

-SQA-SCOTTISH QUALIFICATIONS AUTHORITY

**Hanover House
24 Douglas Street
GLASGOW G2 7NG**

NATIONAL CERTIFICATE MODULE DESCRIPTOR

-Module Number- 0064065 -Session-1986-87

-Superclass- RC

-Title- MATERIALS: STRESS AND STRAIN (x 1/2)

-DESCRIPTION-

Type and Purpose A general module (1/2) which introduces the student to the relationships between stress and strain.

Preferred Entry Level 04001 Introduction to Fundamentals of Technology.

Learning Outcomes The student should:

1. know the deformation effect produced in materials by force;
2. know and apply the relationship between force and stress;
3. extract and apply data from simple material tests to establish properties;
4. quantify stress and strain.

Content/ Context Corresponding to the Learning Outcomes:

1. deformation: compression; elongation; shear; elastic and permanent deformation; strain.
2. relationships: force and stress for direct and shear forces; assumptions such as uniformity of material and distribution of load; symbols; equations; Hooke's law; modulus of elasticity; modulus of rigidity; appropriate units.
3. for a range of materials: load-extension diagrams: significant and distinguishing features; proof stress; related calculations.

4. application of stress/strain relationships and factors of safety for a range of simple practical situations including: components having a change of cross section; joints in single and multiple shear; flanged couplings; blanking and piercing operations and other vocationally specific applications.

Suggested
Learning and
Teaching
Approaches

Students should be aware of the assumptions made when relationships are being derived. A wide range of materials appropriate to the students' vocational area should be used in demonstrations to illustrate their differing stress/strain characteristics.

Assignment sheets should be devised to encourage good practice in presentation of written/graphical work and calculations.

Modern methods of measurement and testing should be used where appropriate.

Prepared computer software for data handling and problem solving could be used to extend the students' experience and accelerate the learning process.

Assessment
Procedures

All learning outcomes must be validly assessed.

The student must be informed of the tasks which contribute to summative assessment and if possible, any unsatisfactory aspects of performance should be discussed with the student as and when they arise.

Acceptable performance in the module will be satisfactory achievement of the performance criteria specified for each learning outcome.

The following abbreviations are used below:

LO Learning Outcome

IA Instrument of Assessment

PC Performance Criteria

LO1 IA Short answer exercises (written or oral).

PC For given components and loading, the student correctly identifies the expected type of deformation.

LO2 IA Written/calculation exercise.

PC From given data, the student applies appropriate formula(e), states recognised assumptions and performs relevant calculations to obtain a solution.

LO3 IA Written/graphics/calculations exercise.

From given test diagrams and relevant information, the student identifies or determines material properties including the following:

- (a) elastic limit load;
- (b) yield point load;
- (c) ultimate load;
- (d) proof load;
- (e) the stress/strain constant.

LO4 IA Assignment report.

PC From given data, the student applies appropriate formula(e) and performs relevant calculations to obtain a solution.