

MECH 225 Engineering Science 2

Coursework

The coursework comprises 50% of the assessment for this module. It consists of two parts:

1. Laboratory report

An experiment is to be carried out in Brunel W8 to assess the performance of a diesel engine. You are expected to perform the experiment, and to write a report. Further details are given in a separate document (mech225 diesel engine exp.doc). (weighting: **15%** of the total module assessment)

Date of submission: 19th December 2003

2. An investigation into the role of fluids in the internal combustion engine

Date of submission: Thursday 22nd January 2004, by 1600 h.

One aim of the course is to impart a sound understanding of how the principles of conservation of mass, momentum and energy determine the design and operation of common fluid dynamic and thermodynamic machinery such as pipe networks, pumps, fans, engines and heating/cooling processes. These five types of machinery are found under the bonnet of a “standard” car or as part of a motorcycle.

In this assignment you are asked to investigate the role of fluids in the operation of an automobile. It is designed to develop and assess:

- Your research skills
- Your understanding of fluid mechanics
- Your analysis and evaluation of common fluid dynamic machines
- Your awareness of environmental issues surrounding engineering design
- Your communication skills

(1) Select any type of vehicle propelled by an internal combustion engine, such as a car or a motorcycle. One you are already familiar with would be most suitable. If you do not have access to any vehicle, please advise the lecturer.

(2) Identify (a) the cooling system
(b) the lubrication system

For each system:

(i) Draw a simplified, but clearly labelled, diagram, identifying in particular any pipe networks, pumps or fans. Hand drawn diagrams are preferred.

- (ii) Identify the fluids within the system, and find out the density, specific heat capacity and viscosity of each fluid. Explain how their properties make them suitable for the application.
- (iii) Find out typical pressures and temperatures of the fluid at key points within the system
- (3) For the cooling system you have identified, calculate the mass flow rate of coolant required to prevent overheating of the engine, under normal operating conditions. State any assumptions you make.
- (4) Discuss any environmental issues you see as being attached to the manufacture, operation and end-of-life treatment of either the cooling or the lubrication system.
- (6) Compile a report of around 2000 words summarising your findings.

Your report should be divided into clearly labelled sections, including an "Introduction" and a "Conclusion". You must give a list of references and a bibliography, including web sites, with the date that you visited them; this is important, since web sites are not permanent. If you use diagrams from the Internet, their source must be referenced. Haynes manuals may provide a useful source of detailed information, and should be available in the Public Library, if not in the University Library. **Remember that you should not copy text out of books or download it directly from the web into your report – this constitutes plagiarism, and will be penalised severely.**

Marks will be allocated as follows:

Diagrams of cooling and lubrication systems	15
Properties of fluids and reasons for their use	10
Identifying key thermodynamic properties of the fluids	15
Calculation of required coolant flow rate	20
Critical analysis of environmental issues	20
Presentation, including grammar and spelling	10
References and bibliography	10
Total	100

Weighting: 35% of the module assessment.

If you have any questions related to this assignment, please e-mail or telephone me.

Date of submission: Thursday 22nd January 2004

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