THE OPEN UNIVERSITY OF SRI LANKA
DIPLOMA IN TECHNOLOGY (CIVIL) - LEVEL 4
FINAL EXAMINATION - 2007/2008

CEX 4232 - CONSTRUCTION ENGINEERING AND PLANNING

Time allowed : Three hours

Date : Monday, 21st April 2008 **Time : 09:30 - 12:30**

Selecting at least two (2) questions from each section, answer a total of five (5) questions. All questions carry equal marks.

Answers for sections A & B should be submitted on separate answer books with section A and Section B written clearly on the cover of the respective book.

Write down your Index Number clearly on both answer books.

SECTION A

(01)

Fresh concrete is a mixture of cement, aggregate, water and admixtures if any. Answer the following in relation to this.

(a). Discuss the main factors that affect the workability of fresh concrete and its implication on final product. (06 marks)

(b). Explain how an air entraining agent improves the workability of a concrete mix. (04 marks)

(c). Explain the procedure for placing concrete under water or bentonite slurry. (05 marks)

(d). Explain what is meant by 'curing' of concrete cast at site, and the reasons for doing it. (05 marks)

(02)

(a) Write down three (3) advantages and three (3) disadvantages of reciprocating pumps. (06 marks)

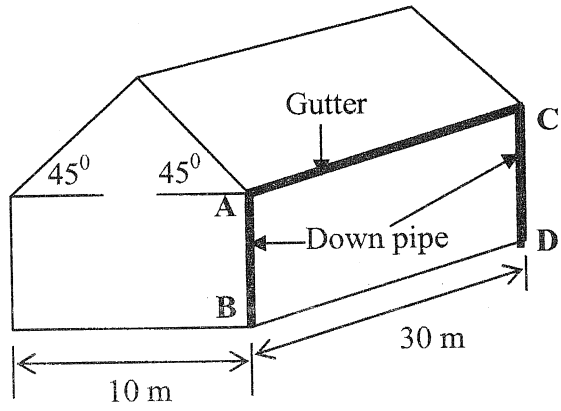
(b) Describe the two (2) basic types of impellers in centrifugal pumps emphasizing on the difference of their basic structure. (04 marks)

(c) The cheapest method that can be adopted for demolition of an existing building to a heap of rubble, is commonly called "fragmentation" in construction industry. Name and briefly describe three (3) types of methods available for carrying out "fragmentation" process. (05 marks)

(d) Explain what is meant by the following terms; (i) Residual soils, and (ii) Soil stabilization. (05 marks)

(03)

(a). Figure below shows a gable-ended factory building which is 30 metres long, and 10 metres wide. The roof angle is 45° as shown in the sketch. Assume a rainfall intensity of 80 mm/hr and the wind driven rain falls at an angle of 2 divisions vertical to 1 division horizontal. Calculate the rainfall discharge through the down pipe AB. Assume water falling on shown area of the roof is equally distributed between down pipes AB and CD.



(05 marks)

(b) When providing electricity to the above building the supply can be given either, single-phase or three-phase. Briefly describe the two systems.

Also explain the function of an 'earth wire' explaining how it provides safety to the user if a fault develops in an electrical appliance.

(05 marks)

(c) Briefly describe the 'secondary treatment of sewage', which takes place in a septic tank. (05 marks)

(d) Draw a neat sketch of a flushing cistern indicating clearly all the main components of it. Briefly describe the role played by each component. (05 marks)

(04)

(a) Explain what is meant by 'ventilation of drains' and give reasons for providing it. Illustrate the method of providing it with a neat diagram. (06 marks)

(b) Write down the (i) functions, and (ii) suitable location of manholes.(04 marks)

(c) Write down the criteria that have to be considered in the selection of pipe gradients for a drainage system. (04 marks)

(d) Explain the procedure adopted for testing of internal soil pipes with the help of a suitable diagram. (06 marks)

SECTION B

(05)

You are appointed as the Assistant Engineer of the Main Contractor for a 10 Km road construction project.

(a) Draw a complete Site Staff organization chart and indicate your position clearly on it. (05 marks)

(b) Name five most important equipment/machinery that need to be provided on a road construction site, and explain their usage. (05 marks)

(c) Name five site facilities commonly provided on a road construction site. How will the work progress suffer if these are not provided at their best? (05 marks)

(d) Draw a complete site layout plan for the above project, indicating the distances between different services where relevant. (05 marks)

(06)

(a) A company is planning the introduction of a new machining centre with associated tooling, materials handling system and control system. The main activities involved, together with their durations and predecessors are shown below.

No	Activity	Duration (weeks)	Predecessors
1	Produce specification	2	
2	Approve	2	1
3	Design equipment	7	2
4	Design control system	6	2
5	Order and deliver equipment	9	3
6	Order and manufacture control system	7	4
7	Clear site	1	3
8	Foundations	1	7
9	Install power	1	8
10	Install Equipment	3	5,8
11	Install control system	2	6,10
12	Test	2	9,11

Draw an activity-on-arrow network for the above project indicating durations, event numbers and event times.
Calculate the Total Floats of each activity and present in a table giving 'activities' and 'floats' in two columns. (10 marks)

(b) Explain the importance of a Bar Chart. Represent the above activities on a bar chart. (05 marks)

(c) Explain 'Resource Aggregation' and its affect on activity schedules. (05 marks)

(07)

(a) It is required to 'plan' and 'construct' additional Technical Colleges to increase the production of technicians in the country. Identify the different levels of planning required for this project and explain each level in detail.

(10 marks)

(b) Describe the special problems associated with the safety of a construction site and explain how safety planning can be carried out.

(10 marks)

(08)

(a) Describe in detail the steps you can take to make the most efficient use of the machinery for an earthwork operation where cut and fill are required within a distance of 10 Km.

(10 marks)

(b) Estimating at tendering stage is important for Contractors. Explain why this is so and describe the 'Unit Rate' estimating method and the 'Operational Estimating' method explaining the significant differences between the two methods, using a simple example.

(10 marks)