PRIFYSGOL ABERYSTWYTH UNIVERSITY

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DEPARTMENT OF PHYSICS

SEMESTER 2 EXAMINATIONS, MAY 2026

PH38210 – Professional Skills in Engineering

Time allowed – 2 hours

- **Full marks can be attained for complete answers to ALL six questions in Section A and TWO questions from Section B**
- **The numbers in brackets after the questions indicate the allocation of marks for each question.**
- **Only calculators from the Casio FX83, FX85 or FX991 range may be used.**
- **A booklet of mathematical formulae and standard constants will be provided.**
- **Only a 1 side of A4 summary sheet is allowed.**
- **MAE MODD I FYFYRWYR GYFLWYNO ATEBION I'R PAPUR HWN NAILL AI YN Y GYMRAEG NEU'R SAESNEG**
- **STUDENTS MAY SUBMIT ANSWERS TO THIS PAPER IN EITHER WELSH OR ENGLISH**

Once seated, students may complete the front cover of the answer book(s) and the attendance slip ONLY.

DO NOT TURN THE EXAMINATION QUESTION PAPER OVER UNTIL INSTRUCTED TO DO SO.

Section A

Attempt ALL questions in the booklet provided

1 One of the competencies of a chartered engineer is the requirement to demonstrate Professional commitment. Discuss the competency, giving three examples of how an applicant can provide evidence of this competency for chartership. [5]

2 State the two types of law in the UK and evaluate the differences between the standards of proof required for each and how legal action may be initiated in each case. [5]

3 State the four principles that underlie professional ethics as outlined by The Engineering Council and the Royal Academy of Engineering [5]

4 Briefly summarise why engineers need an awareness of the law. [5]

5 Discuss the difference between primary and secondary copyright infringement with respect to the law. [5]

6 Define 'priority' as used in matters of patents. How may priority for an idea or an invention be established? [5]

Section B

Answer TWO questions

7 In December 2005, there was a large explosion and fire at the Buncefield Oil Storage Depot in Hemel Hemstead, Hertfordshire.

a) Describe the primary technical causes of the explosion and fire.

[5]

b) The subsequent enquiry found a number of operational and management failings in the way that the site was designed, run and operated. Explain how operational failings in respect of the technical reasons above allowed a dangerous situation to develop.

[5]

c) Discuss the factors which placed the staff working in the local control room at the site under stress which contributed to the accident.

[5]

8 You are working for a small manufacturing company with several product lines. Due to changing market conditions, the company will need to be restructured, switching production from one outdated product to another new one. In implementing the change, it appears that you will need to change staff to get employees skilled in the new production technique.

a) Outline the differences between “dismissal” and “redundancy” under UK employment law

[2]

b) Explain the steps you will need to follow in order to implement the change in staff required to the new production process whilst complying with UK employment law – include those steps needed to hire new staff.

[8]

c) You are worried that some of your former staff could misuse customer data and other know-how gained whilst working for you. What steps could you take to safeguard this information?

[5]

9 You are working for a small startup company working on renewable energy projects for use in developing countries. One of the products made by the company is a refrigeration system to keep medical supplies at the correct temperature. During the course of your work, you have developed a new technology which will dramatically improve the performance of these products.

a) Discuss the options available to safeguard your invention and prevent other companies copying the device.

[5]

b) The company has decided to manufacture the device in-house rather than contracting out this work. This expansion of the company will need to be funded somehow. Discuss different options as to how this money may be raised, with pros and cons for each option.

[5]

c) Suggest two possible structures for the company after the expansion has taken place. The company will still retain its existing consultancy business in addition to the new manufacturing business.

[5]

END OF PAPER