UNIVERISTY EXAMINATIONS 2013/2014 ACADEMIC YEAR

FIFTH YEAR SECOND SEMESTER EXAMINATION

FOR THE DEGREE OF BACHELOR OF SCIENCE

IN

CIVIL AND STRUCTURAL ENGINEERING

COURSE CODE: CSE 502

COURSE TITLE: APPROPRIATE TECHNOLOGY IN C.S.E

DATE: TIME:

INSTRUCTIONS TO CANDIDATE

- Answer any **FOUR** questions
- Marks for each question are indicated in the parenthesis

- 1. (a) Examples of appropriate technology projects would include low cost construction materials for housing, water supply and waste disposal system, labour based road construction etc. **OUTLINE** the various characteristic that would clearly categorize such projects as "appropriate technology" (10 Marks)
 - (b) Simplified sewerage can be used to provide off-site arrangement for the collection and treatment of sewage in slum areas. How does it differs from conventional sewerage? (10 Marks)
- (2) (a) Why is sustainable housing important? (6 Marks)
 - (b) How can the practices of sustainable housing be scaled up (2 Marks)
 - (c) OUTLINE the benefits and challenges in housing construction using the following sustainable construction materials (12 Marks)
 - (i) Timber (iii) Rammed earth
 - (ii) Bamboo (iv) Adobe
- 3 (a) List the potential environmental advantages of in-situ recycling
 Of pavement materials (7 Marks)
 - (b) Labour-based methods of road construction can help alleviate poverty from a geotechnical engineering viewpoint. Outline the advantages and disadvantages of the use of equipment and labour-based methods to improve accessibility of rural access roads to communities in rural areas of developing countries. (13 Marks)
- 4. (a) Indicate as **TRUE** or **FALSE** the following statements regarding sustainable sanitation technology options for urban slums (6 Marks)
 - i. Sanitation can be considered sustainable if it is able to sanitize waste for pathogen destruction
 - ii. One way of keeping the total cost down is to aim for sanitation systems that provide additional income, such as renewable energy, reclaimed water and recyclable solid materials.
 - iii. Pit latrines are the dominant type of excreta disposal facilities in urban slums.
 - iv. Limited space makes non-shared household sanitation virtually impossible in a typical urban slum.
 - v. Grey water in urban slums is the largest wastewater stream. Untreated grey water poses health risks
 - vi. Sustainable sanitation for urban slums implies that the system comprise of collection, storage, transport, and the safe disposal or reuse of end products
 - (b) Discuss the following items regarding grey water management in urban slums (11 Marks)
 - 1. Collection of grey water
 - 2. Treatment of grey water with soil and sand filters

- (c) List the capital requirements associated with rainwater harvesting (3 Marks)
- 5. Discuss how the following sustainable technology practices are applied to support sustainable housing (20 Marks)
 - (a) Environmental retrofitting
 - (b) Green roofs
 - (c) Renewable energy
 - (d) Saving water