

**Higher National Diploma in Construction Technology**

**NVQ Level 06 – Semester I**

**Construction Plant & Earthwork Operations**

**F45C001M17**

**Three Hours**

**Answer any five (05) questions.**

1.

- (a) How do you classify construction equipments based on the functions and purposes they are being used? List out the categories of such equipments, with one example for each.

*(08 marks)*

- (b) A reservoir dam has to be constructed across a valley, for a proposed reservoir. The maximum height of the dam at the river section is 6.0m, and the length of the dam along its crest is around 500 m. According to the design, after stripping and removal of unsuitable soil from the surface, a core trench with a bed width of 4.0 m has to be excavated. The core trench and the central part of the dam to be filled with less pervious clayey material, and the shell of the dam to be constructed with coarse grained gravelly soil, which should be brought to site from borrow areas.

Prepare a list of construction equipments you propose to deploy for this work, with brief description on the purpose of using each of them.

*(12 marks)*

2.

- (a) What do you understand by the term CIF value of construction equipment imported from a foreign country?

*(03 marks)*

- (b) Explain how do you calculate the capital cost (Owning cost) and the Fixed cost of such equipment, based on its CIF value, type of the machine and the depreciation time? Show an example calculation.

*(17 marks)*

3. The construction works of a two span (2 x 13.4 m) bridge for a main road, across a natural stream is in progress. The embankment filling for the road on the two sides has been done. Excavation for abutments and pier, the two concrete abutments with capping beams on top of each, the mid concrete pier with the pier cap, and the bridge deck using pre-stressed beams (13.4 m long x 4.2 t), to be constructed. The depth of excavation is around 4 m. The bridge beams have to be transported from the pre-cast concrete yard located 5 km away from the site. After placing the pre-stressed beams, the bridge deck to be constructed with grade 25 in-situ ready mixed concrete, which should also be transported from the batch plant installed at the same concrete yard. Concreting works of the bridge deck to be carried out continuously without a break in one operation.

- (a) Prepare a list of construction equipment needed for the completion of the works mentioned above, stating the purpose of deploying each type of machine.

*(15 marks)*



**TERTIARY AND VOCATIONAL EDUCATION COMMISSION**  
**COMMON WRITTEN EXAMINATION – 2020/ 2021**



- (b) The sides of deep excavations for foundations of abutments and pier have to be protected from possible failures. What is the method you propose to protect such sides of excavations?  
(05 marks)

4.

- (a) Explain the following types of maintenance works relating to the equipment, used in construction sites.

- (i) Preventive maintenance
- (ii) Corrective or breakdown maintenance
- (iii) Scheduled maintenance
- (iv) Productive maintenance

(03 marks each – Total 12)

- (b) What are the service and maintenance equipment required for a field service yard for a machine fleet in a construction site, established for an earthwork construction site. State the purpose of each service equipment.  
(08 marks)

5.

- (a) What do you understand by the term ‘Resource Histograms’ for construction equipment relating to a construction site? Explain.  
(08 marks)

- (b) Select a construction machinery and prepare a resource histogram for the same, for a given time period? What are the information you need to have for preparing a histogram?  
(05 marks)

- (c) In most of the cases, re-scheduling of resource requirements will be necessary, and the resource histograms may have to be amended accordingly. Explain why such re-scheduling is necessary, and how the amendments are made.  
(07 marks)

6.

- (a) In general, what are the factors you have to consider in the selection of construction equipment for various types of construction works?  
(06 marks)

- (b) Mention the construction equipment you propose to deploy for the execution of following types of construction works. Substantiate your selections with reasons for such selections.

- (i) Excavation from borrow, hauling the excavated material to a road construction site (2 km distance) where embankment filling to be done, placing and compacting the fill material for roadway formation.  
(08 marks)
- (ii) Clearing shrubs, removing and stockpiling top soil for future use, bulk excavation for raft foundation to an average depth of 2.0 m, in an area of 20 m x 15 m, disposing the excavated soil away from site to a distance of 0.5 km.  
(06 marks)