 marks)
4. Governments around the world are beginning to recognise that the growth in road transport expected in the future will not be sustainable. In this context, discuss what options might be available in each of the following three categories to provide an answer, or partial answer, to this unsustainability issue. Discuss the feasibility of implementing these options successfully.
- (a) Economic options. (10 marks)
- (b) Technological options. (15 marks)
- (c) Land Use and Planning options. (15 marks)
- Discuss the social benefits and disbenefits of implementing these “options”. (10 marks)

**END OF PAPER**