00193

The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Civil Engineering

Study Programme	: Bachelor of Technology Honours in Engineering
Name of the Examination	: Final Examination
Course Code and Title	**: CVX4446 Construction Engineering and Materials**
Academic Year	: 2021/2022
Date	: 07th February 2023
Time	: 1330-1630 hrs.

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of Eight (8) questions in Four (4) pages.
3. This question paper has Two (2) sections, Section A & Section B.
4. Answer a total of Five (5) questions selecting at least Two (2) questions from each section. All questions carry equal marks.
5. Answer for each question should commence on a new page.
6. This is a Closed Book Test (CBT).
7. Answers for sections A & B should be submitted on separate answer books with the titles Section A and Section B written clearly on the cover of the respective book.

SECTION A

(01)

(a) Explain what is meant by the term' 'compaction of soil' in relation to civil engineering. (05 marks)

(b) Write down the factors which influence the degree of compaction of soil while briefly explaining them. (05 marks)

(c) Briefly describe the procedure for filling and compacting earth works. (05 marks)

(d) State the different methods available for specifying soil compaction to the contractor. Discuss their advantages and disadvantages. (05 marks)

(02)

(a) Explain what is meant by 'curing' of concrete cast at site and the purposes of curing. (05 marks)

(b) List and explain the factors which influence the 'workability' of freshly mixed concrete. (05 marks)

(c) Explain what is meant by 'durability of concrete' and the precautions which should be taken at site to ensure the durability of a concrete structure. (05 marks)

(d) Explain the terms "entrapped air" in concrete and "entrained air" in a concrete mix. (05 marks)

(03)

(a) Draw a neat sketch of typical 'climbing tower crane' labelling its main components. (05 marks)

(b) Describe the two (02) basic types of poker vibrators, explaining the differences between their vibratory functions. (05 marks)

(c) Provide a neat, labeled sketch of a manhole, and explain its usage. (05 marks)

(d) Briefly discuss five (05) important factors to be considered before commencing an excavation very close to an existing building. (05 marks)

(04)

(a) Draw a diagram of a typical wiring and switching system with two switches and bulbs. Indicate the live and neutral wires clearly in the diagram. (05 marks)

(b) There are three (03) types of electric wiring installations used in domestic buildings. Briefly explain each one of these. (05 marks)

(c) Lamps used for lighting of domestic buildings can be either (i) filament type, or (ii) fluorescent type. Briefly explain the two types. (05 marks)

(d) List the five (05) types of commonly available lamps. Briefly describe each one of them. (05 marks)

SECTION B

(05) A warehouse for a garment factory is to be built. The walls are to be built using bricks and cement mortar and plastered with cement mortar.

(a) State four (04) requirements/characteristics of sand that should be used in the above application and four (04) functions of sand in a mortar. (04 marks)

(b) List four (04) usual defects observable in bricks and the reasons associated with the same. (04 marks)

(c) Explain what blended cement is and state four (04) advantages of blended cement over ordinary Portland cement. (04 marks)

(d) Describe how the cement should be stored inside a shed. (04 marks)

(e) The bricks brought to the site needs to be checked for efflorescence. Explain what is meant by 'Efflorescence' and a test to identify this effect. (04 marks)

(06) A hotel complex is to be extended by building a series of double storey cottages.

(a) The staircase railings are to be made from Mahogany timber. Explain how the surface of this new woodwork should be prepared before applying a paint. (04 marks)

(b) French polish is to be applied on the wooden railings. Explain how this polish is prepared and the process of application. (04 marks)

(c) Explain briefly three (03) different methods that could be used to preserve timber. (04 marks)

(d) Chip board ceiling is to be proposed for the cottages. State four (04) advantages of chip board roofing. (04 marks)

(e) The timber is proposed to be used for fabricating of the roof trusses. Since in recent times the use of steel sections has become a better choice than timber, discuss the advantages if steel is used instead of timber. (04 marks)

(f) Ceramic wall tiles are to be used for washroom walls. State two (02) common defects of ceramic wall tiles and describe how you would attribute these to the manufacturing conditions. Also explain the precautions to avoid these two defects. (04 marks)

(07)

(i) The mechanical properties of pure lead, aluminium and copper are not satisfactory for engineering applications. To improve the mechanical properties either alloying with other elements or performing metallurgical treatments are carried out.

(a) Describe two (02) commercially important lead-based alloys. (02 marks)

(b) Identify four (04) desirable engineering properties that can be obtained from an alloy made by alloying copper and nickel. (04 marks)

(c) Give four (04) properties and four (04) applications of copper-aluminium alloys (Aluminium bronzes). (04 marks)

(d) List four (04) metallurgical treatments of aluminium. (02 marks)

(ii) Use of hot melt and thermosetting adhesives have increased due to the rapid growth and the demand in construction and packaging industry.

(a) Give the polymers used in hot melt adhesives and three (03) applications of the same. (04 marks)

(b) Compare and contrast the properties of thermosetting and hot melt adhesives. (04 marks)

(08) Heavy precipitation and slopes may erode surface soils, especially slopes with fine grained soils. Geosynthetics can be used as vegetation stabilization to control erosion, and the use of sediment traps to stabilize and counteract these types of difficult erosion prone soil conditions.

(a) Explain the process of installing sediment traps on a slope to control erosion. (04 marks)

(b) Describe the properties that should be available in geotextiles used for soil stabilization. (04 marks)

(c) Discuss six (06) advantages of biodegradable geotextiles over geosynthetic geotextiles when used in erosion control applications. (04 marks)

(d) State six (06) different types of geosynthetics that are used in civil/geotechnical/ environmental applications. (04 marks)

(e) List six (06) different biodegradable geotextiles suitable for erosion control. (04 marks)