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
(ii) Bamboo
(iii) Rammed earth
(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