-SQA-SCOTTISH QUALIFICATIONS AUTHORITY

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NATIONAL CERTIFICATE MODULE DESCRIPTOR

-Module Number- **0064624** **-Session-1986-87**

-Superclass- **XH**

-Title- **VIBRATION MONITORING**

-DESCRIPTION-

Type and Purpose

A specialist module which extends the student's knowledge of instrumentation and control to include vibration measurement and analysis.

Preferred Entry Level

04006 Dynamics
04616 Industrial Instrumentation and Control

Learning Outcomes

The student should:

1. know why vibrations occur;
2. know the principles of vibration monitoring systems;
3. select and set-up monitoring equipment;
4. record, quantify and analyse vibrations.

Content/ Context

Corresponding to the Learning Outcomes:

1. qualitative treatment of vibrations: terminology and units; simple harmonic motion.

   Common sources of vibration in rotating machinery, such as: out-of-balance; misalignment; eccentricity; bearing damage; mechanical slackness; worn parts and deficient lubrication. Vibrations in simple machine elements and structures such as beams and cantilevers.

   Relationships among displacement, velocity, acceleration, frequency and periodic time.

2. elements of vibration monitoring systems: data acquisition; signal processing and condition assessment.

   Common types of sensors/transducers, e.g. Eddy - current transducer; velocity transducer and accelerometer (seismic probe). Merits and applications of these transducers. Basic requirements for signal processing and assessment: amplifiers; attenuators; modulators and filters.

   Methods of displaying processed signals such as: meter, graphic recorders; monitors and oscilloscopes.

3. selection and setting up of equipment for particular tasks. Calibration of equipment to manufacturer's specifications.

   Setting and testing alarms and danger level warning signals. Optimum setting of proximity probes.

   Fault finding.

4. practical tests on simple systems to determine the frequency of vibrations.

   Use of vibration monitoring results for trend monitoring and condition checking. Relationships between: vibration amplitude and severity of fault; frequency and source of fault.

   Tests on rotating shaft systems to obtain out-of-balance readings; subsequent testing of balanced shaft.

Suggested Learning and Teaching Approaches

A systems approach should be used and the learning and teaching methods should be primarily student centred.

The use of well defined assignments in which the student is involved in the process of finding out, communicating, planning, implementing and appraising is strongly recommended.

Films, slides, models and simulations should be used to re-inforce the learning outcomes.

Students should be encouraged to discuss problems, exchange ideas and assist each other. They should have ready access to technical publications and specifications.

Assessment Procedures

All learning outcomes must be validly assessed.

The student must be informed of the tasks which contribute to summative assessment. Any unsatisfactory aspects of performance should, if possible, 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:

LO1 IA Short answer questions.

PC The student correctly:

(a) lists SIX common sources of vibrations;

(b) states the effects of velocity and acceleration on the frequency and amplitude of vibrations.

LO2 IA Written/graphics exercise.

PC The student correctly draws a systems diagram for a vibrations monitoring system which includes identification of:

(a) the main elements;

(b) the objectives, inputs outputs and processes of each stage.

LO3 IA Practical assignment and observation checklist.

PC The student satisfactorily:

(a) selects vibration monitoring equipment appropriate to a specified task;

(b) sets up the equipment;

(c) ensures that the equipment is working effectively;

(d) calibrates the equipment as per the given specification.

LO4 IA Assignment report.

PC The student:

(a) satisfactorily monitors a practical test on a simple system;

(b) measures and records significant values;

(c) analyses and comments validly on the results.