THE OPEN UNIVERSITY OF SRI LANKA

00261

Diploma in Technology (Civil) - Level 3

CEX3230 – Construction Materials

Final Examination -2012

Date: 21-02-2012 (Tuesday) Time Allowed: Three(03) hours

Answer Five (05) questions out of Eight (08) questions.
Answers should be illustrated with sketches and diagrams with assumptions stated, clearly and neatly

(Q1) A new bridge is going to be constructed across Mahaweli River in a coastal area of Trincomalee District.

(i) Propose **a type** of Portland cement that should be used in the construction of Foundations of the bridge under considerable amount of water flow. *(04 marks)*

(ii) If Piled foundations are going to be used as the foundations of this bridge, propose **a mix proportion** for these piles. *(04 marks)*

(iii) What **type of steel** do you recommend for the reinforcement structure of the foundations of the bridge? *(06 marks)*

(iv) A chemical analysis on soil and groundwater samples recovered indicates high sulphate and pH levels. What **effects** can be expected to the bridge structure due to these chemical components? **Propose a type** of Portland cement to be used to over come this situation (you may assume that river water flow can be controlled by some other means during the construction). *(06 marks)*

(Q2) Suppose you have been selected as the responsible engineer for the construction of a large hotel complex in Jaffna Peninsula.

(i) What kind of bedrock can be expected to be encountered when constructing foundations for the proposed buildings? *(03 marks)*

(ii) Name **Four (04)** properties that should be satisfied by a particular building stone for construction of foundations. *(06 marks)*

(iii) Propose **Three (03)** groups of rocks that will be suitable sources of building stones that we can use for construction of foundations, if the buildings are multi-storied. *(04marks)*

(iv) What kind of sand would you propose to use in floor rendering? Explain the reasons for your answer. *(07 marks)*

(Q3) A new expressway is going to be constructed from Colombo to Kandy, mostly running through paddy fields and mountain areas.

(i) Explain briefly how you can use Geosynthetic materials in stabilizing newly formed cut slope areas in mountain regions. *(08marks)*

(ii) Explain briefly how you can use Geosynthetic materials in stabilizing the road embankment in water stagnating paddy field areas, prone for flooding. *(08marks).*

(iii) Briefly explain the utilization of Geosynthetic material in retaining wall construction with neat sketches *(04marks).*

(Q4) A 100m height Telecommunication Tower is proposed to be constructed on a hilly area of Hanthana in a slope terrain where, vehicle and machinery access is not possible.

(i) A mix proportion of 1:1:2 (30mm) Grade 30 is mentioned as the mix proportion for concrete in construction of foundations of the tower. What does it mean? *(04 marks)*

(ii) Suggest the **best method** of concrete preparation for the construction of above tower foundation and briefly explain the steps adopted. *(08 marks)*

(iii) State **Four (04)** factors that should be considered when selecting steel for reinforcements of foundations as well as super structure of the tower. *(04 marks)*

(iv) Suggest the **most practical** method that should be adopted in protecting the steel structure of the tower from corrosion. *(04 marks)*

(Q5) A chemical waste treatment plant is to be established in a chemical processing factory at Avissawella.

(i) Briefly explain the applications of using Geosynthetic materials in construction of chemical waste treatment ponds. You may explain the answer with necessary sketches. *(09 marks)*

(ii) Propose **a type** of light weight pipes that can be used in transportation of toxic chemical effluents. *(03 marks)*

(iii) Justify the suitability of your answer to the above ***Question (Q5) (ii)*** by giving reasons. *(08 marks)*

(Q6) Suppose you have been appointed as the Project Engineer of a single storied low cost housing scheme constructed close to seashore.

(i) Do you recommend to use **'stabilized soil blocks'** in construction of walls of these houses? Explain your answer. *(05 marks)*

(ii) Write down **Four (04)** advantages that you can obtain if you use cement blocks instead of stabilized soil blocks in construction of walls. *(05 marks)*

(iii) How would you test the quality of lime delivered to the site? *(06 marks)*

(iv) Propose a mix proportion for mortar in construction of walls and external plaster work. *(04 marks)*

(Q7) A newly constructed multi storied commercial building in Colombo is at the finishing stages.

(i) Write down **Five (05)** factors that should be considered when choosing wall and floor tiles for the particular building. *(05 marks)*

(ii) List down **Four (04)** functions of sand used in mortar. *(06 marks)*

(iii) Write a brief description on role played by 'cleanliness' and 'grading' of sand in forming a good quality mortar. *(09 marks)*

(Q8) A trade exhibition site extending 40acre area is to be come up in Nuwara Eliya. This exhibition will go on for 2 weeks and mainly will have sheds for exhibition stalls and a newly establish road network with other general sanitary facilities for the crowd that will visit. The total infrastructure will be utilized for proposed crop storage facility for the area after the exhibition.

(i) Propose the most suitable type of roofing material to be used in construction of the roof of the sheds that are coming up. *(03 marks)*

(ii) State **Four (04)** functional requirements that should be satisfied by the above mentioned roofing material in ***Question (Q8) (i)***. *(06 marks)*

(iii) Suppose the construction and the exhibition is carried out in dry season of the year and the daily temperature fluctuation is about 15-20^{0}C. Propose the **most suitable** type of binder to be used in the construction of road network. *(04 marks)*

(iv) Justify the suitability of your answer to the above ***Question (Q8) (iii)*** by giving reasons. *(07marks)*