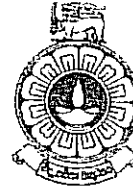


THE OPEN UNIVERSITY OF SRI LANKA
Diploma In Technology (Civil) - Level 3
CEX 3230 / CED 1204 - Construction Materials



FINAL EXAMINATION - 2005 / 06

Time Allowed : Three Hours

Index No.

Date: 2006 - 03 - 28 (Tuesday)

Time: 0930 - 1230 hrs.

The paper consists of two sections, Part A and Part B.
Please detach Part A and submit with your answer script at the end of the examination.

Part A

Part A consists of fourteen (14) questions.
Answer All Questions in the spaces provided.
(You are advised to allocate 50 minutes for Part A)

- 1. List three practical difficulties that you would encounter if a higher proportion of sand were used when preparing cement mortar. (2 points)

- 2. To get at the correct representative sample to carry out tests on aggregates, the method of riffing may be used. Describe how you would reduce the sample size by riffing. (2 points)



3. Use of pressed cement blocks for walling material is a device to cut down on the rising cost of a building a house. State four measures necessary to ensure the manufacture of quality cement blocks. (2 points)

4. Aluminium windows and windowsills for commercial buildings have increased and replaced timber considerably in recent years. List three criteria which makes Aluminium a preferred material over timber for the above application. (2 points)

5. Give two examples of uses of Copper and its alloys in construction industry. (2 points)



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6. Bitumen and coal tar are the two basic materials used in road works as binding materials. Give two major differences of characteristics between these two. (2 points)

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7. You are required to select suitable stones for building a rubble retaining wall. Describe a simple test to check whether the stones are durable enough for the given application. (2 points)

8. Asbestos produce extremely thin fibres and breathing asbestos dust may cause serious lung diseases. State four steps that could be taken to protect workers working with asbestos. (2 points)



9. Sometimes cement needs to be stored outside in case of small sites. Storing outside is liable for hardening early. List four precautions that you would take in storing cement outside. (2 points)

10. Lead and its alloys possess certain properties that make them effective in the construction industry. Give an application of a Lead alloy and three desirable properties identified in selecting it. (2 points)

11. Give four requirements of water with respect to its quality to be used in concreting works (2 points)



12. The following results have been obtained when testing the water absorption rate of aggregates. Mass of saturated surface dry sample in air + vessel = 549 g

Mass of oven dried sample + vessel = 542g

Mass of the vessel = 135g

Compute the water absorption rate of the aggregates. (2 points)

13. Pressure sensitive adhesives are thermoplastic or electromeric character. Give three applications where pressure sensitive adhesive is used. (2 points)

14. Draw typical stress strain curves of mild steel and copper with the same set of axes and label them. (2 points)



Part B

The paper consists of Seven (7) Questions.

Answer Four (4) Questions.

Q1. Concrete is a composite material used frequently by builders in the construction industry. A concrete slab for a water tank is made of a mixture of cement, sand and metal in proportion of 1: 1.5: 3 together with water and reinforced with mild steel bars.

- i. Explain why a mixed proportion of 1: 1.5: 3 is selected. (3 points)
- ii. Identify the specific use of each constituent. (3 points)
- iii. What type of cement would you recommend for the above application? Give two reasons. (3 points)
- iv. Mix proportions of ingredients for concrete maybe either by volume or weight. Discuss the relative advantages and disadvantages of these two methods. (4.5 points)
- v. Describe four steps that should be ensured by the supervisor in preparation of the above concrete mixture by manual mixing. (4.5 points)

Q2.

- i. A load of bricks purchased from a local dealer was in doubt for possible efflorescence.
 - a. What do you understand by the term 'efflorescence'? (3 points)
 - b. Give a simple test to clarify your doubt. (4 points)
 - c. State three undesirable effects using efflorescent bricks. (3 points)
- ii. A mason uses a lime mortar prepared by six parts of sand to one part of lime to be used in plastering walls.
 - a. Would you recommend coarse sand or fine sand to be used in the above mix? Give two reasons for your choice. (4 points)
 - b. How will you ensure the quality of lime? (4 points)



Q3.

Mahogany timber was used to make some window sashes and frames for a dwelling house.

- i. List the basic steps that would transform the Mahogany timber log to a painted window sash. (4 points)
- ii. State what makes Mahogany timber a preferred material for the above purpose (4 points)
- iii. Varnish is the most commonly used natural finish for exterior timber. Describe how you would go ahead with varnishing the window sashes. (3 points)
- iv. State four advantages if plywood is chosen instead of Mahogany for doors. (3 points)
- v. If timber was found to be infested by fungi explain how you would remedy it. (4 points)

Q4.

- i. Cast Iron is widely used in manufacturing irrigation sluice gates and penstocks.
 - a. State its constituents. (3 points)
 - b. List what makes Cast Iron a preferred material for the given application. (4 points)
 - c. Explain why it is undesirable to be used in reinforcing concrete. (4 points)
- ii. Steel comes in different commercial forms such as bars, flats, angle sections, T – sections, I – sections and these have been subjected to heat treatment.
 - a. Explain what is heat treatment. (3 points)
 - b. State four measures that you would adopt to protect structural steel from atmospheric corrosion. (4 points)

Q5.

Wall and roofing tiles of various types, shapes and colors are available to the consumer in the market to choose to suit the requirements.

- i. State three characteristics that you would look for to identify a good roofing tile (3 points)
- ii. Draw a process flow chart for the manufacture of fired clay roofing tiles in the industry (4 points)
- iii. Explain why country tile roof is often preferred to asbestos cement roofing. (3 points)
- iv. You are requested to select a suitable flooring tile for the floor of a warehouse. State four criteria, which influence your choice of material. (4 points)
- v. Explain the process of manufacturing ceramic wall tiles. (4 points)



Q6.

- i. Plastic materials are now widely used in pipeline construction and have largely superseded materials like lined metal, ceramic or glass. Out of the plastic materials the PVC is the most extensively used for pipelines.
 - a. State what makes PVC a preferred material for pipelines. (4 points)
 - b. Discuss the safety of using PVC in the conveyance of drinking water. (4 points)
 - c. List two PVC products used in the construction industry and two areas of uses with respect to the products that you have listed out. (3 points)

- ii. Fiberglass is a glass - fiber reinforced plastic material, which finds its application in roof sheets, wall cladding, and drainage pipes in the building and construction industry.
 - a. Explain the production process of fibreglass by low-pressure technique. (3 points)
 - b. List four desirable properties of fiberglass for wall claddings and roof sheets. (4 points)

Q7. A polypropylene geotextile is provided on a small embankment dam to filter the seepage water so that excess pore pressure would not build up.

- i. State three characteristics of polypropylene. (4 points)
- ii. Sketch a diagram of an embankment dam with a geotextile filter. (5 points)
- iii. Explain the drainage and filtration function performed by the geotextile. (5 points)
- iv. List four different geosynthetics used in geotechnical or environmental engineering and one application of each. (4 points)

