

**9210-201**

**Level 7 Post Graduate Diploma in Civil Engineering**

Construction engineering and management

**Sample Paper**

**You should have the  
following for this examination**

- one answer book
  - non-programmable calculator
  - pen, pencil, ruler
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**General instructions**

- This paper consists of **nine** questions.
- Answer any **five** questions.
- A non-programmable electronic calculator may be used but candidates **must** show sufficient steps to justify their answers.
- Drawings should be clear, in good proportion and in pencil. Do not use red ink.
- All questions carry equal marks. The maximum marks for each section within a question are shown.

- 1
  - a) Explain the purpose of conducting subsoil investigation for a building construction project. (5 marks)
  - b) List any four facilities which are to be provided by the contractor to the site from the beginning of the construction. (4 marks)
  - c) Explain briefly the importance of physical site layout before commencing construction activities. (5 marks)
  - d) Select six main activities in stores management of a construction project. (6 marks)
  
- 2 It is proposed to construct reinforced cement concrete drains along both sides of an existing main road as depth and width of the existing drains are not sufficient.
  - a)
    - i) Outline all construction activities in this drain construction. (6 marks)
    - ii) Propose suitable machinery for relevant work items. (4 marks)
    - iii) Find out information from the specification for carrying out concrete work. (5 marks)
  - b) State five methods of removing water when constructing below the groundwater table. (5 marks)
  
- 3
  - a)
    - i) Discuss the factors which are to be considered when selecting machinery for earth cutting and filling operations in a major road project. (6 marks)
    - ii) Justify the suitability of a scraper for a road project. (5 marks)
  - b) State three tests to determine the performances of a pile foundation. (3 marks)
  - c) Discuss the types of excavation in laying the foundation of a building. (6 marks)
  
- 4
  - a) Soil is to be placed and compacted for the construction of the embankment of a dam.
    - i) Give two main objectives of compacting earth. (2 marks)
    - ii) Find the mechanisms used by machines to apply forces to compact earth. (4 marks)
  - b) Describe briefly the use of a motor grader when carrying out dam construction. (4 marks)
  - c)
    - i) State the main steps in rock blasting. (3 marks)
    - ii) Briefly explain the steps stated in c) i) above. (5 marks)
    - iii) Identify suitable machinery for the rock blasting process. (2 marks)
  
- 5
  - a) Illustrate a cross section of a major road and name all components of the road structure. (10 marks)
  - b) Explain briefly construction activities in asphalt concrete. (6 marks)
  - c) State the advantages of concrete block paving for rural roads. (4 marks)
  
- 6
  - a)
    - i) What is meant by concrete mix design? (3 marks)
    - ii) List the factors which are to be considered in concrete mix design. (4 marks)
  - b)
    - i) Describe briefly the use of scaffolding in high rise building construction. (4 marks)
    - ii) Illustrate the arrangement of independent scaffold placing parallel to one side of a building by sketching plan view and side elevation. (6 marks)
    - iii) Name three main components in b) ii) above. (3 marks)
  
- 7
  - a) Give four factors which affect workability of cement concrete. (4 marks)
  - b) Explain briefly,
    - i) setting of cement concrete (4 marks)
    - ii) curing of cement concrete. (4 marks)
  - c)
    - i) Describe crushing strength of hardened concrete. (4 marks)
    - ii) Identify different types of admixtures used in cement concrete. (4 marks)

- 8 Identified activities, their durations and proposed unskilled labour strength for construction of a box culvert are given below.

<b>Activities</b>	<b>Duration (Days)</b>	<b>Unskilled Labour (Nos)</b>
1) Excavation for foundation	4	08
2) Mass concrete for foundation	2	10
3) RR Masonry	15	08
4) Back filling around foundation	5	05
5) Form work for concrete capping beams and deck	2	02
6) Placing reinforcement for beam and deck	3	03
7) Grade 20 concrete for capping beams and deck	1	10
8) Fixing pre-cast guard stones	2	04
9) Cement Plastering in exposed area	6	04
10) Turfing in embankments	4	05

- a) Produce Activity on Arrow (AOA) diagram for the above box culvert construction. (6 marks)
- b) Derive duration for completion of this construction by analyzing AOA network produced in a) above. (6 marks)
- c) Prepare labour histogram for the above box culvert construction. (4 marks)
- d) Briefly explain the requirement of a resource plan for the construction project. (4 marks)
- 9 a) i) Give five basic functions in management. (5 marks)
- ii) Select a function given in a) i) above and identify the role of project manager in this function. (5 marks)
- b) Discuss the roles of the contractor during construction stage of the project in;
- i) quality management (5 marks)
- ii) safety management. (5 marks)