

THE OPEN UNIVERSITY OF SRI LANKA  
Department of Civil Engineering  
Bachelor of Technology in Engineering - Level 3

CEX 3230 - CONSTRUCTION MATERIALS



FINAL EXAMINATION 2016/17

Time Allowed : Three (03) hours

Date : 2017 - 11 - 09 (Thursday)

Time : 0930 - 1230 hrs.

The paper consists of Eight (08) questions. Answer any Five (05) questions. All questions carry equal marks. Write down your Index Number clearly on the answer script.

*If you have answered more than five questions (either partly or in full), cross out the answers. Otherwise, only the first five answers appearing in the answer book will be evaluated.*

Q1) Fly ash and slag blended cements are now popular in the construction industry in Sri Lanka.

1. State four (04) advantages of blended cement over ordinary Portland cement. (4 marks)
2. If the cement brought to the site is suspected of being adulterated explain how you would identify this. (4 marks)
3. List the precautions that you would exercise if cement is to be stored inside a water proof shed. (4 marks)
4. Explain how you would prepare 1:2:4 (20mm) Grade 25 (water cement ratio 0.4) concrete mix. (4 marks)
5. Describe the importance of initial and final setting times of cement in the construction of a concrete slab. (4 marks)

Q2) A load of bricks and bags of quick lime have been delivered to a site to construct masonry walls. The bricks were found to have a high water absorption ratio.

1. State the serviceability and structural problems that may occur due to high water absorption ratio of bricks. (4 marks)
2. Give a simple test to determine water absorption ratio of bricks in a laboratory. (4 marks)
3. Discuss the relative advantages and disadvantages of bricks compared with cement concrete blocks for walling material. (4 marks)
4. Explain how you would ensure the quality of lime. (4 marks)
5. Lime putty is to be made from quick lime bought for finishes of the soffit plaster of walls. What is the method of preparation of lime putty in the local industry? (4 marks)



Q3) An overhead concrete water tank for a dwelling house is to be made out of 1:2:4 (20mm) Grade 25 with a water cement ratio of 0.4.

1. Explain the why Grade 25 concrete is chosen. (4 marks)
2. Give three (03) undesirable effects if the water cement ratio is exceeded. (4 marks)
3. What kind of steel would you recommend for the reinforcement of the slab of the water tank? Give two (02) reasons. (4 marks)
4. Explain the term 'bulking of sand' and how you would account for it. (4 marks)
5. State four (04) advantages of having a fibre glass water tank instead of a concrete water tank. (4 marks)

Q4) A steel roof truss for an auditorium is to be constructed.

1. State four (04) factors that should be considered when selecting steel for a roof truss. (4 marks)
2. Describe the process of painting of the steel roof truss. (4 marks)
3. List down the advantages of and disadvantages of using a steel truss over a timber roof truss. (4 marks)
4. Give three (03) reasons why Cast iron is not suitable for the said application. (4 marks)
5. Explain how carbon content affects the properties of iron. (4 marks)

Q5) The purlins of the roof need to be made out of Jack timber logs and the ceiling is to be made out of plywood boards for an office building.

1. Explain in detail how you would identify whether the timber logs are satisfactory to be used for purlins. (4 marks)
2. List down the steps that would transform the timber log to a finished purlin. (4 marks)
3. Describe the factors that lead to decay of timber and a suitable method of safeguarding purlins against the decaying. (4 marks)
4. List three (03) advantages and three (03) disadvantages of plywood boards instead of asbestos ceiling sheets. (4 marks)
5. State the factors which affect the classification of timber. (4 marks)

Q6) A newly constructed low cost housing scheme is at its finishing stage. All wood work and walls needs to be painted. The floor needs to be tiled.

1. State four (04) factors that should be considered when choosing floor tiles for the above housing scheme. (2 marks)
2. Give the usual defects for which floor tiles need to be inspected and the manufacturing conditions ascribed to these. (6 marks)
3. List down the ingredients of paints and the function of each ingredient therein. (4 marks)
4. State the characteristics of good quality paint. (4 marks)
5. Explain how French polish is prepared. (4 marks)

Q7) (a) Tar, Bitumen and Asphalts are widely used in the field of civil engineering in damp proofing buildings, water proofing roofs, painting timber and steel and for constructing roads.

1. Explain what Tar, Bitumen and Asphalt is. (3 marks)
2. Give three (03) different types of bitumen stating their uses. (5 marks)
3. State four (04) characteristics in which tar is better than bitumen? (4 marks)

(b) Fibre glass is a glass fibre reinforced plastic material and is used in roof cladding.

4. List down the raw materials used for manufacture of fibre glass products. (2 marks)
5. Describe the process of low pressure technique in manufacturing fibre glass. (3 marks)
6. State three (03) advantages of fibre glass roof sheets over asbestos roof sheets. (3 marks)

Q8) A railway track needs to be constructed along a strip of weak soft soil. Use of geosynthetics is recommended over this length of weak soils.

1. Describe with a neat illustration how geosynthetics would improve the load carrying capacity of soil. (4 marks)
2. State the characteristics of geotextiles that make them suitable for the above application. (4 marks)
3. List down the functions that need to be fulfilled by the geotextile in the said application. (4 marks)
4. Discuss the suitability of natural geotextiles for this application (4 marks)
5. List four (04) advantages of geotextiles in civil engineering applications. (4 marks)