

Specialist Diploma: Offshore Engineering

Friday 6 January 2017

Timetable: 09.30 – 13.00

Notes to Candidates

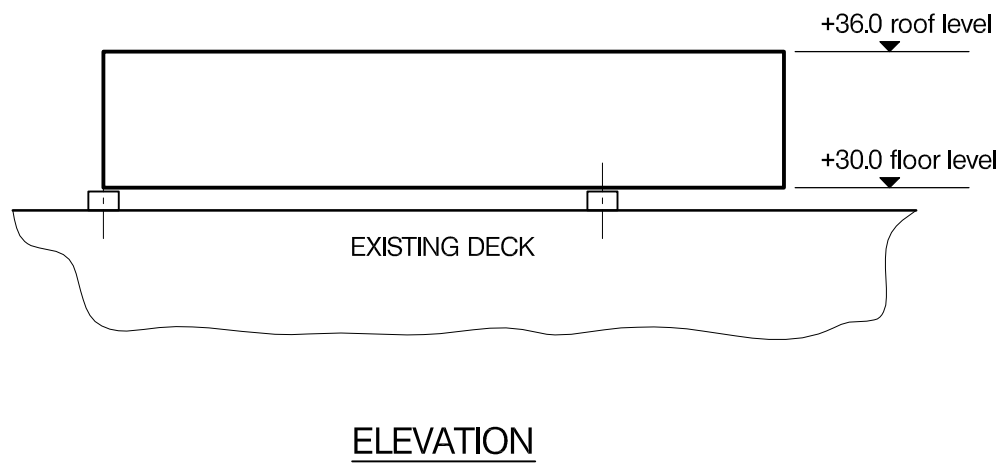
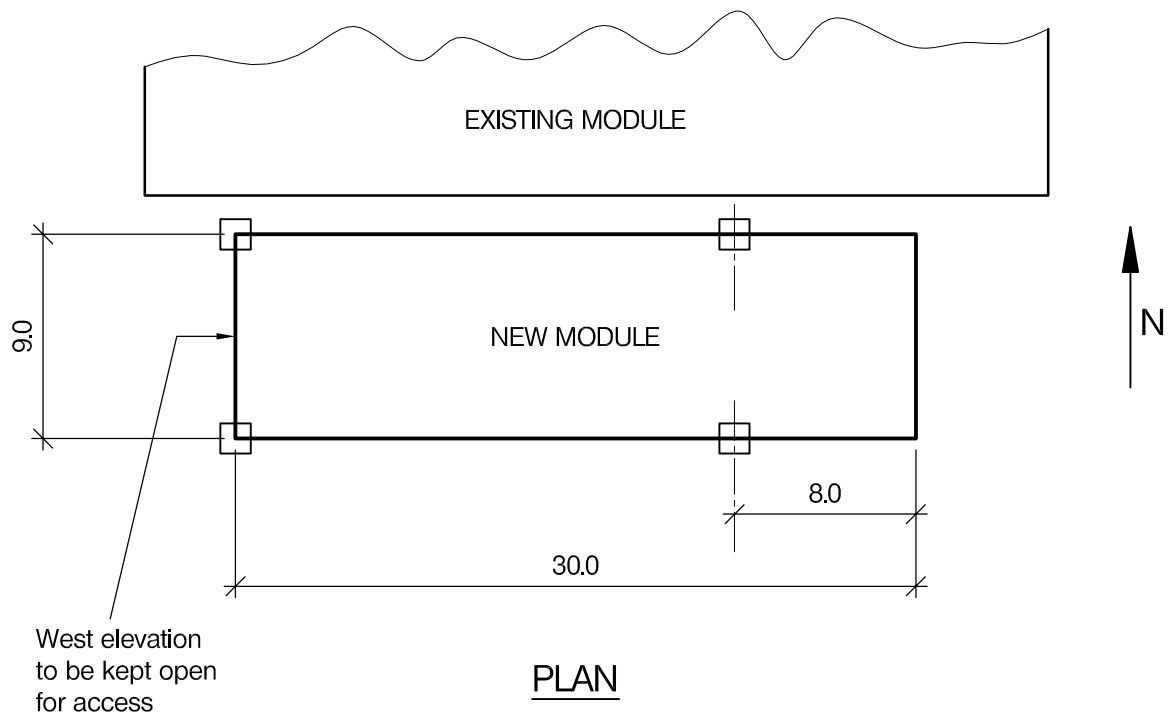
1. TO PASS THE EXAMINATION, CANDIDATES MUST SATISFY THE EXAMINERS IN BOTH PARTS OF THE QUESTION.
2. Examiners will only mark work written by hand during the examination. Candidates will not be allowed to include any previously prepared calculations, notes, sketches, diagrams, computer output or other similar material in their answer sheets. Any previously prepared information submitted by candidates will be ignored by the examiners.
3. A fair proportion of marks will be awarded for the demonstration of an understanding of fundamental engineering concepts, as distinct from calculation of member forces and sizes. NOTE: In the calculation part, establishing “form and size” is taken to mean compliance with all relevant design criteria, i.e. bending, shear, deflection, etc.
4. 60 marks are allocated to Section 1 and 40 marks to Section 2.
5. The Examiners are looking for sound structural designs. It should also be remembered that aesthetics, economy and function are important in any competent engineering scheme.
6. Any assumptions made and the design data and criteria adopted must be stated.
7. Good clear sketches are required; they should show all salient and structural features and should incorporate adequate details.
8. Candidates may not bring into the examination room any electronic devices capable of wireless communication, optical photography or scanning.

The following devices are not permitted: Mobile phones, laptops, notebooks or portable computers and similar devices, iPads, tablets and similar devices, E-readers (e.g. Kindle) and similar devices, cameras, optical scanners and similar devices.

Any candidates arriving at the examination room with such devices will be asked to switch them off and place them in a sealed bag kept by the Invigilator for the duration of the exam.
9. This paper is set in SI Units.

A reminder on codes of practice

Any design code or standard may be used to answer the question in the paper, as long as reference to that code is consistent throughout and any assumptions made or design data adopted (including loadings other than those specified in the question) are stated at the beginning of the answer.



NOTE: All dimensions are in metres

FIGURE 1

New module for offshore platform

Client's requirements

1. A new module is to be installed offshore on top of an existing deck. The module dimensions are 30m long x 9m wide x 6m high, see figure 1.
2. The module is to be supported on 4 support points, as shown in Figure 1, to match the structural capacity of the existing deck.
3. The module is to be fully enclosed on North, South and East elevations, and left open to the West elevation to allow access during operational and maintenance activities. The inside of the module must be kept completely free from structural obstructions.
4. The module is to be transported to the offshore location by barge and lifted into place by a single crane lift vessel.

Imposed loading

5. Module floor live load, 10kN/m^2 .
Module roof live load, 20kN/m^2 . (Roof is designated laydown area)
Wind load equivalent to 1.5kN/m^2 .

North elevation wall to resist blast design pressure of 0.1 bar (10kN/m^2) from existing module.

Section 1

(60 Marks)

- a. Prepare a design appraisal with appropriate sketches indicating two distinct and viable solutions for the proposed module. Indicate clearly the functional framing, load transfer and stability aspects of each scheme. Include transportation and installation load cases. Recommend one solution, to be further developed in the next section.

Section 2

(40 Marks)

- a. For the recommended solution, prepare sufficient design calculations to establish the form and size of all the principal structural elements. (30 Marks)
- b. Prepare design sketches of module and padeye detail, sufficient for estimating purposes. (10 marks)

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