CONFIDENTIAL

EXAMINERS' REPORTS 2011

[Abridged version for Ox-only website]

MATERIALS SCIENCE (MS)
MATERIALS, ECONOMICS & MANAGEMENT (MEM)

REPORT ON PRELIMINARY EXAMINATION IN MATERIAL SCIENCE

Part I

A. STATISTICS

Category	Number			Percentage		
	2010/11	2009/10	2008/09	2010/11	2009/10	2008/09
Distinction	13	8	9	38	27	32
Pass	20	20	16	59	67	57
Fail	1	2*	3*	3	6	11

* Passed the resit in September
One further candidate passed the entire 2009/10 examination in September.

Marking of scripts

Scripts are single marked except for borderline cases which are double-marked.

B. NEW EXAMINING METHODS AND PROCEDURES

None in this year

C. Please list any changes in examining methods, procedures and conventions which the examiners would wish the faculty/department and the divisional board to consider.

None

D. Please describe how candidates are made aware of the examination conventions to be followed by the examiners

Circulation by Deputy Administrator (Academic) to all students and tutors by e-mail, hard copy, and onto the Departmental website.

A copy of the conventions for this examination is attached below.

Part II

A. GENERAL COMMENTS ON THE EXAMINATION

34 students were registered for the examination.

33 candidates passed all papers, without the necessity for compensation. Of the total of 33 successful candidates in June, 13 were awarded Distinctions, all with marks of 75% and above. This relatively high number of distinctions reflected what the Moderators saw as a strong set of scripts.

All but one candidate passed the MS1 and MS3 paper in June. In the Long Vacation examination this candidate successfully passed the 2 papers failed previously.

The prize for the best overall performance in Prelims was awarded to Fred Woodstock of The Queen's College. The prize for the best performance in 1st year Practicals was awarded to Duncan Johnstone, of St Catherine's College. Additional prizes for outstanding performance were awarded to Amy Goodfellow of St Anne's College, and Duncan Johnstone, of St Catherine's College.

B. EQUAL OPPORTUNITIES ISSUES AND BREAKDOWN OF THE RESULTS BY GENDER

3 candidates were notified to the Examiners as requiring extra time.

Gender Issues:

Of the 34 candidates 9 were women and 25 men.

2 of the 13 distinctions were awarded to women.

In view of the small overall number of candidates, it is not sensible to draw conclusions from these data. The mean score for males was 72.45 and for females 70.25.

C. DETAILED NUMBERS ON CANDIDATES' PERFORMANCE IN EACH PART OF THE EXAMINATION

All candidates took the same papers for the whole examination.

D. COMMENTS ON PAPERS AND INDIVIDUAL QUESTIONS

Attached.

E. COMMENTS ON THE PERFORMANCE OF IDENTIFIABLE INDIVIDUALS AND OTHER MATERIAL WHICH WOULD USUALLY BE TREATED AS RESERVED BUSINESS

F. NAMES OF MEMBERS OF THE BOARD OF EXAMINERS

Dr J.M. Smith (Chairman)
Dr S.C. Benjamin
Dr J.T. Czernuszka
Dr F. Giustino

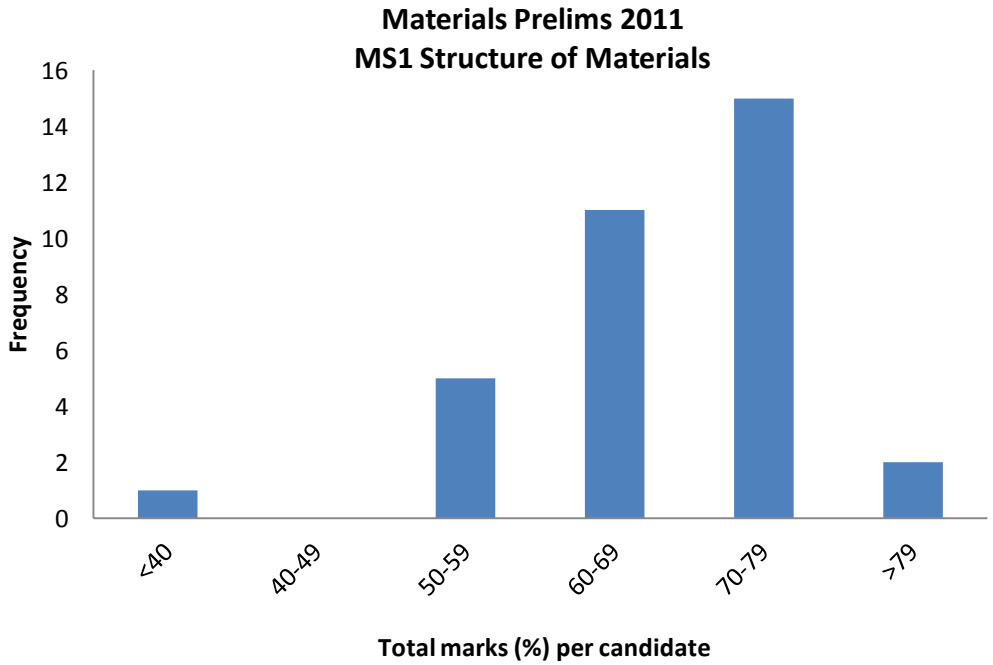
Attachments: Examination Conventions 2011
Comments on Materials Science 1: Structure of Materials
Comments on Materials Science 2: Properties of Materials
Comments on Materials Science 3: Transforming Materials
Comments on Maths for Materials and Earth Scientists

MS1 – Structure of Materials

Examiner: **Dr Jason Smith**
Candidates: **34**
Mean mark: **68.6%**
Maximum mark: **91%**
Minimum mark: **38%**

Detailed comments on the paper are as follows:

Question	No of Answers	Average Mark	Highest Mark	Lowest Mark
1	17	12.41	17	7
2	33	14.88	19	9
3	19	12.21	17	8
4	9	12.44	18	3
5	11	13.73	18	11
6	31	15.94	20	4
7	29	13.14	18	6
8	21	12.38	18	5



General Comments

1. A question on quantum theory answered by about half the cohort. Sections on failures of classical physics, the Heisenberg uncertainty principle, and wave packets were reasonably well done. Students struggled to convert an uncertainty in momentum to an uncertainty in wavelength.
2. A very standard crystallography question on nomenclature, Weiss zone law, and stereographic projections. Answered by all but one student. Most students had very good general appreciation but many answers lacked precision.
3. Crystallography, answered by just over half the cohort. Part (a) on crystal systems was answered well. Answers to (b), (c), and (d) on a tetragonal I lattice were a bit variable (especially indexing of planes). Part (e) on the structure factor was generally done quite well when attempted.
4. A question on X ray diffraction answered by surprisingly few candidates. Part (a) was just Bragg's condition – almost all got this exactly. Parts (b) and (c) on X ray production were generally done well also. Parts (d) and (e), on diffraction techniques (powder vs Laue methods, and resolution) were a bit variable, and few obtained full marks for these.
5. A question on polymers not done by many, but generally good answers.
6. A question on dislocations, answered by nearly all candidates and generally very well, averaging nearly 16/20.
7. A question on solid solutions attempted by most candidates. Mostly good answers to parts (a) and (bi) and (bii) concerning the Hume Rothery rules, but few correct answers to (biii) which concerned CuAu superlattices.
8. A question on bonding and structure in diamond and graphite attempted by most candidates. Parts (a), (b), and (c) were very standard and generally answered well although sometimes lacking in precision. Answers to (d) were few in number, but some candidates answered correctly that the ionisation energy for P in diamond is too large for effective n-type doping at room temperature.

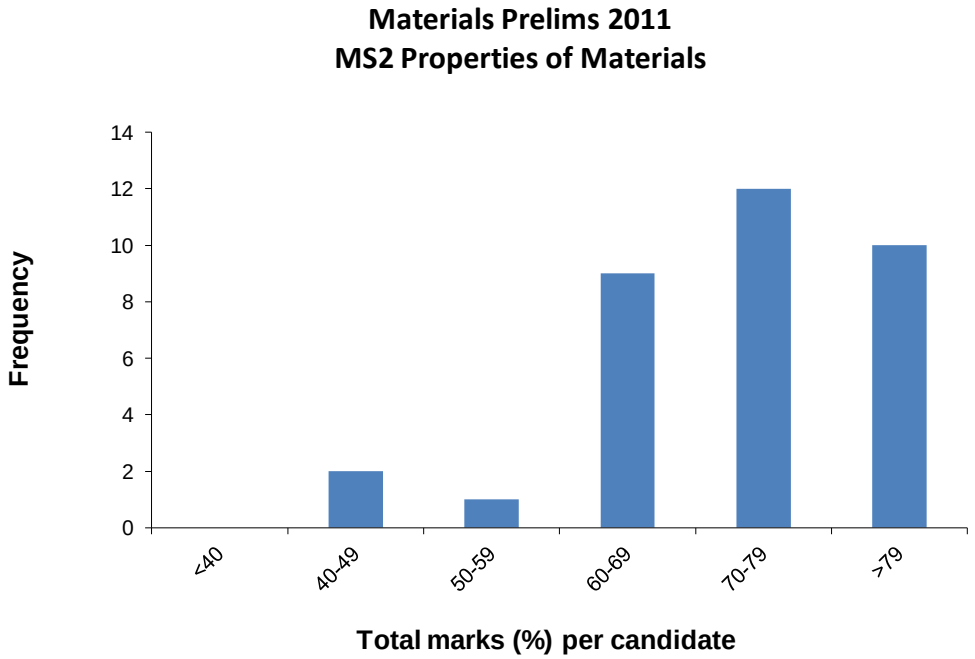
General comment:
The questions which stuck closely to book work were very popular – those that required problem solving were less so. In particular questions 2 and 6 on crystallography and dislocations respectively were answered by the vast majority and scored highly, resulting in a relatively high mean mark for the overall paper. Apart from this, attempts were fairly evenly distributed and no mean mark was below 12/20, reflecting a generally strong set of scripts.

MS2 – Properties of Materials

Examiner(s): **Dr Feliciano Giustino / Dr Jan Czernuszka**
Candidates: **34**
Mean mark: **72.6%**
Maximum mark: **94%**
Minimum mark: **42%**

Detailed comments on the paper are as follows:

Question	No of Answers	Average Mark	Highest Mark	Lowest Mark
1	8	16.63	20	11
2	7	18.71	20	13
3	20	10.80	19	6
4	32	15.66	20	2
5	27	12.41	19	7
6	32	12.66	19	7
7	34	16.82	20	7
8	10	17.50	20	10



General Comments

1. **Gauss theorem in electrostatics** The question requires the use of the standard Gauss theorem in electrostatics, and is very close to standard classwork (cross-checked with the lecturer). Very few candidates answered this question (23%), which is somewhat disappointing. It is surprising that 77% of the students avoided it. Those who answered the questions generally did well, apart from a few sign errors.
2. **Complex impedence and RLC circuit** This question is about the calculation of the series impedence in a AC circuit. This is discussed only during one lecture in the Electricity and Magnetism course, but the lecturer assured me that the students should be able to answer. Only 21% of the students answered, which again is rather surprising. Interestingly only 3 students answered both Q1 and Q2, and scored practically full marks in both. This indicates that questions Q1 and Q2 were indeed within reach but most students just avoided them (too risky? Maths involved?).
3. **Elasticity** A question on thin walled pressure vessels and the construction and use of Mohr's circle. Part (c) seemed to catch some candidates out. Reasonably popular question.
4. **Elasticity** Question related to shear forces and bending moments of a beam. A popular straightforward question.
5. **Mechanical properties** A general essay based question on interactions of dislocations with a set fo defects. Popular and generally well answered
6. **Mechanical properties** A very popular question about the effect of microstructural evolution during ageing on the yield strength of an aluminium alloy. Reasonably well answered.
7. **Mechanical properties** The most popular question. Basic relationships between crystallographic orientation and yield stress.
8. **Kinetic theory of gases and Boltzmann equation** In this question the only tricky bit is to use the Boltzmann distribution in an integral in order to calculate an average particle velocity in an ideal gas. As in Q1 and Q2 most students (71%) avoided this question. Those who answered did rather well, apart from some confusion in the evaluation of the integral (a hint for the solution of the integral was provided).

General comment:
It seems to me that a scheme whereby a student can completely skip certain questions and still pass the examination can be dangerous.
I would be more inclined towards a scheme whereby the student is required to score a minimum mark in every question, or a scheme where some questions on the foundations of materials science and engineering are compulsory.

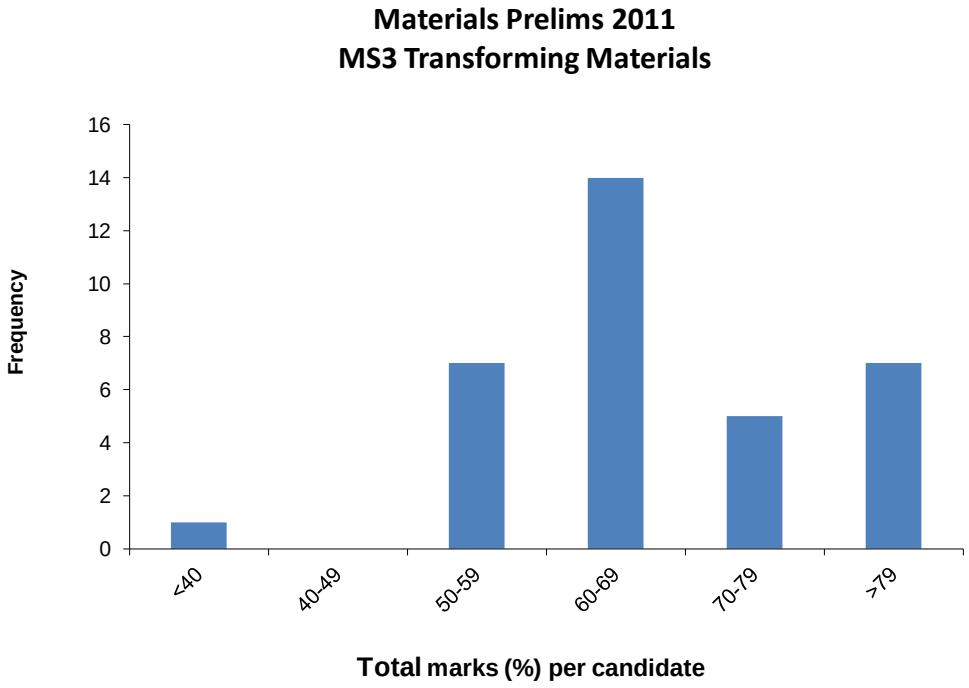
Once again the mechanical properties questions were the most popular with some excellent (full) marks attained.

MS3 – Transforming Materials

Examiner(s): **Dr Jan Czernuszka / Dr Feliciano Giustino**
Candidates: **34**
Mean mark: **65.8%**
Maximum mark: **85%**
Minimum mark: **53%**

Detailed comments on the paper are as follows:

Question	No of Answers	Average Mark	Highest Mark	Lowest Mark
1	32	11.84	15	6
2	31	12.65	17	6
3	11	11.27	16	6
4	4	19.75	20	19
5	23	15.22	20	8
6	29	15.24	20	10
7	6	12.83	20	8
8	29	13.59	19	1



General Comments

1. **Microstructures** Essay based questions on a range of common microstructural features. Generally reasonably well answered.
2. **Phase diagrams** A question on the phase diagram of the carbon steels. Most candidates got the main features. Marks were usually lost by not putting in temperatures and/or compositions of important reactions.
3. **Polymer synthesis** A straightforward question on methods of polymer synthesis, plus an application. Generally well answered.
4. **Intro to manufacturing** The question is about investment casting and other standard manufacturing techniques. Only 4 students answered and scored full marks. I am surprised by the fact 88% of the students avoided the question, especially because this question was somewhat close to those proposed in past prelim examinations.
5. **General thermodynamics and pV work** This question is about the basic notions of thermodynamics (open/closed system, entropy, pV work). Impressive attempt rate of 67% here. My impression is that the question is so standard and so close to the content of the lecture course that it was impossible to fail. This hypothesis is confirmed by the fact that when I changed the standard ideal gas equation into the slightly more complicated Van der Waals equation (the calculation of the pV work using the Van der Waals equation is only a tiny bit more complicated than in the other case) most students could not calculate the pV work correctly. This seems to indicate that the students do well when they are asked to learn formulas by heart, but they don't seem to be able to elaborate on what they've learned.
6. **Helmholtz equation and reaction equilibria** The question is about reaction equilibria and Gibbs energy changes of a reaction. Almost every student answered this question (85%), performing rather well on average. This question was very close to previous exam questions on the subject, therefore I am not surprised that most students did well. The first part of the question is standard bookwork and is thoroughly discussed in the lecture course.
7. **Rate equations** This question requires sketching of an Arrhenius plot, and is a standard example from the course on Kinetics. Only very few students attempted the question (18%). The question is relatively easy, therefore one possible reason for the very low attempt rate may be that Kinetics is a small 4h lecture course, and the students might have decided to drop it in order to concentrate their time on bulkier courses.
8. **Electrochemical cells** This question on electrochemical cells was very popular (85% attempt rate), similarly to Q6. The first part is standard bookwork and everybody was able to write something. In the second part some students got confused during the calculation procedure. Similarly to Q6 this question was close to previous exam questions.

General comments:
For MS3 my general comment is that the students do well predominantly in those questions which are very close to the examples discussed in the lecture courses or questions which are similar to those proposed in previous examinations. I think that this trend should be monitored closely.

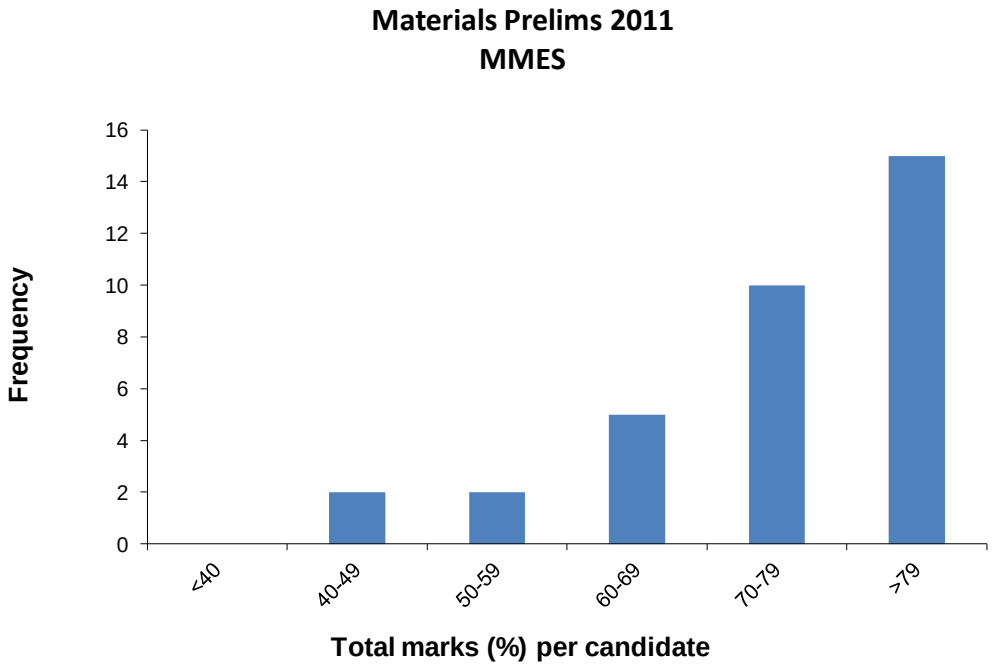
The essay based questions produced reasonable answers. It was good to see a spread of questions attempted.

Mathematics for Materials and Earth Sciences

Examiner(s): **Dr Simon Benjamin**
Candidates: **34**
Mean mark: **75.9%**
Maximum mark: **93%**
Minimum mark: **40%**

Detailed comments on the paper are as follows:

Question	No of Answers	Average Mark	Highest Mark	Lowest Mark
1	34	4.97	8	0
2	34	7.00	8	3
3	34	6.32	8	3
4	34	7.91	8	7
5	34	5.82	8	0
6	34	2.91	8	0
7	34	6.62	8	1
8	34	6.65	8	0
9	34	6.88	8	1
10	34	4.76	8	0
11	26	19.69	25	0
12	34	22.44	25	10
13	11	13.91	24	1
14	26	14.96	25	2
15	3	22.00	24	20
16	34	21.47	25	8



General Comments

Questions 1 to 10 are compulsory and represent the full range of topics taught in the first year course. Each is worth 8 marks.

Generally, the questions 1-3 relating to vectors and vector transformations were reasonably well handled. The eigenvalue question Q4 was performed almost perfectly; unsurprising as it is a completely mechanical procedure (see comment regarding Q12 below).

Questions 5-10 were generally satisfactory with the notable exception of Q6, with relatively few candidates understanding the transformation necessary to tackle the integral. However in previous years integrals have been reasonably well performed and therefore this is probably a 'blip'.

Candidates attempt four of the questions 11-16. As in previous years, almost all candidates attempted the eigenvalue question Q12 and the differential equation question Q16. These are attractive since they are "turn the handle" procedures and marks are mainly lost from slips. In a future paper it would be interesting to present candidates with an eigenvalue/eigenvector question that requires them to think outside of the standard procedure.

As in previous papers that I have marked, the question on partial differentiation (here Q13) was the least well answered of the optional questions. Candidates frequently confused some fairly basic concepts (such as order of differentiation). Perhaps the corresponding segment of the course could benefit from a review.

Overall the paper had exceptionally high marks, with a mean of 75.9%. John Woodhouse and I reviewed the paper against prior examples and did not feel that the questions were particularly easy by comparison; however it may be that there were fewer questions that demanded original thinking (versus merely the correct application of known techniques).

Examination Conventions 2010/11
Common Preliminary Examination
Materials Science and Materials, Economics & Management

The formal procedures determining the conduct of examinations are established and enforced by the University Proctors. These conventions are a guide to the examiners and candidates but the regulations set out in the Examination Regulations have precedence. The examiners are nominated by the Nominating Committee* in the Department and those nominations are submitted for approval by the Vice-Chancellor and the Proctors. In Prelims the examiners are called "moderators". Formally, moderators are independent both of the Department and of those who lecture. The paragraphs below give an indication of the conventions to which the moderators usually adhere, subject to the guidance of other bodies such as the Academic Committee in the Department, the Mathematical, Physical and Life Sciences Division, the Education Committee and the Proctors who may offer advice or make recommendations to the moderators. It must be stressed that to preserve the independence of the Moderators, candidates are not allowed to make contact directly about matters relating to the content or marking of papers. Any communication must be via the Senior Tutor of your college, who will, if he or she deems the matter of importance, contact the Proctors. The Proctors in turn communicate with the Chairman of Prelims.

(1) *Setting of papers*

The Moderators set the papers, but are advised to consult the course lecturers. The course lecturers are required to provide draft questions if so requested by the Moderators. The Prelims paper on Maths for Materials and Earth Sciences is set jointly by the Departments of Earth Sciences and Materials. There are no external examiners for Prelims.

(2) *Paper Format*

The Materials Science papers 1 - 3 comprise eight questions from which candidates must attempt five. Each question is worth 20 marks. The total marks available for each of these papers are 100. The Prelims paper on Maths for Materials and Earth Sciences consists of two sections, candidates are required to answer all questions in Part A and 4 from Part B.

(3) *Marking of papers*

For prelims double marking is not necessarily double "blind" marking. It is usually considered sufficient for the second marker merely to check the first marker's marks.

(4) *Marking of course practicals and crystallography classes*

First year practicals are assessed regularly by senior demonstrators in the teaching laboratory. The work done for crystallography classes is assessed by the Crystallography Class Organiser(s). The assessed work for both practicals and crystallography classes constitutes the Coursework Paper. Each of the five papers in Prelims, comprising the 3 Materials Science papers, Maths for Materials and Earth Sciences, and the Coursework Paper, carry equal total marks. Satisfactory performance in the practical work is defined in the MS/MEM Prelims Handbook. Penalties for late submission of practical reports are set out in this handbook.

(5) *Classification*

The pass/fail border is at 40%. Distinctions are usually awarded for average marks of at least 70%. Failure in one or two written papers may be compensated by better performance in other written papers provided the candidate obtains at least 35% on the failed paper. Failure of three papers precludes compensation. Where compensation is permitted, only those marks in excess of 40 on a passed paper may be used towards compensation and normally this shall be at a rate of 3 marks to every deficit mark to be compensated.
For example, if two written papers are passed and marks of 36% and 38% are obtained in the remaining two written papers then the total for the four written papers must be at least 172 marks {36 + 38 + 2x40 + $\underline{\mathbf{3}}\times(4+2)$} for both failures to be compensated

The Moderators have the authority to use their discretion and consider each case on its merit.

* for 2010-11 the Nominating Committee comprises Dr Czernuszka (Chair), Professor Grovenor and Dr Taylor.

(6) *Failure of one or more Papers*

Failure of the coursework paper will normally constitute failure of the Preliminary Examination. Materials coursework cannot normally be retaken. Exceptionally a candidate who has failed the coursework may be permitted jointly by the Moderators and the candidate's college to retake the entire academic year.

Candidates who pass the coursework paper and fail 1 or 2 written papers will be asked to resit only those written papers.

Candidates who pass the coursework paper and fail more than 2 written papers will be asked to resit all 4 written papers.

The resits usually take place in September. To pass a resit paper the candidate must obtain at least 40%, and normally no compensation is allowed. There is only one opportunity to resit the examination, and failure to pass a resit examination normally results in the candidate being prevented from continuing to Part I. Exceptionally, a college may allow a student to go down for a year and take Prelims a second time the following June.

The Moderators have the authority to use their discretion and consider each case on its merit.

REPORT ON FINAL HONOURS SCHOOL OF MATERIALS SCIENCE, PART I EXAMINATION

Part I

A. STATISTICS

(1) **Numbers and percentages in each category**

The Part I Examination in Materials Science is unclassified. No distinctions are awarded.

Category	Number			Percentage		
	2010/11	2009/10	2008/09	2010/11	2009/10	2008/09
Distinction	n/a	n/a	n/a	n/a	n/a	n/a
Pass	21	24	22	100	100	100
Fail	0	0	0	0	0	0

(2) **If vivas are used**
The Board of Examiners decided at the start of the examination process that Part I students would not be given vivas. Students were informed of this by e-mail on 8 February 2011 and again on 20 April 2011. The information was also made available on the Department website from 20 April 2011.

(3) **Marking of scripts**
All scripts were double-blind marked by the Examiners and Assessors. The full procedures are described in the Examination Conventions.

B. NEW EXAMINING METHODS AND PROCEDURES

Each marker was required to award only integer marks for each question, following recommendations from the external examiners. The two marks awarded for each question were then averaged. These averaged marks were then summed to give a total for the entire paper, rounding **up** to the next integer if the sum was not an integer. Similarly, for each element of coursework, any non-integer final mark was rounded **up** to the next integer. It is recommended that this now becomes standard practice. The format of the Options papers differed from previous years; hence a specimen of Options Paper 1 was issued to candidates earlier in the year.

C. CHANGES IN EXAMINING METHODS, PROCEDURES AND CONVENTIONS WHICH THE EXAMINERS WOULD WISH THE FACULTY AND THE DIVISIONAL BOARD TO CONSIDER

None this year

D. EXAMINATION CONVENTIONS

The previous year's Examination Conventions were included in the Course Handbook that was distributed to all candidates in hard-copy and was also made available on the Departmental website, to which candidates' attention was drawn by e-mail. The current year's Conventions were put on the Departmental website and sent electronically, along with other information in a letter from the Chair of Examiners, on 21 February 2011 and again on 20 April 2011 to all candidates. The Examination Conventions were agreed by the Board of Examiners and the Department's Academic Committee.

Part II

A. GENERAL COMMENTS ON THE EXAMINATION

There were 21 candidates for the examination, and all were awarded Honours. The examination consisted of 6 written papers plus coursework that included a team design project, a business plan, industrial visit reports and practical work carried out during the 2nd year. Four candidates opted to take the language option. This option replaced the business plan. In addition, candidates completed further coursework in the 3rd year in the form of either a module on Materials Characterisation (12 candidates) or one on Materials Modelling (8 candidates). One candidate who withdrew from the Part I Examination last year returned this year to take only the written papers, and was not required to redo the coursework components of the exam.

Each written paper lasted 3 hours. For the General papers, candidates were required to answer 5 questions out of 8, as in previous years. For Options Paper 1, candidates were offered 10 questions in 5 sections each containing 2 questions; candidates were required to answer 4 questions, 1 from each of three sections and 1 from any of the same three sections. For Options Paper 2, candidates were offered 12 questions in 6 sections each containing 2 questions; candidates were required to answer 4 questions, 1 from each of three sections and 1 from any of the same three sections.

In 2010/11 there was one returning candidate who was examined under the 2008 regulations. This required the examiners to set individual Options papers 1 and 2 for this candidate with modified instructions and questions appropriate to the 2009/10 Part 1 courses as below:

The candidate was offered 9 questions in 3 sections each containing 3 questions; the candidate was required to answer 3 questions, 2 from one section and 1 from either of the remaining sections.

Team design projects were marked by two Examiners, one of whom was the Chairman. Teams were marked as groups. The allocation of bonus or penalty marks is permitted under the Conventions, and was applied by the examiners.

The business plans were marked by an Assessor from Isis Innovation and an Assessor appointed to represent the Faculty of Materials, again with teams being marked as a group.

Candidates' work on the two coursework modules was marked either by 2 Assessors (modelling) or 2 of 3 Assessors (characterisation).

Reports for each of the Industrial Visits were assessed as pass/fail by the Industrial Visits Organiser, appointed as an Assessor.

The overall mean mark for Part I was at the lower end of the 2(i) band. Excluding the marks of candidates who were unwell during a particular paper, the mean marks over all MS and MEM candidates for 3 of the 6 written papers in the examination were in the 2(i) band (60-69%); these papers did not need to be considered for scaling. The mean marks for the remaining 3 written papers were in the 2(ii) band (50-59%) and, after careful consideration, the examiners scaled paper GP3 by adding 5% points to each candidate's overall mark for that paper.

B. EQUAL OPPORTUNITIES ISSUES AND BREAKDOWN OF THE RESULTS BY GENDER

Insofar as can be judged from the small sample size, the performance of male and female candidates was not significantly different. Both male and female groups of candidates performed better in the coursework than in written examinations.

Where approved by the Proctors, candidates were allowed (i) extra time on account of dyslexia, and/or (ii) other special arrangements. These allowances seemed satisfactory.

	Overall mark		Written Examinations		Coursework	
mark (%)	Male	Female	Male	Female	Male	Female
30-40	-	-	1	-	-	-
40–50	1	1	1	2	-	-
50–60	1	2	3	3	-	-
60–70	7	4	4	4	3	3
70–80	1	4	1	2	7	8
80–90	-	-	-	-	-	-
Totals	10	11	10	11	10	11

C. DETAILED NUMBERS ON CANDIDATES' PERFORMANCE IN EACH PART OF THE EXAMINATION

All candidates took the same papers for the whole examination, in that there were no optional written papers, notwithstanding the requirements given above for the returning candidate.

D. COMMENTS ON PAPERS AND INDIVIDUAL QUESTIONS

Detailed comments on the written examination papers and overall candidates' performance on individual questions are attached

E. COMMENTS ON THE PERFORMANCE OF IDENTIFIABLE INDIVIDUALS AND OTHER MATERIALS WHICH WOULD USUALLY BE TREATED AS RESERVED BUSINESS

One medical certificate was received and considered for illness during three of the General Papers, for which allowance was made.

F. NAMES OF MEMBERS OF THE BOARD OF EXAMINERS

Prof. A.I. Kirkland (Chairman)	Prof. C.R.M. Grovenor
Dr M.R. Castell	Dr R.I. Todd
Prof. P.S. Grant	Dr P.R. Wilshaw
Prof. J. Binner (external)	Prof. M. Rainforth (external)

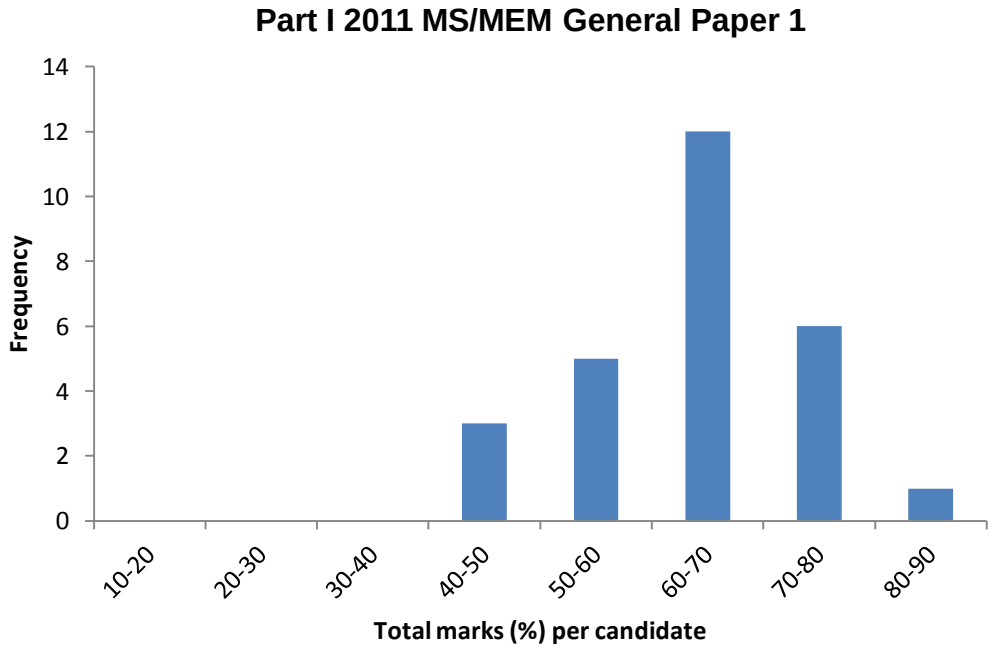
Attachments: Examination Conventions 2010/11 Final Honours School Materials Science
Comments on General Paper 1
Comments on General Paper 2
Comments on General Paper 3
Comments on General Paper 4
Comments on Materials Options Paper 1
Comments on Materials Options Paper 2

General Paper 1 – Structure and Transformations

Examiner: **Prof. Patrick Grant**
Candidates: **26 (20 MS / 6 MEM)**
Mean mark: **65.35%**
Maximum mark: **85%**
Minimum mark: **44%**

Detailed comments on the paper are as follows:

Question	No of Answers	Average Mark	Highest Mark	Lowest Mark	Topic
1	19	13.29	19.5	1.5	Powder Processing
2	10	12.55	15	9.5	Processing,properties and characterization of polymers
3	11	10.86	14	5.5	Corrosion
4	23	13.78	19.5	8.5	Corrosion inhibitors
5	24	13.98	17	6	Surfaces and interfaces
6	7	9.43	12.5	6	Phase diagram & solidification
7	16	13.19	18.5	1.5	Binary phase diagrams and solidification
8	20	13.25	19	5.5	Diffusion



General Comments:

Overview: the paper presented a spread of marks consistent with the examination guidelines and a mean in the mid-upper second band. Consequently no scaling was required, and the overall spread of attempted answers suggested the paper was well-balanced in terms of subject scope and difficulty.

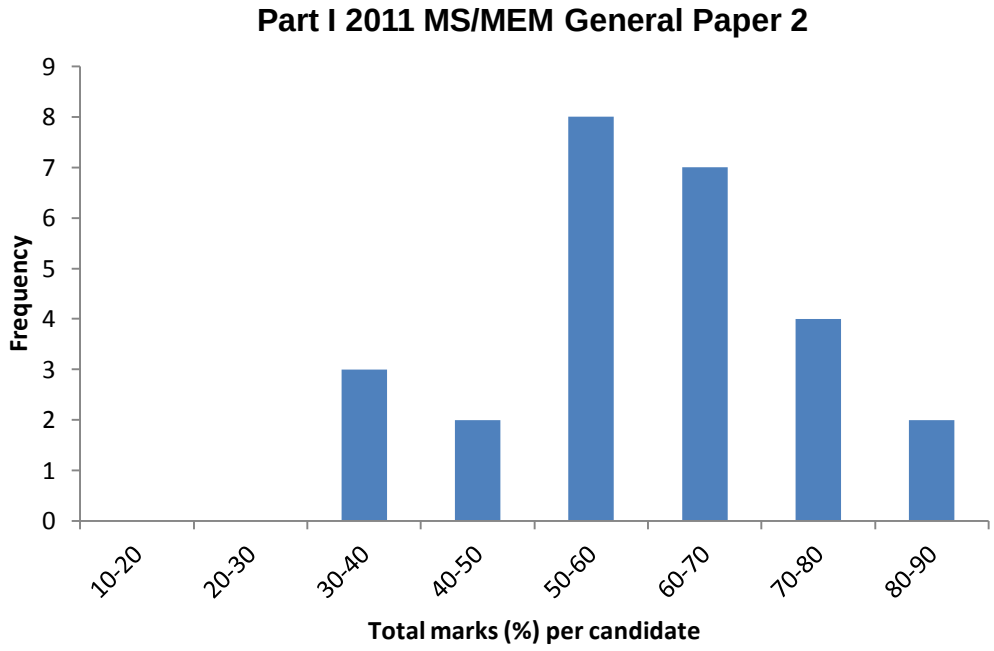
1. A powder processing question on a common examination subject with no special features or complexity - consequently, this was a popular question. The answer required was essentially descriptive although quite long; comprehensive use of diagrams was required for the highest marks. Generated a broad spread of marks but with a sensible mean.
2. Straightforward question on the processing, structure and properties of polymers, with early parts drawn carefully from the lecture notes. Candidates were unable to score the very highest marks as the final part of the question on the evolution of microstructure as a function of heating-cooling cycle required a modest extension and application of understanding.
3. Corrosion protection question requiring the candidate to make qualitative assessments of the most corrosion-prone of a several pairs of materials. Essentially a descriptive answer was required, but with the use of Evans, Pourbaix, etc diagrams. Overall the question made straightforward use of lecture information, but with a slightly unusual presentation. Of average popularity but lower than average scores; many candidates were unable to choose – and provide supporting arguments – wisely.
4. Corrosion inhibition. Required a series of long descriptive answers covering many scenarios. Popular and generally well-answered although several answers lacked structure and were “write everything you know about corrosion” in style. Allowed well-prepared candidates to score highly.
5. Surfaces and interfaces. A long question broken into several parts of low value, gradually building up in complexity and depth. A very popular question overall with very familiar material questioned in a clear manner, and yielding the highest average score. The question was however still difficult enough to fox less-able candidates in the later parts.
6. Solidification and ternary phase diagrams. A relatively simple opening on interfaces moving to probe correct reading of ternary diagrams, culminating in a near fiendish requirement to work out likely solidification paths from a real as–solidified ternary microstructure. The most unpopular question, with students perhaps put off by the use of real microstructures! The first part of the question on solid-liquid interfaces was generally well answered by the few who attempted it; latter parts were abandoned readily.
7. Solidification and phase diagrams. Very straightforward question on basics of binary solidification, drawing heavily on lectures notes and second year practicals. Quite popular and generally well answered.
8. Diffusion. Drew heavily on the lecture notes for the early parts and required some basic and core derivations, generally very well-executed. Later parts slightly extended beyond the lectures notes and were well-attempted, although with only a few completely correct answers.

General Paper 2 – Electronic Properties of Materials

Examiner: **Dr Peter Wilshaw**
Candidates: **26 (20 MS / 6 MEM)**
Mean mark: **60.20%**
Maximum mark: **83%**
Minimum mark: **35%**

Detailed comments on the paper are as follows:

Question	No of Answers	Average Mark	Highest Mark	Lowest Mark	Topic
1	11	10.59	16.5	4.5	Quantum Mechanics
2	23	12.70	18	4.5	Statistical Mechanics
3	20	12.40	18.5	5.5	Semiconductors
4	7	11.50	13.5	8	Electronic Properties of Materials
5	22	11.89	16	6.5	Tensors
6	15	11.13	20	2	Magnetic Properties of Materials
7	8	15.38	19	1	Electronic Structure
8	19	11.00	16.5	4.5	Electronic Structure



General Comments:

The answers produced were often very untidy with poor handwriting. This sloppy layout led to careless slips which could have been avoided with neater and more careful presentation of the work.

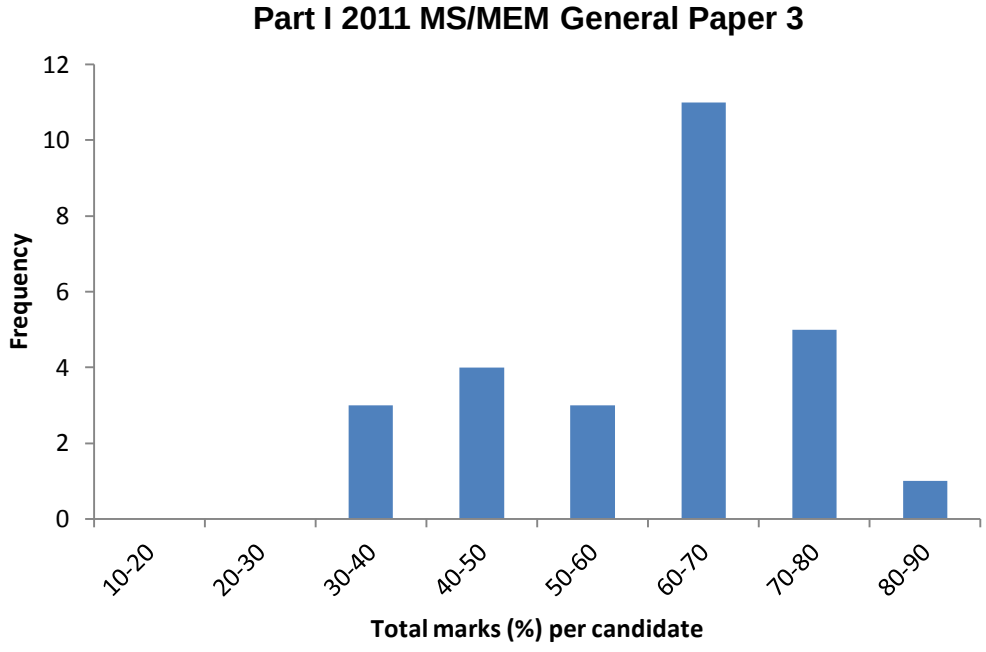
1. This question was almost entirely about the hydrogen atom. Candidates would have scored much better if they had been confident on the following relatively straightforward points: quantisation of L is a key feature of the Bohr model, integration by parts, and the meaning of the term “expectation value”
2. This statistical mechanics question, mainly about the occupation of a two level system, was the most popular on the paper and generally received good marks. However, a common misconception was that bosons are always massless. Photons have zero rest mass but plenty of other types of bosons do have rest mass. The final part about the relative magnitudes of specific heat of a free electron gas and an ideal monatomic gas was surprisingly badly answered.
3. Another popular and generally well answered question on semiconductors. However, some candidates were weak on simple concepts such as phonon and ionised impurity scattering effects on carrier mobility. The Gunn Effect was either well understood (gaining good marks) or apparently not at all!
4. An unpopular question on loss mechanisms in dielectrics. The question was mainly answered ok except for the section on the ratio of electronic to ionic polarisation in silicon dioxide. This was difficult but was similar to a tutorial question. Candidates are reminded that methods for solution of problems required for tutorial problems may appear in Part I examinations.
5. This popular question on tensors was well answered by most candidates. As always for this type of question marks were lost by careless mistakes but also notable were the number of candidates who failed to realise that compressive and tensile stresses have opposite signs.
6. A generally well answered question on the temperature dependence of magnetic susceptibility. Attempted by a few candidates who seemed to be guessing their answers but otherwise well done.
7. An unpopular question on tight binding theory with generally extremely high marks. This was a rather straightforward question on what is often perceived to be a difficult topic. It is clear that candidates who decided to give it a go mainly were able to do it rather easily and it should, perhaps, have been attempted by more candidates.
8. A popular question on 2DEG. There was something of a bimodal split in marks between those candidates who knew how to derive the Fermi Energy and density of states using free electron theory and those who didn’t. These standard book work derivations should have been understood by nearly all candidates.

General Paper 3 – Mechanical Properties

Examiner: **Dr Richard Todd**
Candidates: **26 (20 MS / 6 MEM)**
Mean mark: **60.36%**
Maximum mark: **81%**
Minimum mark: **34%**

Detailed comments on the paper are as follows:

Question	No of Answers	Average Mark	Highest Mark	Lowest Mark	Topic
1	8	12.25	18	7	Elasticity
2	14	10.57	17.5	0	Fracture Mechanics
3	16	9.75	14	3.5	Dislocation structures
4	20	14.78	19	9.5	Polymers
5	15	10.83	17.5	2	Rolling
6	16	8.25	14.5	2.5	Dissociation of dislocations
7	16	11.66	17	7	Solid solution hardening
8	20	10.10	17.5	2	Failure of long fibre composites



General Comments:

Overview: A few candidates scored high marks on this paper in which most of the questions were highly original but also straightforward for those who fully understood the subject. Whilst the high marks are encouraging, there was a substantial proportion of students on each question who did not understand the basics of the subject very well and it is recommended that tutors and lecturers take into account the large range of material in GP3 when teaching the relevant courses.

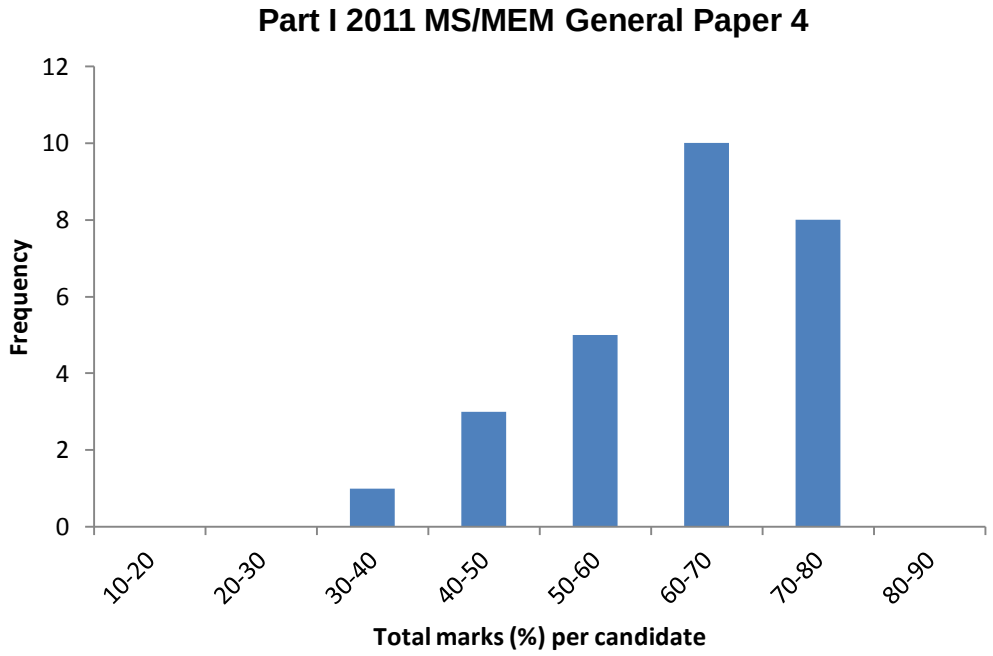
1. Some good answers to this question on elasticity. Some candidates had problems in confusing cylindrical and spherical polar co-ordinates, losing sight of what variable to differentiate with respect to, partial differentials.
2. A wide spread of marks on this question on fracture mechanics. A surprisingly high number of marks was dropped on part (a), which was very basic bookwork. Many candidates tried to work out the derivation based on the answer, which was given in the question. This method was rarely successful. The level of basic geometry in calculating the area associated with an increment of crack growth in the triangular cross section was also disappointing. Nonetheless, some good marks were obtained by the best candidates.
3. Part (a), on typical dislocation structures, was done moderately well on the whole. Part (b) relied on fitting some basic empirical expressions to results concerning fatigue and then using them to predict the outcome of other testing conditions. This was disappointingly done by many. Many candidates either did not know which expression to use or did not understand how to use it. Other candidates fell down on simple algebraic manipulation.
4. A straightforward and popular question on polymers which was very well done by many candidates. Some candidates had difficulty in describing the mechanism of loss around T_g.
5. A wide spread of marks on this question on rolling, with several high marks. The discursive part (a) showed that some candidates did not appreciate the similarities between rolling and forging, and even some of those who did, did not understand the original of the friction hill. The standard derivation in part (b) was well done. Part (c) was well done by many although some candidates did not appreciate the link between rolling pressure and front/back tension through Tresca's yield criterion.
6. The question was about the dissociation of dislocations and centred on a particular example shown in a high resolution electron micrograph. The principles of dissociation (Part (a)) were generally well understood. Part (b) asked about the specific dissociation of the micrograph. Some candidates obtained full marks here, but others lost marks because the Burgers vectors suggests did not lie in the slip plane. In parts (c) and (d) many candidates gained a few marks for approximate or general answers but no candidate was able to solve the specific problem completely.
7. A straightforward question on solid solution hardening which was generally well done.
8. Question on failure of long fibre composites with some good answers to the qualitative part (a) on the possible failure modes. Some candidates obtained good marks on part (b) which asked for a derivation of the condition for one failure mode giving way to another but, as with q. 2, many candidates tried to work out the derivation backwards because the answer was given in the question and again few of these candidates were able to come up with the correct, forwards derivation using this approach.

General Paper 4 – Engineering Applications of Materials

Examiner: **Professor Angus Kirkland**
Candidates: **27 (21 MS / 6 MEM)**
Mean mark: **62.48%**
Maximum mark: **78%**
Minimum mark: **38%**

Detailed comments on the paper are as follows:

Question	No of Answers	Average Mark	Highest Mark	Lowest Mark	Topic
1	12	10.58	14.5	1.5	Microstructural Characterisation
2	19	10.21	15.5	1	Microstructural Characterisation
3	10	9.45	14	6	Polymers
4	12	12.50	16	8	Semiconductor Devices
5	19	12.95	18	7.5	Engineering Alloys
6	20	12.23	15.5	7	Engineering Alloys
7	18	13.78	19.5	8	Ionic Oxides
8	25	15.04	19	10.5	ceramics



General Comments:

1. A reasonably popular question, generally well answered, although few students achieved very high marks. The concept of the phase problem was not well understood. Most students were able to describe phase contrast imaging and interferometry and were also able to describe how phase contrast is achieved in the TEM. Very few students were able to calculate the step height required in part (d).
2. A popular question generally well answered. Almost all students were able to describe how magnification is generated in the SEM, although few could explain the origin of a useful maximum magnification. In part (b) almost all answers described the operation of the STM well. No student was able to estimate the work function required in part (b) ii. The explanation of the features in the images in part (b) iii was often confused.
3. Few students attempted this question and the attempts were generally mediocre as in 2009-10. Most answers to part (a) were poorly structured and failed to address the key points required. In part (b) many students did not clearly identify the advantages and disadvantages of the addition conducting additives. Part (c) was generally well answered but some students did not make the relationship of mechanism to a thermal switch.
4. A relatively popular question, generally well answered. The answers to part (a) gave good descriptions of the operation of a double heterostructure stripe laser diode. Part(b) was also well answered but very few candidates were able estimate the quaternary composition required in part (b) ii and were vague in their description of the commercial importance required in part (b) iv.
5. A very popular question which was well answered, with a few students achieving near maximum marks. Parts (a) and (b) were answered well by almost all students. The effects of Mo addition and their practical benefits were clearly identified by the better students but some failed to describe the mechanism for modification of the TTT curve and did not identify more than one practical benefit.
6. The second most popular question, not unsurprisingly showing a strong correlation with candidates who attempted Q5. Parts (a) and (b) were very well answered. Part (c) differentiated the strong and weak candidates where the former clearly identified the alternative candidate materials and their advantages / disadvantages but the latter either failed to identify the full range of alternative materials and / or did not clearly define the advantages / disadvantages.
7. Another very popular question which produced a narrow range of relatively high marks. Almost all candidates described Schottky and Frenkel disorder and identified the lattice conditions likely to favour these. Marks were lost in part (c) where many candidates were not able to derive the required expression.
8. This question was the most popular in GP4 and also produced the highest average mark. The weakest section was part (a) were the answers were often unstructured. Part (b) was exceptionally well answered and many candidates achieved full marks. In part (c) marks were lost by candidates who did not provide clear explanations for each of the methods defined in part (b).

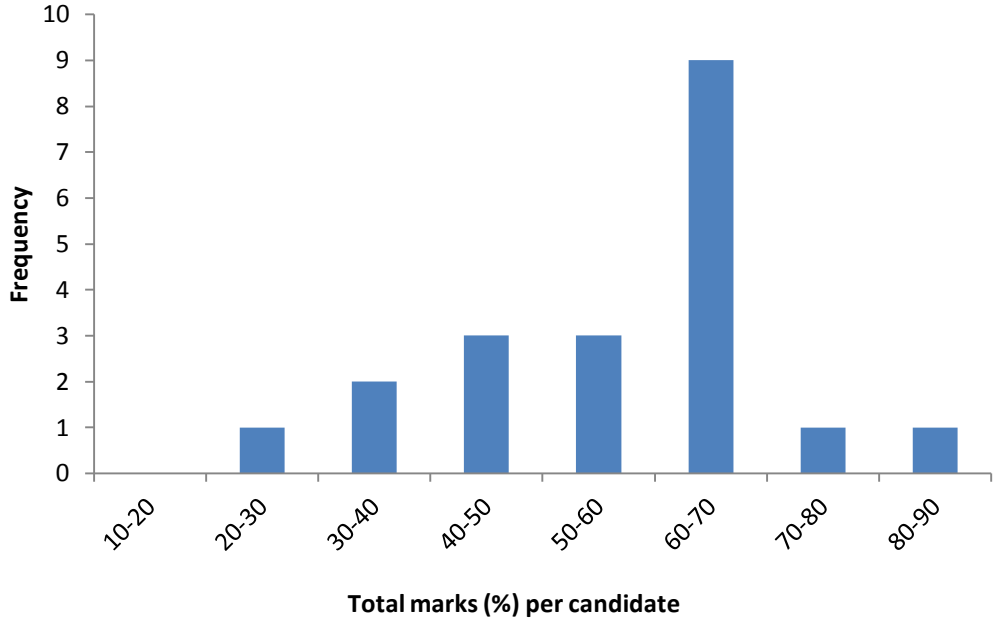
Materials Options Paper 1

Examiner: **Dr Martin Castell**
Candidates: **20 (MS)**
Mean mark: **58.05%**
Maximum mark: **83%**
Minimum mark: **30%**

Detailed comments on the paper are as follows:

Question	No of Answers	Average Mark	Highest Mark	Lowest Mark	Topic
1	8	14.31	21.5	2.5	Materials & Devices for Optics & Optoelectronics
2	13	16.54	22.5	4.5	Materials & Devices for Optics & Optoelectronics
3	7	12.29	18	2.5	Strength & Failure of Materials
4	10	14.95	20	5.5	Strength & Failure of Materials
5	0	n/a	n/a	n/a	Nanomaterials
6	12	14.33	20.5	5.5	Nanomaterials
7	4	18.75	24	13	Prediction of Materials Properties
8	1	20.50	20.5	20.5	Prediction of Materials Properties
9	15	11.83	16.5	6.5	Engineering Ceramics: Synthesis & Properties
10	10	14.75	19	9	Engineering Ceramics: Synthesis & Properties

Part I 2011 MS Option Paper 1



General Comments

Overview: The mean mark of the paper was 58%, which is below the target mid 2.1 range. The low mean was in part due to some particularly weak performances which dragged it down, as demonstrated by the median mark which was closer to target at 62%. The broad spread of marks across the range from 30% to 83% indicates that the exam was good at being able to distinguish between the candidates' abilities. However, given that a quarter of the candidates were only able to achieve a 3rd class performance or less it is possible to argue that the questions should have had a shallower grading structure to benefit the weaker candidates.

1. This question on electromagnetic waves and their interaction with materials had a broad spread of answers with only one candidate scoring particularly poorly. The majority of the answers were good, but there was a particular difficulty with the wave mechanics aspect of one of the sections. Some of the candidates showed a good knowledge of relatively new ideas (meta-materials).

2. This was a popular question on photovoltaics that was generally well done. The spread of marks was healthy with only one candidate scoring low marks. One section appeared to be mathematically more problematic than the other parts.

1. Both the "Materials & Devices for Optics & Optoelectronics" questions (1 and 2) appear to have been set well to attain a desirable distribution of answers.

2. This question was on crack propagation. The answers were generally good, with only one poor one. All candidates made at least one serious error regarding the maths in the second section. There were also some errors due to carelessness in copying equations.

3. A reasonably popular question on the mechanical properties of steels with a relatively tight spread of answers.

4. There were no attempts on the theoretical nanomaterials question. This is possibly due to the mathematical nature of the question that might put candidates off.

5. The other nanomaterials question was reasonably popular with a broad range of answers due to the good grading structure of the question.

6. Not a popular question but well answered by those that attempted it.

7. Only one candidate answered this question, possibly due to its slightly lateral nature, but that candidate scored well.

8. Neither of the "Prediction of Materials Properties" questions were popular, possibly due to the mathematical nature of the course, however the candidates that did attempt these questions were rewarded with the highest marks on average.

9. The most popular question was on crack propagation in ceramics. This is possibly because of a degree of overlap between the second year fracture course and the third year ceramics course. Ironically, the average mark was the lowest of all the questions. In general this was a straightforward question that required some lateral thinking in parts a and c, and some of the candidates struggled with this.

10. A fairly standard question on ceramics synthesis and processing with a tight range of marks.

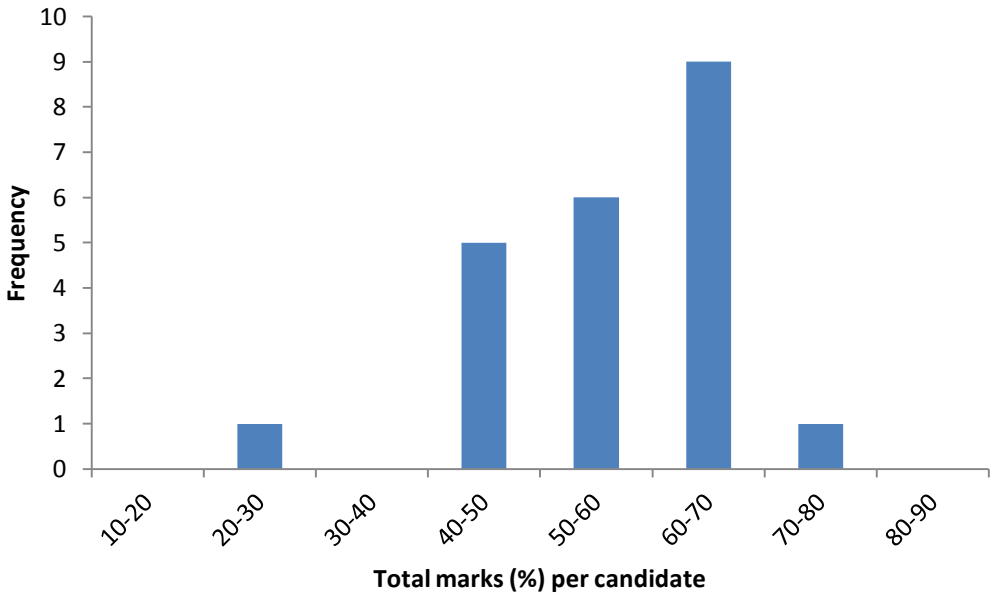
Materials Options Paper 2

Examiner: **Prof Chris Grovenor**
Candidates: **22 (20 MS / 2 MEM)**
Mean mark: **57.45%**
Maximum mark: **76%**
Minimum mark: **28%**

Detailed comments on the paper are as follows:

Question	No of Answers	Average Mark	Highest Mark	Lowest Mark	Topic
1	6	9.08	12	1	Microstructures in eng. alloys
2	7	14.79	20.5	6.5	Ordering, and uses of beta Ti alloys
3	12	15.17	19	3.5	Ni alloy turbine blades
4	5	13.50	17	11.5	Fabrication of components
5	4	11.88	17.5	7	Magnetoresistive devices
6	8	12.56	16.5	9	Silicon crystal growth
7	9	14.67	18.5	11.5	Bioreactivity and drug delivery
8	10	16.60	21.5	10.5	THR materials and fixation
9	5	12.10	14.5	9.5	Polymer based PV devices
10	2	14.25	16	12.5	Analysing polymers/PET life cycle
11	7	15.71	19.5	7	Nuclear fuel cycle
12	13	15.85	19.5	10	Alternative power generation

2011 Part I MS/Part II MEM Option Paper 2



General Comments

The paper average of 57.5% is rather below what the examiners were aiming at, although the fact that one candidate was able to score 76% suggests that it was not inappropriately difficult. On all questions except Q1 the average score was above 40%, and the highest average mark was 66.4 on question 8. The questions required mostly discursive essay type answers, and the most common reason for poor marks was simply a lack of enough specific, relevant information.

Specific Comments

ADVANCED ENGINEERING ALLOYS AND COMPOSITES

Question 1. Microstructures in engineering alloys.

A relatively unpopular and poorly done question. Even the introductory section on basic definitions of key concepts in martensitic transformations seemed beyond the students, and the TiAl and maraging steel micrographs only elicited general and vague answers with very little detail of the kind explicitly requested.

Question 2. Ordering, and uses of beta Ti alloys

Several candidates showed good recall of the equations governing the thermodynamics of ordering, but the amount of detail they were able to contribute to a discussion of the manufacture, microstructure and applications of beta Ti alloys was very limited.

ADVANCED MANUFACTURE WITH METALS AND ALLOYS

Question 3. Solidification of Ni alloy turbine blades

A relatively popular question, with one of the better average scores. Candidates had a reasonable grasp of the processes involved in controlling nucleation and growth to achieve single crystal blades, including in the better scripts a description of constitutional supercooling. The discussion of thermal barrier coatings varied from the non-existent to quite detailed and informed answers.

Question 4. Fabrication of metallic components

An essay question that was attempted by few candidates and no one produced a really good answer. The discussion of casting, extruding and welding techniques was mostly superficial and lacking in detail, and in particular it was rarely obvious that the candidates understood that a manufacturing process needs to be thought about as a whole, rather than as a single operation.

DEVICES, MEMORY AND STORAGE

Question 5. Magnetoresistive devices

Only 4 answers to this very detailed question on magnetoresistance phenomena and the kind of devices that can exploit it, but at least one candidate achieved a respectable mark. Other candidates clearly had rather little understanding of the subject at the level of detail that was required.

Question 6. Silicon crystal growth

Eight answers to a standard question on the growth of large Si crystals by the Czochralski or the float zone process. While several candidates knew the basics of the growth processes, they were unable with any confidence to select material from the two processes for the application areas specified, and knew rather little about COP defects. The calculation was a simple one once the concentrations had been correctly identified from the question, but several candidates did not do this correctly.

BIOMATERIALS AND NATURAL MATERIALS

Question 7. Bioreactivity and drug delivery

Relatively popular question on a topic where a lot of students attend the lectures. Almost all the answers showed some understanding of the key issues, but no one answer could bring together all the information needed to generate a really good mark. The main failing was in giving insufficient information on specific materials choices for the different applications.

Question 8. THR materials and fixation

Another popular question, on hip replacement materials, and with the best overall average on this paper. Almost all the answers showed understanding of the components and materials involved, and some were

extremely complete and well argued. The most common reason for losing marks was, as for Q7, failing to give sufficient information on specific materials choices for the different applications.

ADVANCED POLYMERS

Question 9. Polymer based PV devices

5 attempts at this question from the Advanced Polymers course, none of which scored better than 14.5/25. There were few convincing descriptions of the key morphological issues in a P3HT-PCBM solar cell, and only generic descriptions of spinodal decomposition in this system rather than showing an understanding of the asymmetry of the phase diagram.

Question 10. Characterisation of polymers and PET life cycle

Only two attempts at this question on diffraction analysis of polymers and the PET life cycle, both showing some understanding. In both cases it was the lack of detail that limited the marks awarded, especially in the differences between X-ray and neutron scattering from polymers and the value of deuteration in neutron experiments, and in the full breadth of the PET life cycle.

MATERIALS FOR ENERGY (New course)

Question 11. Nuclear fuel cycle

Several good answers to a question on the nuclear fuel cycle and components in different designs of reactor. The candidates were not able to accurately select materials for cladding, control rods and moderators, but were able to describe reprocessing strategies and to classify waste with much more confidence.

Question 12. Alternative power generation

A very popular question on wind power and fuel cells that also produced some good scripts and a high average mark. The section on fuel cells was fairly straightforward, but the answers were confident and comprehensive. The section on materials aspects of wind generators was not done as well, but a good deal of understanding of the issues was demonstrated.

REPORT ON FINAL HONOURS SCHOOL OF MATERIALS SCIENCE, PART II EXAMINATION

Part I

A. STATISTICS

(1) **Numbers and percentages in each category**

Candidates are given a mark on the basis of their performance in the Part II examination and then given a classification on the basis of their performance across Part I and Part II.

Class	Number			Percentage (%)		
	2010/11	2009/10	2008/09	2010/11	2009/10	2008/09
I	9	6	11	39.1	26.1	45.8
II.I	8	14	10	34.8	61.9	41.7
II.II	6	3	3	26.1	13.0	12.5
III	0	0	0	0	0	0
Pass	0	0	0	0	0	0
Fail	0	0	0	0	0	0
Total	23	23	24	-	-	-

(2) **The use of vivas**
The Part II examination in Materials Science consists only of a research project, for which a thesis not exceeding 15,000 words, or 120 pages, is produced. Each thesis was read by two internal examiners and one external and the final thesis mark was then agreed. All candidates were given a viva but numerical marks are not given for viva performance. The viva was used to clarify points of detail and to ensure that the thesis presented has been prepared by the candidate being examined.

(3) **Marking of theses**
All theses were double blind marked by two internal examiners, and read by one external examiner. (Due to the small number of candidates, which makes it easy to identify who is working on a particular research topic, anonymous marking is not possible.) Provisional marks were exchanged in advance of the viva, to allow a brief discussion of differences of assessment, which if necessary could be explored further during the viva. Following the viva, a final agreed mark was decided between the three relevant examiners.

B. NEW EXAMINING METHODS AND PROCEDURES

None this year.

C. CHANGES IN EXAMINING METHODS, PROCEDURES AND CONVENTIONS WHICH THE EXAMINERS WOULD WISH THE FACULTY AND THE DIVISIONAL BOARD TO CONSIDER

None this year.

D. EXAMINATION CONVENTIONS

The previous year's Examination Conventions were included in the Course Handbook that was distributed to all candidates in hard-copy and was also made available on the Departmental website, to which candidates' attention was drawn by e-mail. The current year's Conventions (2011, attached) were put on the Departmental website and sent electronically on 1 March 2011 to all candidates. The Examination Conventions were assessed by the Board of Examiners and the Department's Academic Committee.

Part II

A. GENERAL COMMENTS ON THE EXAMINATION

There were 24 candidates for the examination, although one withdrew due to illness; the remaining 23 were all awarded Honours. The examination required the candidates to submit a thesis (maximum 15,000 words) on a research project carried out by candidates during the year, usually in the Department of Materials. Candidates were then given a 25 minute viva, during which they were asked detailed questions on their research work.

The theses were generally of a very high quality, and the candidates were able to explain their work well in the vivas. As usual, in some cases the vivas became short but in-depth scientific discussions with the candidates. The marks for the Part II examination ranged from 40% to 82%, with an overall mean mark almost in the middle of the 2i range. The external Examiners played a crucial role in deciding the final marks for the candidates, and the Chairman would like to express his thanks to both of them for their hard work in reading so many Part II theses and contributing greatly to the vivas.

B. EQUAL OPPORTUNITIES ISSUES AND BREAKDOWN OF THE RESULTS BY GENDER

Insofar as can be judged from the small sample size, the performance of male and female candidates was not significantly different.

If necessary, where approved by the Proctors, the Examiners took into account the following: (i) the impact of dyslexia and other specific learning difficulties, (ii) use of appropriate English-Foreign language dictionaries, and/or (iii) other special arrangements. These allowances seemed satisfactory.

	Overall mark		Part 2 Project		Part I Mark	
mark (%)	Male	Female	Male	Female	Male	Female
40–50	-	[redacted]	1	[redacted]	-	[redacted]
50–60	4	[redacted]	2	[redacted]	5	[redacted]
60–70	9	[redacted]	9	[redacted]	6	[redacted]
70–80	4	[redacted]	4	[redacted]	6	[redacted]
80–90	1	[redacted]	2	[redacted]	1	[redacted]
Totals	18	5	18	5	18	5

C. DETAILED NUMBERS ON CANDIDATES' PERFORMANCE IN EACH PART OF THE EXAMINATION

All candidates took the same examination, producing a thesis and attending a viva. The statistics on the final marks for both Part I (2010) and Part II for these candidates is given above.

D. COMMENTS ON PAPERS AND INDIVIDUAL QUESTIONS

Not relevant for this examination.

E. COMMENTS ON THE PERFORMANCE OF IDENTIFIABLE INDIVIDUALS AND OTHER MATERIALS WHICH WOULD USUALLY BE TREATED AS RESERVED BUSINESS

None this year.

F. NAMES OF MEMBERS OF THE BOARD OF EXAMINERS

Prof. A.I. Kirkland (Chairman)	Prof. C.R.M. Grovenor
Dr M.R. Castell	Dr R.I. Todd
Prof. P.S. Grant	Dr P.R. Wilshaw
Prof. J. Binner (external)	Prof. M. Rainforth (external)

Examination Conventions 2010/11
Final Honours School
Materials Science

1. INTRODUCTION

The formal procedures determining the conduct of examinations are established and enforced by the University Proctors. These conventions are a guide to the examiners and candidates but the regulations set out in the Examination Regulations have precedence. The examiners are nominated by the Nominating Committee* in the Department and those nominations are submitted for approval by the Vice-Chancellor and the Proctors. Formally, examiners are independent of the Department and of those who lecture courses. However, for written papers on Materials Science in Part I examiners are expected to consult with course lecturers in the process of setting questions. The paragraphs below indicate the conventions to which the examiners usually adhere, subject to the guidance of the appointed external examiners, and other bodies such as the Academic Committee in the Department, the Mathematical, Physical and Life Sciences Division, the Education Committee of the University and the Proctors who may offer advice or make recommendations to examiners. It must be stressed that to preserve the independence of the examiners, candidates are not allowed to make contact directly about matters relating to the content or marking of papers. Any communication must be via the Senior Tutor of your college, who will, if he or she deems the matter of importance, contact the Proctors. The Proctors in turn communicate with the Chairman of Examiners.

During the marking process the scripts of all written papers remain anonymous to the markers.
[In some of the descriptions of marking for individual elements of coursework that are given later in this document the term 'double marked, blind,' is used; this refers to the fact that the second marker does not see the marks awarded by the first marker until he or she has recorded his or her own assessment, and does not indicate that the candidate is anonymous to the markers.]

Marking criteria for the Business Plan, Team Design Project and Part II project are published in the relevant course handbook.

Late Submission of or Failure to Submit Coursework
The Examination Regulations stipulate specific dates for submission of the required pieces of coursework to the Examiners (1. One piece of Engineering & Society Coursework; 2. A set of detailed reports of practical work; 3. A Team Design Project Report; 4. Industrial Visit Reports as specified in the course handbook; 5. A report on the work carried out in either the Characterisation of Materials module or the Introduction to Modelling in Materials module; and 6. A Part II Thesis). Rules governing late submission and any consequent penalties are set out in the 'Late submission of work' sub-section of the 'Regulations for the Conduct of University Examinations' section of the Examination Regulations (pp45-46 of the 2006, 2007 & 2008 Regulations and pp46-47 of the 2009 Regulations).

Under the provisions permitted by the regulation, late submission of coursework for Materials Science or Materials, Economics & Management examinations will normally result in the following penalties:

(a) With permission from the Proctors under clause (1) of para 16.8 no penalty.
(b) With permission from the Proctors under clauses (3) + (4) of para 16.8, for the first day or part of the first day that the work is late a penalty of a reduction in the mark for the coursework in question of up to 10% of the maximum mark available for the piece of work, and for each subsequent day or part of a day that the work is late a further penalty of up to 5% of the maximum mark available for the piece of work; the exact penalty to be set by the Examiners with due consideration given to any advice given in the Proctors' "Notes for the Guidance of Examiners and Chairmen of Examiners".
(c) Where the candidate is not permitted by the Proctors to remain in the examination he or she will be deemed to have failed the examination as a whole.

Where no work is submitted or it is proffered so late that it would be impractical to accept it for assessment the Proctors may, under their general authority, and after (i) making due enquiries into the circumstances and (ii) consultation with the Chairman of the Examiners, permit the candidate to remain in the examination. In this case the Examiners will award a mark of zero for the piece of coursework in question.

Penalties for late submission of individual practical reports are set out in the MS/MEM FHS Handbook and are separate to the provisions described above.

* for 2010-11 the Nominating Committee comprises Dr Czernuszka (Chair), Professor Grovenor and Dr Taylor.

2. PART I

(1) *Setting of papers*

Part I General Papers 1 – 4 are set by the examiners in consultation with course lecturers. The responsibility for the setting of each examination paper is assigned to an examiner, and a second examiner is assigned as a checker. Option papers are set by lecturers of the option courses and two examiners, the examiners acting as checkers. The examiners, in consultation with lecturers, produce model answers for every question set. The wording and content of all examination questions set, and the model answers, are scrutinised by all examiners, including, in particular, the external examiners.

(2) *Paper Format*

All General papers comprise eight questions from which candidates attempt five. Each question is worth 20 marks. The total number of marks available on each general paper is 100. Materials Option papers comprise one section for each twelve-hour Options lecture course, each section containing two questions: candidates are required to answer one question from each of any three sections and a fourth question drawn from any one of the same three sections. The total number of marks available on each option paper is 100, and all questions carry equal marks. Questions are often divided into parts, with the marks for each part indicated on the question paper.

(3) *Marking of papers*

All scripts are double marked, blind, by the setter and the checker. After individual marking the two examiners meet to agree marks question by question. If the differences in marks are small (~10% of the total available for the question, 2-3 marks for most questions), the two marks are averaged, with no rounding applied. Otherwise the examiners identify the discrepancy and read the answer again, either in whole or in part, to reconcile the differences. If after this process the examiners still cannot agree, they seek the help of the Chairman, or another examiner as appropriate, to adjudicate. An integer total mark for each paper is awarded, where necessary rounding up to achieve this.
Options papers are marked by course lecturers acting as assessors and an examiner acting as a checker. The external examiners provide an independent check on the whole process of setting and marking.
The rubric on each paper indicates a prescribed number of answers required (e.g. "candidates are required to submit answers to no more than five questions"). Candidates will be asked to indicate on their cover sheet which questions, up to the prescribed number, they are submitting for marking. If the cover slip is not completed then the examiners will mark the first five questions in numerical order by question number. The examiners will NOT mark questions in excess of the prescribed number. If fewer questions than the prescribed number are attempted, (i) each missing attempt will be assigned a mark of zero, (ii) for those questions that are attempted **no** marks beyond the maximum per question indicated under section 2(2) above will be awarded and (iii) the mark for the paper will still be calculated out of 100.

As the total number of students is small, it is not unusual for mean marks to vary from paper to paper, or year to year. It is not therefore normal practice to adjust marks to fit any particular distribution. However, where marks for papers are unusually high or low, the examiners may, having reviewed the difficulty of the paper set or other circumstances, decide with the agreement of the external examiner to adjust all marks for those papers. Such adjustment is referred to as 'scaling' and the normal procedure will be as follows:

a. Papers with a *mean taken over all candidates* of less than 55% or more than 75% are normally adjusted to bring the *mean* respectively up to 55% or down to 75%. Normally this is achieved by adding/subtracting the same fixed number of marks to/from each candidate's score for the paper.
b. For papers with a mean in the ranges either of 55-60% or 70-75%, including those scaled under (i) above, the questions and typical answers are compared in order to ascertain, with the help of the external examiners, whether the marks are a fair reflection of the performance of the candidates as measured against the class descriptors. If not, the marks are adjusted. Normally this is achieved by adding/subtracting the same fixed number of marks to/from each candidate's score for the question or for the paper.
c. The mean mark and the distribution of marks, both taken over all written papers, are considered, again with the help of the external examiners, in order to ascertain whether these overall marks are a fair reflection of the performance of the candidates as measured against the class descriptors. If not, the overall marks are adjusted. Normally this is achieved by adding/subtracting the same fixed number of marks to/from each candidate's overall score.

(4) *Marking of Second Year Practicals for Part I*

Second year practicals are assessed continually by senior demonstrators in the teaching laboratory and in total are allocated 60 marks. Part I examiners have the authority to set a practical examination.

(5) *Marking Industrial Visits*

Four industrial visit reports should be submitted during Part I. Reports are assessed by the Industrial Visits Academic Organiser on a satisfactory / non-satisfactory basis, and are allocated a total of 20 marks.

(6) *Marking Engineering and Society Essays*

The business plan for "Entrepreneurship and new ventures" is double marked, blind, by two assessors; last year one assessor was from ISIS Innovation and one was appointed by the Faculty of Materials. The business plan is allocated a total of 20 marks.

If the Foreign Language Option or a Supplementary Subject has been offered instead of the Business Plan, the reported % mark, which is arrived at in accordance with the CVCP degree class boundary descriptors, is divided by five to give a mark out of 20.

(7) *Marking the Team Design Project*

The team design project is double marked, blind, by two of the Part I Examiners. They then compare marks and analyse any significant disagreement between these marks before arriving at a final agreed mark for each project and each team member. Supervisors of the projects submit a written report to the examiners on the work carried out by their teams and these are taken into consideration when the examiners decide the final agreed marks. Industrial representatives may be asked to contribute to the assessment process. The project is allocated 50 marks, of which 25 are for the written report and 25 for the oral presentation. The same two examiners assess both the reports and the presentations.

(8) *Marking the Characterisation of Materials and the Introduction to Materials Modelling modules*

The reports for these modules are double marked, blind, by the module assessors. Normally, at least one of the two assessors for each report will be a module organizer. The assessors then compare marks and analyse any significant disagreement between these marks before arriving at a final agreed mark for each report. The Chairman of Examiners oversees this process, sampling reports to ensure consistency between the different pairs of assessors and the two modules. The lead organizer for the Characterisation Module submits to the Assessors and Examiners of the module a short report which provides, by sample set only, (i) a summary of the availability of appropriate characterization instruments during the two-week module and (ii) any other pertinent information. An analogous report is provided by the lead organizer for the Modelling Module in respect of the software & hardware required for each mini-project. The Report for the Characterisation module is allocated 50 marks and each of the two reports for the Modelling module are allocated 25 marks.

(9) *Part I vivas*

There will be no Part I vivas in the 2010/11 Examination.

3. PART II

The Part II project is assessed by means of a thesis which is submitted to the Examiners, who will also take into account a written report from the candidate's supervisor*****.

The project is allocated 400 marks, which is one third of the total marks for Parts I and II. Two Part II examiners read the thesis, including the project management chapter, together with Part A of the supervisor's report, and each of them independently allocates a provisional mark based on the guidelines****** published in the course handbook. In addition, normally the thesis will be read by one of the two external examiners.

A *viva voce* examination is held: the purpose of the viva is to clarify any points the readers believe should be explored, and to ascertain the extent to which the work reported is the candidate's. An examiners' discussion is held after the viva, involving all Part II examiners, and at which time Part B of the supervisor's report is taken into account. The outcome of the discussion is an agreed mark for the project. It is stressed that it is the scientific content of the project that is being considered in the viva. In the overwhelming majority of cases, the viva has only a small influence on the agreed mark awarded to a Part II thesis.

If there are believed to be mitigating circumstances, such as illness, which may have affected the candidate's progress with the project these should, in the normal way, be drawn to the attention of the Senior Tutor at the candidate's college, who will, if appropriate, inform the Proctors. The Proctors may in turn communicate with the Chairman of Examiners about the mitigating circumstances. Subject to guidance from the Proctors, if appropriate the Board of Examiners will take into account these mitigating circumstances in their discussion after the viva.

***** The Supervisor's report is divided into Parts A & B: Part A provides simple factual information that is of significance to the examiners, such as availability of equipment, and is seen by the two markers before they read and assess the thesis. Part A does **not** include personal mitigating circumstances which, subject to guidance from the Proctors, normally are considered only in discussion with **all** Part II examiners thus ensuring equitable treatment of all candidates with mitigating circumstances. Part B of the supervisor's report provides her/his opinion of the candidate's engagement with the project and covers matters such as initiative and independence; it is not seen by the examiners until the discussion held after the viva.

****** These guidelines may change and candidates are notified of any such changes before the end of Hilary Term of their 4th year.

4. CLASSIFICATION

The following boundaries (CVCP) and descriptors (MPLSD) are used as guidelines:

Class I Honours 70 – 100	The candidate shows excellent problem-solving skills and excellent knowledge of the material over a wide range of topics, and is able to use that knowledge innovatively and/or in unfamiliar contexts.
Class IIi Honours 60 – 69	The candidate shows good or very good problem-solving skills, and good or very good knowledge of much of the material over a wide range of topics.
Class IIii Honours 50 – 59	The candidate shows basic problem-solving skills and adequate knowledge of most of the material.
Class III Honours 40 - 49	The candidate shows reasonable understanding of at least part of the basic material and some problem solving skills. Although there may be a few good answers, the majority of answers will contain errors in calculations and/or show incomplete understanding of the topics.
Pass 30 - 39	The candidate shows some limited grasp of basic material over a restricted range of topics, but with large gaps in understanding. There need not be any good quality answers, but there will be indications of some competence.
Fail 0 - 29	The candidate shows inadequate grasp of the basic material. The work is likely to show major misunderstanding and confusion, and/or inaccurate calculations; the answers to most of the questions attempted are likely to be fragmentary only.

In borderline cases the examiners use their discretion and consider the overall quality of the work the candidate has presented for examination. The external examiner often plays a key role in such cases.

Part I:

Unclassified Honours – The examiners are required to classify each candidate according to her/his overall average mark in Part I as (a) worthy of Honours, (b) Pass or (c) Fail. A candidate is allowed to proceed to Part II only if he/she has been adjudged worthy of honours by the examiners in Part I. The examiners do not divide the categories further but tutors and students may infer how well they have done from their marks. Candidates adjudged worthy of honours normally proceed to Part II but they may, if they wish and subject to approval from the relevant bodies, leave after Part I in which case an Unclassified Honours B.A. degree will be awarded.

Pass – The examiners consider that the candidate is not worthy of honours and therefore will not be allowed to proceed to Part II. The candidate may leave with a B.A. (without honours) or may retake Part I the following year (subject to college approval).

Fail – The examiners consider that the candidate is not worthy of a B.A. The candidate either leaves without a degree or may retake Part I the following year (subject to college approval).

Part II:

Classified Honours – Once marking is completed for both Parts I and II an overall percentage mark is computed for each candidate and classification then takes place. Subject to the requirement that Part II be adjudged worthy of honours (see below), classification is based solely on the overall percentage mark; the candidate's profile of marks from each element of assessment is only taken into account in borderline cases. However, a candidate cannot be awarded an M.Eng. degree unless his/her performance in Part II is adjudged worthy of honours i.e. a candidate must be adjudged worthy of honours both in Part I and in Part II to be awarded the M.Eng. degree. Failure to achieve honours in Part II will result in the candidate leaving with an unclassified B.A. (Hons) irrespective of the aggregate mark.

Pass – Notwithstanding the award of unclassified honours in Part I, the examiners consider that the candidate's overall performance is not worthy of an M.Eng. The candidate is listed as a Pass on the class list and is awarded an unclassified B.A. (Hons) on the basis of Part I performance.

Fail – The examiners consider that the candidate's overall performance is not worthy of an M.Eng. *and* that the performance in Part II is not worthy of a Pass. The candidate is excluded from the class list but is nevertheless awarded an unclassified B.A. (Hons) on the basis of Part I performance.

- The examiners cannot award unclassified honours on the basis of Part II performance unless permitted to do so by the Proctors.
- Nevertheless, candidates awarded a Pass or a Fail by the Part II examiners leave with an unclassified B.A. (Hons) because they were judged worthy of that in Part I (i.e. their degree is the same as if they had left immediately after Part I).
- In terms of the degree awarded, there is no difference between a Pass and a Fail in Part II. The only difference is whether or not the name appears on the class list.
- Candidates cannot normally retake Part II because the Examination Regulations require that they must pass Part II within one year of passing Part I. This rule can only be waived in exceptional circumstances, with permission from the Education Committee.

Annex: Summary of marks to be awarded for different components of the MS Final Examination in 2011 (For Part I and Part II students who embarked on the FHS respectively in 2009/10 and 2008/09)

	Component	**Mark**
Part I	General Paper 1	100
	General Paper 2	100
	General Paper 3	100
	General Paper 4	100
	Options Paper 1	100
	Options Paper 2	100
	Practicals & Industrial visits	80
	Engineering and Society coursework	20
	Team Design Project	50
	Characterisation or Modelling options module	50
Part I Total		*800*
Part II	Thesis	400
Overall Total		*1200*

REPORT ON FINAL HONOURS SCHOOL OF MATERIALS ECONOMICS AND MANAGEMENT, PART I EXAMINATION

Part I

A. STATISTICS

(1) **Numbers and percentages in each category**

The Part I Examination in Materials Economics and Management is unclassified. No distinctions are awarded. Since the number of candidates in this and previous years is less than 6, numerical data is confidential (see section E, below).

(2) T**he use of vivas**

The Board of Examiners decided at the start of the examination process that Part I students would not be given vivas. Students were informed of this by e-mail on 8 February 2011 and again on 20 April 2011. The information was also made available on the Department website from 20 April 2011.

(3) **Marking of scripts**
All scripts were double-blind marked by the Examiners. The full procedures are described in the Examination Conventions.

B. NEW EXAMINING METHODS AND PROCEDURES

For the Materials element of the MEM programme, each marker was required to award only integer marks for each question, following recommendations from the external examiners. The two marks awarded for each question were then averaged. These averaged marks were then summed to give a total for the entire paper, rounding **up** to the next integer if the sum was not an integer. Similarly, for each element of coursework, any non-integer final mark was rounded **up** to the next integer. It is recommended that this now becomes standard practice. The format of the Options papers differed from previous years; hence a specimen of Options Paper 1 was issued to candidates earlier in the year.

C. CHANGES IN EXAMINING METHODS, PROCEDURES AND CONVENTIONS WHICH THE EXAMINERS WOULD WISH THE FACULTY AND THE DIVISIONAL BOARD TO CONSIDER

During the marking of MEM scripts a possible anomaly was revealed, in that in previous years MEM marks may have been confirmed for release prior to the final meeting of the Management examiners, including their externals. In future this issue should be addressed either by agreeing that the MEM marks will be delayed until the final meeting of the management board of examiners or by a mechanism by which the management examiners agree to the release of the MEM marks prior to their meeting. There is a particular concern here should the aforesaid final meeting decide to scale a paper taken by MEM candidates.

D. EXAMINATION CONVENTIONS

The previous year's Examination Conventions were included in the Course Handbook that was distributed to all candidates in hard-copy and was also made available on the Departmental website, to which candidates' attention was drawn by e-mail. The current year's Conventions were put on the Departmental website and sent electronically, along with other information in a letter from the Chair of Examiners, on 21 February 2011 and again on 20 April 2011 to all candidates. The Examination Conventions were agreed by the Board of Examiners and the Department's Academic Committee.

Part II

A. GENERAL COMMENTS ON THE EXAMINATION

There were 6 candidates for the examination. The examination consisted of 7 written papers plus coursework that included a team design project, industrial visit reports and practical work carried out during the 2nd and 3rd years. One of the written papers (Introductory Economics) is taken in the 2nd year.

The written papers consisted of 4 Materials papers, 2 Economics papers and 1 Management paper, each of which lasted 3 hours. For the Materials papers, candidates were required to answer 5 questions out of 8, as in previous years. The Economics and Management Examiners followed their usual procedures. Team design projects were marked by two Examiners, including the Chairman. Teams were marked as groups. The allocation of bonus or penalty marks is permitted under the Conventions, but was not used. Reports for each of the Industrial Visits were assessed as pass/fail by the Industrial Visits Organiser, appointed as Assessor.

The overall mean mark for Part I was in the middle of the 2(i) band. Excluding the marks of candidates who were unwell during a particular paper, the mean marks over all MS and MEM candidates for 3 of the 4 Materials written papers in the examination were in the 2(i) band (60-69%); these papers did not need to be considered for scaling. The mean mark for the remaining Materials written paper (GP3) was in the 2(ii) band (50-59%) and, after careful consideration, the examiners scaled this paper by adding 5% points to each candidate's overall mark for that paper.

B. EQUAL OPPORTUNITIES ISSUES AND BREAKDOWN OF THE RESULTS BY GENDER

There were no female candidates and no candidates with declared disabilities.

C. DETAILED NUMBERS ON CANDIDATES' PERFORMANCE IN EACH PART OF THE EXAMINATION

All candidates took the same papers for the whole examination.

D. COMMENTS ON PAPERS AND INDIVIDUAL QUESTIONS

Detailed comments on the written examination papers and overall candidates' performance on individual questions are attached.

E. COMMENTS ON THE PERFORMANCE OF IDENTIFIABLE INDIVIDUALS AND OTHER MATERIALS WHICH WOULD USUALLY BE TREATED AS RESERVED BUSINESS

(1) **Numbers and percentages in each category**
The Part I Examination in Materials Economics and Management is unclassified. No distinctions are awarded. There were 6 candidates for the examination, [redacted].

Category	Number			Percentage		
	2010/11	2009/10	2008/09	2010/11	2009/10	2008/09
Distinction	n/a	n/a	n/a	n/a	n/a	n/a
Pass	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Fail	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

(2) **Breakdown of the results by gender**

	Overall mark		Written Examinations		Coursework	
mark (%)	Male	Female	Male	Female	Male	Female
40–50	[redacted]	-	[redacted]	-	[redacted]	-
50–60	[redacted]	-	[redacted]	-	[redacted]	-
60–70	[redacted]	-	[redacted]	-	[redacted]	-
70–80	[redacted]	-	[redacted]	-	[redacted]	-
80–90	[redacted]	-	[redacted]	-	[redacted]	-
Totals	6	-	6	-	6	-

(3) Medical Certificates: [redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

(4) [redacted]

(5) The examiners also considered concerns raised regarding delays with the Y3 MEM practical classes and disturbances during the last 30 minutes of the Microeconomics paper. It was concluded that no adjustments were needed.

F. NAMES OF MEMBERS OF THE BOARD OF EXAMINERS

MEM:

Prof. A.I. Kirkland (Chairman)

Dr M.R. Castell

Prof. P.S. Grant

Prof. C.R.M. Grovenor

Dr. R.I. Todd

Dr. P.R. Wilshaw

Dr Owen Darbishire (Management)

Dr Victor Seidel (Management)

Dr Eric Thun (Management)

Dr Chris Bowdler (Economics)

Dr Howard Smith (Economics)

Prof Jon Binner (External)

Prof Mark Rainforth (External)

Prof Paul Cousins (External, Management)

Prof Robin Mason (External, Economics)

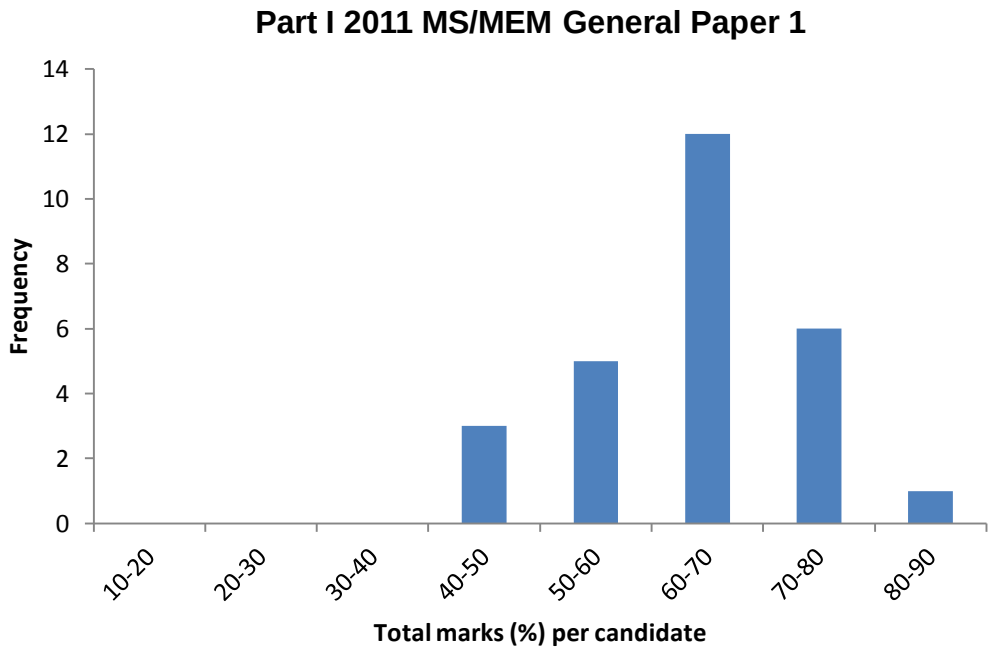
Attachments: Examination Conventions 2010/11 FHS Materials, Economics & Management
Comments on General Paper 1
Comments on General Paper 2
Comments on General Paper 3
Comments on General Paper 4
Comments on Economics papers
Comments on Introduction to Management paper

General Paper 1 – Structure and Transformations

Examiner: **Prof. Patrick Grant**
Candidates: **26 (20 MS / 6 MEM)**
Mean mark: **65.35%**
Maximum mark: **85%**
Minimum mark: **44%**

Detailed comments on the paper are as follows:

Question	No of Answers	Average Mark	Highest Mark	Lowest Mark	Topic
1	19	13.29	19.5	1.5	Powder Processing
2	10	12.55	15	9.5	Processing,properties and characterization of polymers
3	11	10.86	14	5.5	Corrosion
4	23	13.78	19.5	8.5	Corrosion inhibitors
5	24	13.98	17	6	Surfaces and interfaces
6	7	9.43	12.5	6	Phase diagram & solidification
7	16	13.19	18.5	1.5	Binary phase diagrams and solidification
8	20	13.25	19	5.5	Diffusion



General Comments:

Overview: the paper presented a spread of marks consistent with the examination guidelines and a mean in the mid-upper second band. Consequently no scaling was required, and the overall spread of attempted answers suggested the paper was well-balanced in terms of subject scope and difficulty.

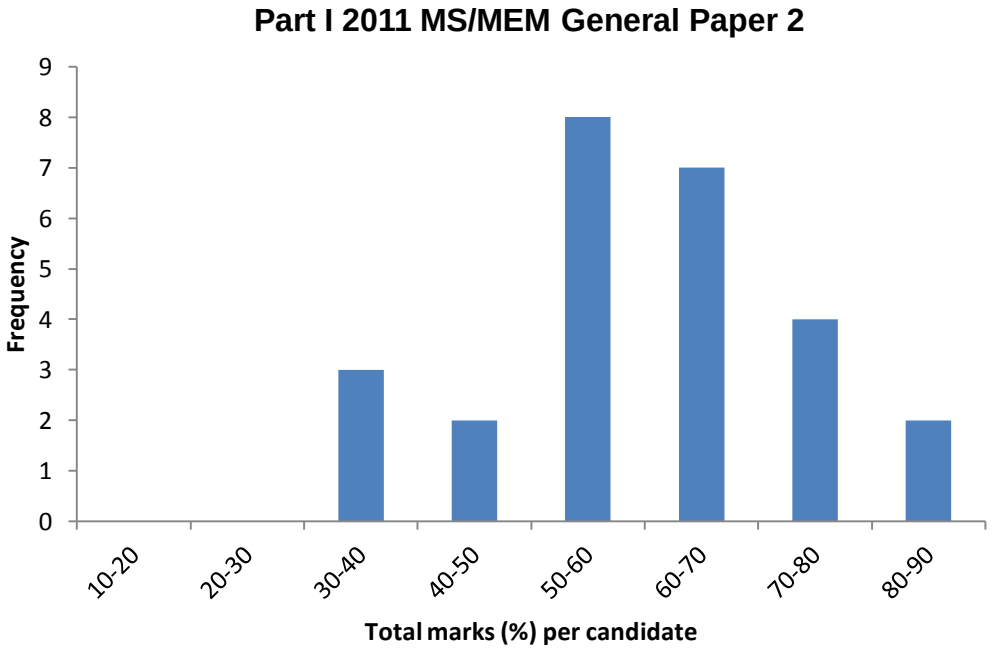
1. A powder processing question on a common examination subject with no special features or complexity - consequently, this was a popular question. The answer required was essentially descriptive although quite long; comprehensive use of diagrams was required for the highest marks. Generated a broad spread of marks but with a sensible mean.
2. Straightforward question on the processing, structure and properties of polymers, with early parts drawn carefully from the lecture notes. Candidates were unable to score the very highest marks as the final part of the question on the evolution of microstructure as a function of heating-cooling cycle required a modest extension and application of understanding.
3. Corrosion protection question requiring the candidate to make qualitative assessments of the most corrosion-prone of a several pairs of materials. Essentially a descriptive answer was required, but with the use of Evans, Pourbaix, etc diagrams. Overall the question made straightforward use of lecture information, but with a slightly unusual presentation. Of average popularity but lower than average scores; many candidates were unable to choose – and provide supporting arguments – wisely.
4. Corrosion inhibition. Required a series of long descriptive answers covering many scenarios. Popular and generally well-answered although several answers lacked structure and were "write everything you know about corrosion" in style. Allowed well-prepared candidates to score highly.
5. Surfaces and interfaces. A long question broken into several parts of low value, gradually building up in complexity and depth. A very popular question overall with very familiar material questioned in a clear manner, and yielding the highest average score. The question was however still difficult enough to fox less-able candidates in the later parts.
6. Solidification and ternary phase diagrams. A relatively simple opening on interfaces moving to probe correct reading of ternary diagrams, culminating in a near fiendish requirement to work out likely solidification paths from a real as–solidified ternary microstructure. The most unpopular question, with students perhaps put off by the use of real microstructures! The first part of the question on solid-liquid interfaces was generally well answered by the few who attempted it; latter parts were abandoned readily.
7. Solidification and phase diagrams. Very straightforward question on basics of binary solidification, drawing heavily on lectures notes and second year practicals. Quite popular and generally well answered.
8. Diffusion. Drew heavily on the lecture notes for the early parts and required some basic and core derivations, generally very well-executed. Later parts slightly extended beyond the lectures notes and were well-attempted, although with only a few completely correct answers.

General Paper 2 – Electronic Properties of Materials

Examiner: **Dr Peter Wilshaw**
Candidates: **26 (20 MS / 6 MEM)**
Mean mark: **60.20%**
Maximum mark: **83%**
Minimum mark: **35%**

Detailed comments on the paper are as follows:

Question	No of Answers	Average Mark	Highest Mark	Lowest Mark	Topic
1	11	10.59	16.5	4.5	Quantum Mechanics
2	23	12.70	18	4.5	Statistical Mechanics
3	20	12.40	18.5	5.5	Semiconductors
4	7	11.50	13.5	8	Electronic Properties of Materials
5	22	11.89	16	6.5	Tensors
6	15	11.13	20	2	Magnetic Properties of Materials
7	8	15.38	19	1	Electronic Structure
8	19	11.00	16.5	4.5	Electronic Structure



General Comments:

The answers produced were often very untidy with poor handwriting. This sloppy layout led to careless slips which could have been avoided with neater and more careful presentation of the work.

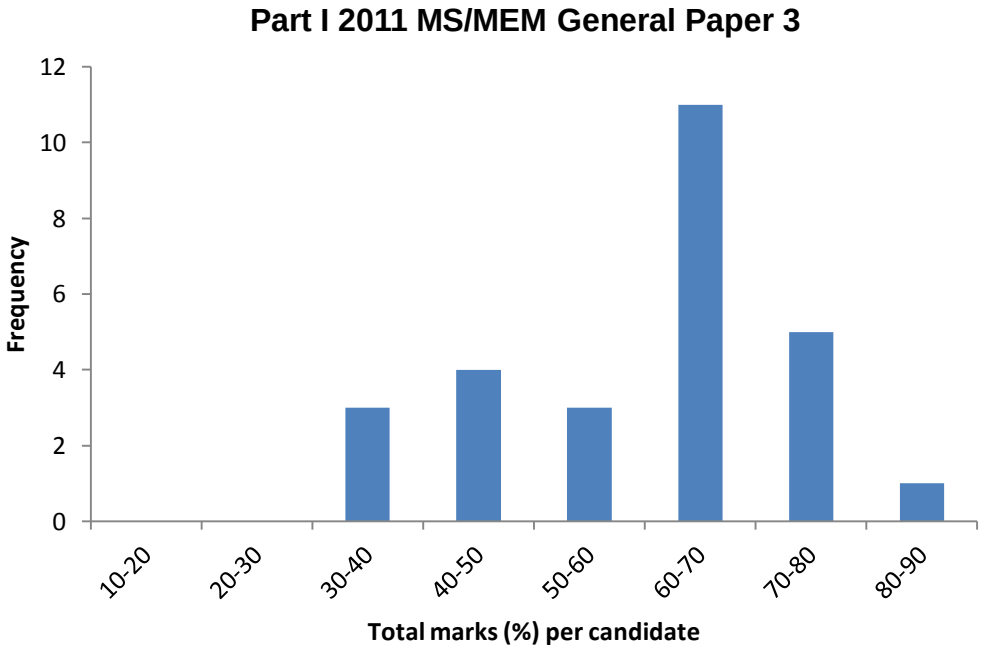
1. This question was almost entirely about the hydrogen atom. Candidates would have scored much better if they had been confident on the following relatively straightforward points: quantisation of L is a key feature of the Bohr model, integration by parts, and the meaning of the term “expectation value”
2. This statistical mechanics question, mainly about the occupation of a two level system, was the most popular on the paper and generally received good marks. However, a common misconception was that bosons are always massless. Photons have zero rest mass but plenty of other types of bosons do have rest mass. The final part about the relative magnitudes of specific heat of a free electron gas and an ideal monatomic gas was surprisingly badly answered.
3. Another popular and generally well answered question on semiconductors. However, some candidates were weak on simple concepts such as phonon and ionised impurity scattering effects on carrier mobility. The Gunn Effect was either well understood (gaining good marks) or apparently not at all!
4. An unpopular question on loss mechanisms in dielectrics. The question was mainly answered ok except for the section on the ratio of electronic to ionic polarisation in silicon dioxide. This was difficult but was similar to a tutorial question. Candidates are reminded that methods for solution of problems required for tutorial problems may appear in Part I examinations.
5. This popular question on tensors was well answered by most candidates. As always for this type of question marks were lost by careless mistakes but also notable were the number of candidates who failed to realise that compressive and tensile stresses have opposite signs.
6. A generally well answered question on the temperature dependence of magnetic susceptibility. Attempted by a few candidates who seemed to be guessing their answers but otherwise well done.
7. An unpopular question on tight binding theory with generally extremely high marks. This was a rather straightforward question on what is often perceived to be a difficult topic. It is clear that candidates who decided to give it a go mainly were able to do it rather easily and it should, perhaps, have been attempted by more candidates.
8. A popular question on 2DEG. There was something of a bimodal split in marks between those candidates who knew how to derive the Fermi Energy and density of states using free electron theory and those who didn’t. These standard book work derivations should have been understood by nearly all candidates.

General Paper 3 – Mechanical Properties

Examiner: **Dr Richard Todd**
Candidates: **26 (20 MS / 6 MEM)**
Mean mark: **60.36%**
Maximum mark: **81%**
Minimum mark: **34%**

Detailed comments on the paper are as follows:

Question	No of Answers	Average Mark	Highest Mark	Lowest Mark	Topic
1	8	12.25	18	7	Elasticity
2	14	10.57	17.5	0	Fracture Mechanics
3	16	9.75	14	3.5	Dislocation structures
4	20	14.78	19	9.5	Polymers
5	15	10.83	17.5	2	Rolling
6	16	8.25	14.5	2.5	Dissociation of dislocations
7	16	11.66	17	7	Solid solution hardening
8	20	10.10	17.5	2	Failure of long fibre composites



General Comments:

Overview: A few candidates scored high marks on this paper in which most of the questions were highly original but also straightforward for those who fully understood the subject. Whilst the high marks are encouraging, there was a substantial proportion of students on each question who did not understand the basics of the subject very well and it is recommended that tutors and lecturers take into account the large range of material in GP3 when teaching the relevant courses.

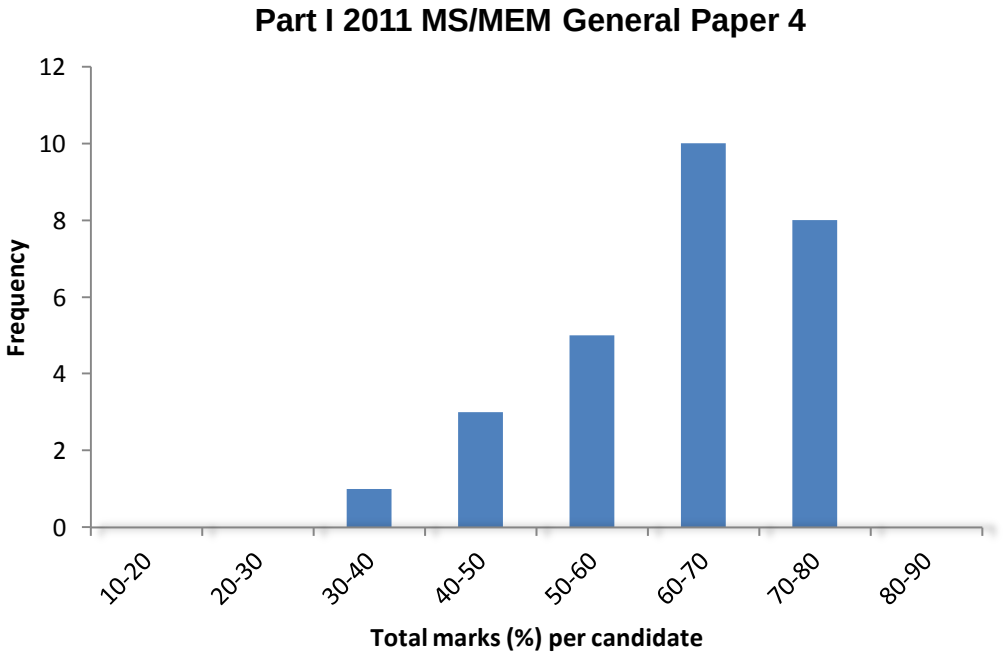
1. Some good answers to this question on elasticity. Some candidates had problems in confusing cylindrical and spherical polar co-ordinates, losing sight of what variable to differentiate with respect to, partial differentials.
2. A wide spread of marks on this question on fracture mechanics. A surprisingly high number of marks was dropped on part (a), which was very basic bookwork. Many candidates tried to work out the derivation based on the answer, which was given in the question. This method was rarely successful. The level of basic geometry in calculating the area associated with an increment of crack growth in the triangular cross section was also disappointing. Nonetheless, some good marks were obtained by the best candidates.
3. Part (a), on typical dislocation structures, was done moderately well on the whole. Part (b) relied on fitting some basic empirical expressions to results concerning fatigue and then using them to predict the outcome of other testing conditions. This was disappointingly done by many. Many candidates either did not know which expression to use or did not understand how to use it. Other candidates fell down on simple algebraic manipulation.
4. A straightforward and popular question on polymers which was very well done by many candidates. Some candidates had difficulty in describing the mechanism of loss around T_g.
5. A wide spread of marks on this question on rolling, with several high marks. The discursive part (a) showed that some candidates did not appreciate the similarities between rolling and forging, and even some of those who did, did not understand the original of the friction hill. The standard derivation in part (b) was well done. Part (c) was well done by many although some candidates did not appreciate the link between rolling pressure and front/back tension through Tresca's yield criterion.
6. The question was about the dissociation of dislocations and centred on a particular example shown in a high resolution electron micrograph. The principles of dissociation (Part (a)) were generally well understood. Part (b) asked about the specific dissociation of the micrograph. Some candidates obtained full marks here, but others lost marks because the Burgers vectors suggests did not lie in the slip plane. In parts (c) and (d) many candidates gained a few marks for approximate or general answers but no candidate was able to solve the specific problem completely.
7. A straightforward question on solid solution hardening which was generally well done.
8. Question on failure of long fibre composites with some good answers to the qualitative part (a) on the possible failure modes. Some candidates obtained good marks on part (b) which asked for a derivation of the condition for one failure mode giving way to another but, as with q. 2, many candidates tried to work out the derivation backwards because the answer was given in the question and again few of these candidates were able to come up with the correct, forwards derivation using this approach.

General Paper 4 – Engineering Applications of Materials

Examiner: **Professor Angus Kirkland**
Candidates: **27 (21 MS / 6 MEM)**
Mean mark: **62.48%**
Maximum mark: **78%**
Minimum mark: **38%**

Detailed comments on the paper are as follows:

Question	No of Answers	Average Mark	Highest Mark	Lowest Mark	Topic
1	12	10.58	14.5	1.5	Microstructural Characterisation
2	19	10.21	15.5	1	Microstructural Characterisation
3	10	9.45	14	6	Polymers
4	12	12.50	16	8	Semiconductor Devices
5	19	12.95	18	7.5	Engineering Alloys
6	20	12.23	15.5	7	Engineering Alloys
7	18	13.78	19.5	8	Ionic Oxides
8	25	15.04	19	10.5	Ceramics



General Comments:

1. A reasonably popular question, generally well answered, although few students achieved very high marks. The concept of the phase problem was not well understood. Most students were able to describe phase contrast imaging and interferometry and were also able to describe how phase contrast is achieved in the TEM. Very few students were able to calculate the step height required in part (d).
2. A popular question generally well answered. Almost all students were able to describe how magnification is generated in the SEM, although few could explain the origin of a useful maximum magnification. In part (b) almost all answers described the operation of the STM well. No student was able to estimate the work function required in part (b) ii. The explanation of the features in the images in part (b) iii was often confused.
3. Few students attempted this question and the attempts were generally mediocre as in 2009-10. Most answers to part (a) were poorly structured and failed to address the key points required. In part (b) many students did not clearly identify the advantages and disadvantages of the addition conducting additives. Part (c) was generally well answered but some students did not make the relationship of mechanism to a thermal switch.
4. A relatively popular question, generally well answered. The answers to part (a) gave good descriptions of the operation of a double heterostructure stripe laser diode. Part(b) was also well answered but very few candidates were able estimate the quaternary composition required in part (b) ii and were vague in their description of the commercial importance required in part (b) iv.
5. A very popular question which was well answered, with a few students achieving near maximum marks. Parts (a) and (b) were answered well by almost all students. The effects of Mo addition and their practical benefits were clearly identified by the better students but some failed to describe the mechanism for modification of the TTT curve and did not identify more than one practical benefit.
6. The second most popular question, not unsurprisingly showing a strong correlation with candidates who attempted Q5. Parts (a) and (b) were very well answered. Part (c) differentiated the strong and weak candidates where the former clearly identified the alternative candidate materials and their advantages / disadvantages but the latter either failed to identify the full range of alternative materials and / or did not clearly define the advantages / disadvantages.
7. Another very popular question which produced a narrow range of relatively high marks. Almost all candidates described Schottky and Frenkel disorder and identified the lattice conditions likely to favour these. Marks were lost in part (c) where many candidates were not able to derive the required expression.
8. This question was the most popular in GP4 and also produced the highest average mark. The weakest section was part (a) were the answers were often unstructured. Part (b) was exceptionally well answered and many candidates achieved full marks. In part (c) marks were lost by candidates who did not provide clear explanations for each of the methods defined in part (b).

Examiners Report for MEM 2011---Economics Papers.

Howard Smith 25th October 2011

Part I

Five (5) MEM candidates were entered for Introductory Economics, which they sat in 2010. The Introductory Economics scripts were double marked for EEM and MEM students. The paper is also taken as a Prelims exam by PPE and E&M students, and for those students the paper is single marked. A detailed report on this paper was produced by the Prelims Examiners for PPE in 2010, including comments on individual questions.

The mark for the MEM (year 2010) candidates is compared with the E&M (year 2010) candidates below:

MEM (5 candidates) mean [redacted]. E&M candidates: Mean 62.

Part II

Five economics papers are available to MEM Part II candidates, of which Microeconomics is compulsory.

Only two of these Microeconomics and Economic Decisions within the Firm were taken this year by MEM candidates. For these two papers the means for the MEM candidates are compared with the E&M candidates below:

Microeconomics
MEM (5 candidates): Mean [redacted] E&M (81 candidates): Mean 62.9

Note that for Microeconomics the paper taken by EEM candidates was the same as that for E&M (and PPE) candidates; however as EEM candidates had 3 hours and E&M candidates only 2 hours 15 minutes, the EEM candidates were asked to answer an extra question. The Microeconomics paper is taken in large numbers by PPE and E&M students, and full reports on these papers can be found in the Examiners Report for PPE.

Economic Decisions within the Firm
MEM (1 candidate): Mark[redacted]. Note that this paper is mainly taken by EEM students. The report below is reproduced from the EEM examiner report:

19 candidates sat the paper: 15 EEM, 1 MEM and 3 EM students. Performances were on the whole very strong. There were 17 First Class marks, 1 Upper Second Class mark and 1 failing mark. Answers were more evenly spread between the Linear Programming and Applied Probability parts of the course than in some years.

Comments on Individual Questions

1. (Duality)(10 attempts) On the whole answered well but students were not always able to state results accurately.
2. (Simplex)(17 attempts) A standard question which attracted very good answers.
3. (Transportation/Assignment)(18 attempts) Answered well.
4. (Zero-Sum Games)(2 attempts) Not popular.
5. (Decision Trees)(18 attempts) As ever a popular topic. Not as straightforward as some decision tree problems in past exams but still very good answers.
6. (Queues)(10 attempts) Mostly standard material and answered well.
7. (Dynamic Programming)(15 attempts) A fairly standard problem, which was answered well.
8. (Inventories/Dynamic Programming)(5 attempts) Not popular but on the whole answered well.

END

PRELIMINARY EXAMINATION IN ECONOMICS AND MANAGEMENT

TRINITY TERM 2011

EXAMINERS' REPORT

PART I

A1. STATISTICS

Category	Number				Percentage			
	2010/11	2009/10	2008/9	2007/08	2010/11	2009/10	2008/9	2007/08
Distinction	19	31	26	25	21.6%	36.0%	32.5%	26.6%
Pass	69	52	53	66	78.4%	60.5%	66.25%	70.2%
Fail	0	3	1	3	0%	3.5%	1.25%	3.2%
Total	88	86	80	94				

A2. MARKING OF SCRIPTS

Scripts were single-marked, except when the first marking indicated either a fail (less than 40), or a total mark that fell three marks or less below the 200 required for a distinction (i.e., 197-199). Four candidates who had total initial marks in the range 197-199 had all three scripts blind second marked. All of these candidates were raised to a distinction. The final mark awarded to double-marked scripts was agreed between the two examiners.

A.3 HANDLING OF MEDICAL CERTIFICATES AND OTHER INFORMATION WHICH THE PROCTORS AUTHORISE BOARDS OF EXAMINERS TO TAKE INTO ACCOUNT IN THE ADJUDICATION PROCESS

After the initial classification of candidates the Board considered whether there should be any revision in light of the information received. In no case was the classification affected.

B. NEW EXAMINING METHODS AND PROCEDURES

No new examining methods or procedures were introduced.

C. RECOMMENDATIONS FOR CHANGES IN CONVENTIONS

There are no recommendations for changes in conventions.

D. COMMUNICATION OF EXAMINATION PROCEDURES TO CANDIDATES

The Chairman's circular to candidates and the Examination Conventions are attached. In line with previous years the Chairman's circular contained a summary of the aggregation conventions (how marks translate into results) and details of the penalties for short-weight, but did not contain the full version of the conventions with the re-reading rules and the recommended distribution of marks for examiners.

PART II

A. GENERAL COMMENTS ON THE EXAMINATION

Excellent administrative support was provided by the Susan Barrington, and in general the examination process ran smoothly.

However a number of issues arose on the Management side of the Examination Process. First, there were developments the syllabus of the General Management subject, which the Moderators needed to deal with by arranging for additional questions to be included in the Examination Paper. Second, the initial paper provided for Financial Management needed to be considerably sharpened, and the Moderators oversaw that process. Third, there was some confusion as to who was to mark the Financial Management paper, and this led to a need to appointment of additional Assessors at the last moment. And, finally, there was some confusion about how long the Moderators are required to be in Oxford after the examinations have been sat and after the first-marking has been completed.

These problems were dealt with in a satisfactory manner.

However, this experience suggests that there is a need for an initial Formal meeting of Moderators at the end of Hilary term, at which the timetable for the Examination Process is circulated in writing, and at which the plans for setting of the paper in each of the three subjects are discussed and agreed by the Moderators. This would be in addition to the meeting of Moderators which normally happens in the early part of the Trinity Term, at which the draft Examination Papers are discussed and finalised.

David Vines (Chair, EandM Prelims Moderators)

B. EQUAL OPPORTUNITIES – BREAKDOWN OF RESULTS BY GENDER

Number of Candidates

Overall Number	Male	Female
88	68	20

Distinctions

Male	% Overall	% Within Grade	% of Males
16	18.2%	84.2%	23.5%
Female	**% Overall**	**% Within Grade**	**% of Females**
3	3.4%	15.8%	15.0%

Pass

Male	% Overall	% Within Grade	% of Males
52	59.1%	75.4%	76.5%
Female	**% Overall**	**% Within Grade**	**% of Females**
17	19.3%	24.6%	85.0%

Fail

Male	% Overall	% Within Grade	% of Males
0	-	-	-
Female	**% Overall**	**% Within Grade**	**% of Females**
0	-	-	-

C. PERFORMANCE ON EACH PART OF THE EXAMINATION

Summary Mark Statistics for Each Paper are as follows:-

	Introductory Economics	Financial Management	General Management	Total
No of Candidates	88	88	88	88
Maximum Mark	84	74	71	220
Minimum Mark	40	52	40	143
No of Marks > 70	11	9	1	n/a
No Marks > 60	43	73	43	n/a
No Marks >= 50	80	88	78	n/a
No of Marks < 50	8	0	10	n/a
No of Marks < 40	0	0	0	n/a
Mean Mark	61.1	64.4	59.2	184.6
Median Mark	60	64	60	183.5
First Quartile	56	62	55	176
Third Quartile	67	67	65	194
Standard Deviation	8.7	4.7	7.6	16.0

Previous Distributions of marks. Examiners took note of the distributions of marks in recent years:

Summary Mark Statistics for 2009-10 (2008-09 in brackets)

	Introductory Economics	**Financial Management***	**General Management**	**Overall**
No of Candidates	86(80)	86	86(80)	86(80)
Maximum Mark	80(79)	81	72(71)	228(230)
Minimum Mark	27(44)	49	55(38)	144(133)
No of Marks > 70	20(12)	12	7(1)	n/a
No of Marks < 50	11(2)	2	0(2)	n/a
No Marks < 40	3(0)	0	0(1)	n/a
Mean Mark	61.8(65.0)	63.0	66.3(60.9)	191.1(189.8)
Median Mark	63.5(65.25)	62	67(61)	192(190)
Standard Deviation	11.0(6.0)	7.5	3.4(5.8)	17.6(18.3)

*Financial Management did not run in 2008-9

D. **PERFORMANCE IN INDIVIDUAL PAPERS**

Introductory Economics

Most questions on this paper referred to very standard material for the first year course, covered fully in both lectures and textbooks. The level of understanding of the material exhibited by candidates was disappointing, however. While most were able to reproduce conventional diagrams and perform common algebraic manipulations, these were rarely accompanied by clear explanations or economic insight. Candidates generally coped better with the more "mathematical" parts of the questions than with other parts asking for explanation and economic interpretation.

Part A

1. ***Efficiency and Perfect Competition*** (134+8+36)[1]

This question covered standard material, but was the least well-done of the micro questions.

(i)(a) Most candidates were able to define Pareto efficiency, and to explain that society may also be concerned about distribution. Very few distinguished between the cases when A is a Pareto improvement over B, and when it is not. Discussion of welfare functions, perhaps in conjunction with a diagram of the utility possibility frontier, provided some structure for better answers.

(b) Many candidates did not mention the central role of prices: a *very* common misapprehension is that in competitive equilibrium MRSs must be equal because if not, agents would exchange goods with each other until no-one could be made better off.

[1] Numbers in brackets are the numbers of answers for each question in PPE, H&E, and E&M.

Some candidates explained only that MRSs are equal at an efficient allocation. (Some credit was given for this if the 1st Fundamental Theorem was used as a link.) Even amongst the good answers, very few noted that well-behaved preferences are required for the statement to be true.

(c) The most common approach was to describe situations in which *neither* free-entry *nor* price-taking are required for efficiency (Bertrand equilibrium; perfect price discrimination). Only a minority were able to provide good answers in the context of a perfect competitive market, distinguishing between the roles of the two characteristics. A natural way to do this would have been to distinguish between the short-run (no entry, but nevertheless allocative efficiency) and the long-run (production at minAC).

(ii)(a) Most candidates were able to note that if price is above/below average cost, super-normal profits will induce entry/exit (although worryingly this was often explained as if firms were price-setting, and entering firms would undercut them). To explain why the long-run price is *minimum* average cost it is necessary also to explain the role of marginal cost.

(b) The majority of candidates did the required calculations easily and correctly.

(c) Very poorly answered. The majority of candidates who attempted this part interpreted the *short-run* as a period of fixed prices (i.e. the macro interpretation) which has no meaning in the context of the model of a perfectly competitive market.

2. ***Preferences and Demand*** (167+9+58)

(i) Most candidates understood and explained "well-behaved" as *monotone* and *convex*. Fewer could define "consistent" (e.g. as complete, reflexive, transitive). The example was a straightforward violation of WARP. Candidates who did not recognise this were often confused by their own assumption that income was the same in the two situations.

(ii)(a) Almost all candidates were able to derive the demand functions correctly. Almost no-one used the information that the preferences were well-behaved to infer that all income would be spent and that the solution of the first-order conditions is a maximum point.

(b) A common mistake was to show that *demand* is decreasing in price, and deduce that the elasticity is negative.

(c) Good candidates did this successfully; others got stuck at the point of calculating what the new level of income must be, or calculated the new bundle but could not recognise the substitution effect. Some didn't realise the implication of "still afford his original bundle" and hence attempted the Hicksian approach. For those who failed to do the calculation correctly, credit was still given for a good diagram.

3. ***Price Discrimination*** (144+8+63)

(i) Good answers explained that if marginal costs are equal, price is a mark-up on marginal costs which is inversely related to the elasticity. Poorer answers stated the demand for men's haircuts must be lower, and/or tried a graphical comparison of demand curves.

(ii) A standard calculation, generally done correctly but mostly without mentioning second-order conditions.

(iii) The majority wrote the correct profit function, and most of these obtained the correct first order conditions. Very few attempted second-order conditions. Algebraic/numerical mistakes were common. Few could explain that the increase in the price of women's haircuts could be attributed to the effect of men's haircuts on the marginal cost.

(iv) A significant number of candidates did not attempt to calculate the required values of consumer surplus, but tried to make more general arguments, mostly unsuccessfully. In the second part of the question, credit was given for any sensible comments – candidates were not expected to know the precise conditions under which welfare increases or decreases.

4. ***AS-AD Model*** (29+ 1+15)

(i) Brief explanation for the AS-AD diagram should have been given, but few students devoted more than a sentence to explaining AS. AD slopes down because at lower prices, the supply of real money balances is larger for a given nominal money supply, which leads to a lower equilibrium real interest rate and higher output. Good answers said something about nominal versus real interest rates. The Pigou effect could have been mentioned: falling prices raise the value of forms of wealth fixed in nominal terms, which could increase consumption

(ii) Diagrams are useful here, showing the leftward shift of IS, and hence AD. Output and interest rate fall; prices fall along AS, partially offsetting the output reduction through the effects described in part i, with an increase in the real money supply lowering the interest rate further. Some candidates wrote that the interest rate falls because savings increase when consumers reduce their spending, which is incorrect within the structure of this model.

(iii) With adaptive expectations, $P^e = P_{t-1}$, the AS curve shifts down in the next period because P has fallen, such that $Y=Y^*$ at exactly last period's price level. AD remains unchanged. Output rises and P falls again, leading to a further round of adjustment. Eventually the economy returns to Y^* at a lower P than initially.

Description "in detail" required an explanation of the underpinnings of the AS curve. There are many possibilities: some candidates used a labour market model based on workers' price expectations, or a story about wage contracts; others tried a Lucas "surprise" model. This is difficult material for first years, and examiners rewarded serious attempts even if they contained errors. Good students understood that rational expectations imply that agents can anticipate the long-run equilibrium and adjust their price expectations accordingly so that AS will shift there immediately.

(iv) Although the answer to this question comes directly from the lecture notes, it seemed to be a good discriminator. Good candidates could explain the steps in the derivation clearly, but many others produced a jumble of equations.

5. ***ISLM*** (182+13+79)

(i) Almost all candidates got the basic calculation right, but used few or even no words to explain what they were doing or how the model works. A first class mark was given only for an answer which showed a full understanding of the economics.

(ii) Most students got the calculation right, but again, an explanation was required for a good mark. Some candidates were confused by the fact that this was an IS rather than an LM shock. The diagram should show a leftward shift of the IS curve. Output falls because of the fall in investment demand; the negative impact on investment of the risk premium is partially offset because a fall in the demand for money, leads to a decline in the (risk-free) real interest rate.

(iii) This part of the question was more testing and produced more variance in marks. The central bank's problem is nominal interest rates cannot fall below zero; there could also be a liquidity trap at a positive interest rate. Arithmetically, setting r=0 in the new IS leaves Y at only 2600. In quantitative easing, the CB creates money and uses it to intervene in asset markets, but instead of targeting the short-term risk-free rate of interest it seeks to influence other rates. In this case, it could purchase long term risky assets in an attempt to lower the risk premium θ: QE would shift IS rather than LM. Candidates required some self-confidence to be able to say this. Going beyond the model, QE might create expectations of future inflation, allowing negative real interest rates – extending the range of real interest rates below the horizontal axis in the ISLM diagram.

6. ***Consumption*** (64+3+14)

(i) The diagram should be well-labelled, showing the budget constraint (PV of consumption equals PV of income), indicating its slope, with tangency to a conventionally shaped indifference curve, and distinguishing between the endowment and the consumption choice.

(ii) This part required an analysis of income and substitution effects for savers and possibly also borrowers. Many candidates used a diagram.

(iii) Again, a diagrammatic approach is helpful; it requires careful labelling to show how the change in endowment differs when increase in income is permanent rather than temporary. A neat way to allow for many periods is to let y_2 represent all future periods, with $y_2 >> y_1$. The analysis suggests that mpc out of a permanent increase in income would be large – even 100%, while mpc out of a temporary increase would be very small.

Really good marks required answers which referred to the model in the question. However some credit was given for a good general discussion of permanent income and life-cycle models.

(iv) (Ricardian equivalence). This requires an explanation of why the budget constraint does not change if consumers and the government face the same interest rate. With borrowing constraints, the tax and refund plan *might* affect consumption: the best answers demonstrated this by using the model to analyses a simple case – for example, when households cannot borrow.

(v) With a standard Keynesian consumption there is no distinction between temporary and permanent income changes, and the rate of interest does not matter. Fiscal policy is less powerful, and monetary policy may be more powerful, in the inter-temporal model than in the simple Keynesian model. One could argue that countercyclical policy would also seem less necessary in the inter-temporal model. Some candidates again attempted to answer this question based only on what they have learned about permanent income and life cycle models, the apc and mpc in the Keynesian model, etc, and/or neglected the instruction to address policy implications.

Part B

7. ***Oligopoly*** (61+3+26)

This question was generally done well. Good candidates were able to give a reasonably detailed account of the oligopoly models, contrast their predictions, *and* discuss, with examples, to what type of market each of the models best applies.

8. ***Invisible Hand*** (18+1+2)

This was by far the least popular essay question. There were some very poor answers, consisting of ill-informed waffle about "free market economics". A few good answers focused on the First Fundamental Theorem and sources of market failure.

9. ***Unemployment*** (48+6+18)

Many candidates interpreted the question as contrasting active policies suggested by classical and Keynesian models. Where wages are fixed by unions or legislation above market clearing, cutting wages can increase employment; in the interest rate story, monetary expansion can raise aggregate demand. Some students took the opportunity to talk about structural and frictional unemployment.

However, these were partial stories; for a really good answer the statements could be integrated in some kind of AS-AD model: for example, a negative demand shock will be followed by a fall in the interest rate and the nominal wage as the economy returns to equilibrium output with a lower price level.

10. **Mundell Fleming** (113+6+48)

This was the most popular essay question. The statement is correct. Interpreting the financial crisis as a negative IS shock, we could ask why depreciation has not quickly restored the UK economy to health. Part of the answer might be that it is a "world shock"; in addition, very low (short term risk free) interest rates may disable monetary policy. It is fiscal policy that might work in these circumstances, since the usual rise in the interest rate, causing currency appreciation, need not happen.

Candidates tended to lay out the MF model competently, and then offer generic criticisms of the assumptions, e.g. capital markets aren't really perfect, so that the UK interest rate could differ from world rates. Credit was given for this, but higher marks were reserved for answers that said something more specific about the current situation and that recognised the importance of the international context – a synchronous, worldwide downturn that lowers interest rates everywhere.

Financial Management

Examiner's Report for Financial Reporting (within the Financial Management paper)

Financial Reporting paper (Questions from 1 to 8) is the first half of Financial Management paper, followed by Finance paper. Section I is General Knowledge Questions (From Questions 1 and 2; 10 points altogether.) which candidates should answer all questions. Section II is Numerical Questions (From Questions 3 to 5; 20 points altogether.) which candidates also need to answer all questions. Finally, Section III is Explanatory and Critical Questions which candidates choose either Question 7 or 8 for 20 points.

Question 1 was a very basic question requiring students to explain the difference between the two approaches of financial reporting, which candidates answered very well.

Question 2 was a conceptual question about the treatment of stock options. Most candidates discussed this topic in a good way highlighting pros and cons of the "expensing stock options costs" treatment.

Question 3 was a basic question on accounting policy related to a change in method of inventory valuation. i.e. LIFO versus FIFO, and the effects it would have on the yearend financial statements. Many candidates did very well, and only a few did some calculative mistake which fetched them relatively less marks.

Question 4 was a basic question on goodwill calculation and other items arising on account of business combinations. This case was taken from the main handout in the lecture, but surprisingly many students did not score in full.

Question 5 was a Financial Statement interpretation question requiring intellectual reading of financial statements. Sub- Question "1" was well answered as it pertained to ratio calculations. In Sub-Question "2" most candidates gave general interpretation of the company's financial situation and only a very few could correctly identify the creative accounting practice adopted by the company. This creative accounting was critically important to make up the seemingly healthy state of the company's financial statements.

Question 6 was on financial analysis involving ratios. It required candidates to provide a concise overall evaluation of a communication technology company in question. There was an important message in this question that related to valuation of fixed assets and the consequent effect on the performance which most candidates could not very well identify and comment upon though a relatively few could provide a good critical analysis. Marks therefore ranged between most candidates gaining average marks and only a relatively few gaining high marks.

Question 7a tested candidates' knowledge about the effects of global standardization of accounting standards based on IFRS. Not only for positive aspects but also for negative aspects should have been carefully articulated. Overall, candidates answered well, but there were only few papers which demonstrated balanced arguments with good examples.

Question 7b was related to the inherent problems with goodwill valuation under various accounting approaches such as historical cost accounting and the new fair value accounting. A significant number of candidates attempted Question 7b exhibiting good knowledge of the issue based on the historical evolution of goodwill accounting.

Note:-

Candidates tended to write a lot in terms of the volume, but without clear thinking, structure and presentation. This paper is about account-*ing* in which candidates are required to demonstrate their knowledge effectively in a limited space and time. So, candidates should come up with clear and concise answers rather than unnecessarily long wordy answers.

Examiner's Report for Financial Analysis (within the Financial Management paper)

Section IV. Numerical Questions (30points)

Q8. This question was a compulsory question. In this question, students were asked to i) calculate the cash flows related to company X's acquisition and disposition of equipment in the replacement decision, ii) estimate company X's cost of capital, and iii) make an investment decision by discounting the relevant cash flows using company X's cost of capital. This question was very similar to the question in the previous years, but this was more complicated in the sense that it involves old and new equipment.

In part i), the most challenging part was to calculate the correct amount of tax associated with the replacement of old equipment with new equipment. First, it should be noted that the depreciation expenses of new equipment reduce the tax amount, whereas the foregone depreciation expenses of old equipment increase the tax amount. Second, the capital losses associated with both old equipment and new equipment should be taken into account. Those are non-cash expenses like depreciation expenses. Although non-cash expenses do not involve cash transactions, they reduce the taxes payable. Other issues regarding the calculation of cash flows were quite straightforward. Nevertheless, some students made mistakes in dealing with the change in working capital. Students should understand why the change in working capital, not working capital, should be subtracted in the calculation of cash flows. In addition, if taxes are mentioned in the script, taxes should be taken into account.

In part ii), students were asked to compute the weighted average cost of capital (WACC). As taxes were mentioned in this question, they were expected to calculate after-tax WACC. However, many students provided the before-tax WACC. As the question was stated as "cost of capital", the marking was quite generous to this mistake. However, the "cost of capital" would mean the after-tax WACC because tax is present.

In part iii), students were expected to calculate NPV and IRR. Higher marks were given to the students who provided correct procedures rather than those who provided correct answers without presenting correct procedures.

Section V. Explanatory and Critical Questions (20 points): Either Q9 or Q10

Students were allowed to choose one question between two essay-type questions. Q9 was related to the portfolio theory and firm's investment decisions and Q10 was related to corporate governance mechanisms. The first two parts in both questions were very well answered, but the last parts in both questions were not very well answered in general. Although variation was not very high, some variation of the marks in essay-type questions was attributed to the last parts in both questions.

General Management

In general candidates displayed a sound basic understanding of management theory and the various field of management studies, with answers well supported by references, examples and evidence. Essays were well structured, although candidates varied in how directly they addressed the questions and in the quality of the supportive material. Overall scores were some time brought down by the ability to sustain four good answers, reflected a limited depth of knowledge across enough substantive topics and or poor time management in the examination. There was a reasonable spread of answers across the 12 questions, although some questions proved more popular than others: many students addressed question 3a on culture and q9 on Taylorism/Fordism; few attempted q1 on the 'Third industrial revolution' or q8 on positivism/interpretivism. The quality of each answer, in turn, is considered

Q1: As noted, few candidates answered this question on the first, second and third industrial revolutions. Better candidates focused on the nature of the third industrial revolution and the suggestion that it was not embedded in any country. Weaker candidates focused more on the first and second industrial revolutions and had difficulty in tying down the notion of the third industrial revolution.

Q2. This question of corporate governance was generally well answered. Candidates had sound grasp of different models of corporate governance and the theoretical propositions underpinning them. Better candidates directly addressed the question by considering whether the Anglo-American model was transferable; weaker candidates tended to describe different corporate models, dealing in a cursory way with issues of transfer.

Q3 Most candidates answered question 3a on culture. Many candidates displayed knowledge of different definitions and models of organisational culture. Weaker candidates limited their answers to setting out such models; stronger candidates realised that different definitions and different models had analytical importance for the scope, nature and outcome of culture change. Some candidates spent too much space discussing culture as a source of competitive advantage-this was relevant to this question (as a possible rationale for culture change) but not central to it.

Q4. Most candidates answered q4b on the difference between corporate and competitive strategy. Most, although not all, clearly distinguished between the two. There was perhaps an over emphasis by some on competitive strategy, with a strong concentration on Porter, with better candidates able to produce a more balanced discussion.

Q5. The quality of answers to this question on market share and monopolies was uneven. This was not an easy question, and better candidates were able to draw upon different models, again often Porter, to justify their choice. However, in the absence of such models answers were often general and or rambling.

Q6. Better students were able clearly to distinguish between brands and reputations, and discuss the relationship between the two. Weaker students were much fuzzier about this relationship, and sometimes devoted too much of their discussion to the nature and creation of brands

Q7 A number of candidates failed to get to grips with this question, apparent in many focusing solely on Taylorism and scientific management. The question required a more general discussion of management as a science- whether and in what sense it was a science. Good candidates drew upon Kuhn and Popper; and even stronger students applied their thought to management studies. Excellent studies sought to address and relate the notion of management as science to the performance of companies.

Q8. Most candidates were able to distinguish between positivism and interpetivism, but had much greater difficulty exploring how this produced different understandings of the organisation.

Q9 This was a generally well answered question with candidates displaying an understanding of the different insights on operations provided by Taylor and Ford. Weaker candidates found it difficult to move beyond a description of such insights, and to apply them to the service sector. Better candidates were able to explore debates on the application of Taylorist/Fordist principles to the services. The strongest students assessed the application of these principles to e-services, but this element of the question was often neglected by candidates

Q10 In general candidates displayed a basic understanding of supply chain relationships. Better students took a critical approach to such relationships, both in terms of how they played out- so highlighting some of the tensions within them- and in terms of whether and how they contributed to corporate performance.

Q11. Most candidates presented and had a gasp of basic models of power, with French and Raven in particular being regularly quoted. Better students were able to draw upon a broader range of models, sometime referring to Luke's three dimensions of power and even Foucault. The strongest candidates were not only able to present different theoretical models of power but, as the question required, critically evaluate them.

Q12 Answers to this question on new technology were uneven. Weaker answers concentrated too heavily on examples of new technologies, simply describing and discussing how important they were to particular organisations. Better students adopted a stronger analytical approach, highlighting different models of how organisation engaged with new technologies, and stressing the socially constructed nature of this relationship.

REPORT ON FINAL HONOURS SCHOOL OF MATERIALS ECONOMICS AND MANAGEMENT, PART II EXAMINATION

Part I

A. STATISTICS

(1) **Numbers and percentages in each category**
Candidates are given a mark on the basis of their performance in the Part II examination and then given a classification on the basis of their performance across Part I and Part II. Since the number of candidates in this and previous years is less than 6, numerical data is confidential (see section E, below).

(2) **The use of vivas**
Vivas were not used for this Examination.

(3) **Marking of scripts**
All scripts were double-blind marked by the Examiners and Assessors. The full procedures are described in the Examination Conventions.

B. NEW EXAMINING METHODS AND PROCEDURES

For the Materials Paper (Materials Options Paper 2), each marker was required to award only integer marks for each question, in response to recommendations from the external examiners. The two marks awarded for each question were then averaged. These averaged marks were then summed to give a total for the entire paper, rounding **up** to the next integer if the sum was not an integer. It is recommended that this now becomes standard practice. The format of the two Materials Options papers differed from previous years; hence a specimen of Options Paper 1 was issued to candidates earlier in the year.

C. CHANGES IN EXAMINING METHODS, PROCEDURES AND CONVENTIONS WHICH THE EXAMINERS WOULD WISH THE FACULTY AND THE DIVISIONAL BOARD TO CONSIDER

During the marking of MEM scripts a possible anomaly was revealed, in that in previous years MEM marks may have been confirmed for release prior to the final meeting of the management examiners, including their externals. In future this issue should be addressed either by agreeing that the MEM marks will be delayed until the final meeting of the management board of examiners or by a mechanism by which the management examiners agree to the release of the MEM marks prior to their meeting. There is a particular concern here should the aforesaid final meeting decide to scale a paper taken by MEM candidates.

D. EXAMINATION CONVENTIONS

The previous year's Examination Conventions were included in the Course Handbook that was distributed to all candidates in hard-copy and was also made available on the Departmental website, to which candidates' attention was drawn by e-mail. The current year's Conventions were put on the Departmental website and sent electronically, along with other information in a letter from the Chair of Examiners, on 11 March 2011 to all candidates. The Examination Conventions were agreed by the Board of Examiners and the Department's Academic Committee.

Part II

A. GENERAL COMMENTS ON THE EXAMINATION

There were 2 candidates for the examination. The examination consisted of 2 written papers, one being a compulsory Materials Options paper, and the other paper being selected from a range of Economics and Management options. For the Materials Options paper, candidates were offered 12 questions in 6 sections each containing 2 questions; candidates were required to answer 4 questions, 1 from each of three sections and 1 from any of the same three sections. In addition to the written papers, candidates are required to submit a report on a 24-week industrial placement, which has the

weight of 2 written papers. The reports on these 24-week Management projects are marked by staff at the Said Business School. For reasons of anonymity, the details of the overall mean marks are discussed in Section E, below.

B. EQUAL OPPORTUNITIES ISSUES AND BREAKDOWN OF THE RESULTS BY GENDER

Due to the small number of candidates for this examination, the numerical data is confidential (see section E, below).

C. DETAILED NUMBERS ON CANDIDATES' PERFORMANCE IN EACH PART OF THE EXAMINATION

Since the number of candidates in this and previous years is less than 6, numerical data is confidential (see section E, below).

D. COMMENTS ON PAPERS AND INDIVIDUAL QUESTIONS

Detailed comments on the written examination papers and overall candidates' performance on individual questions are attached.

E. COMMENTS ON THE PERFORMANCE OF IDENTIFIABLE INDIVIDUALS AND OTHER MATERIALS WHICH WOULD USUALLY BE TREATED AS RESERVED BUSINESS

For reasons of anonymity, the details of the overall mean marks are discussed in this section. For Parts I and II combined the average mark was in the [redacted] range.

(1) **Numbers and percentages in each category**
Candidates are given a mark on the basis of their performance in the Part II examination and then given a classification on the basis of their performance across Part I and Part II. There were 2 candidates for the examination, [redacted]

Class	Number			Percentage (%)		
	2010/11	2009/10	2008/09	2010/11	2009/10	2008/09
I	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
II.I	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
II.II	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
III	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Pass	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Fail	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

(2) **Breakdown of the results by gender**

	Overall mark		Part 2 Mark		Part 1 Mark	
mark (%)	Male	Female	Male	Female	Male	Female
0 - 40	[redacted]	-	[redacted]	-	[redacted]	-
40–50	[redacted]	-	[redacted]	-	[redacted]	-
50–60	[redacted]	-	[redacted]	-	[redacted]	-
60–70	[redacted]	-	[redacted]	-	[redacted]	-
70–80	[redacted]	-	[redacted]	-	[redacted]	-
80–90	[redacted]	-	[redacted]	-	[redacted]	-
Totals	2	-	2	-	2	-

(3) **Candidates' Performance in each part of the examination**

Both candidates sat the Materials Options paper, for which the mean mark (MS and MEM students combined) was 57.5%. In addition, one candidate sat the Strategic Management paper, achieving [redacted], whilst the other candidate sat the Economic Decisions paper with a mark of [redacted].

(4) **Equal Opportunities issues**
There were no female candidates and no candidates with declared disabilities.

F. NAMES OF MEMBERS OF THE BOARD OF EXAMINERS

MEM:

Prof. A.I. Kirkland (Chairman)

Dr M.R. Castell

Prof. P.S. Grant

Prof. C.R.M. Grovenor

Dr. R.I. Todd

Dr. P.R. Wilshaw

Dr Owen Darbishire (Management)

Dr Victor Seidel (Management)

Dr Eric Thun (Management)

Dr Chris Bowdler (Economics)

Dr Howard Smith (Economics)

Prof Jon Binner (External)

Prof Mark Rainforth (External)

Prof Paul Cousins (External, Management)

Prof Robin Mason (External, Economics)

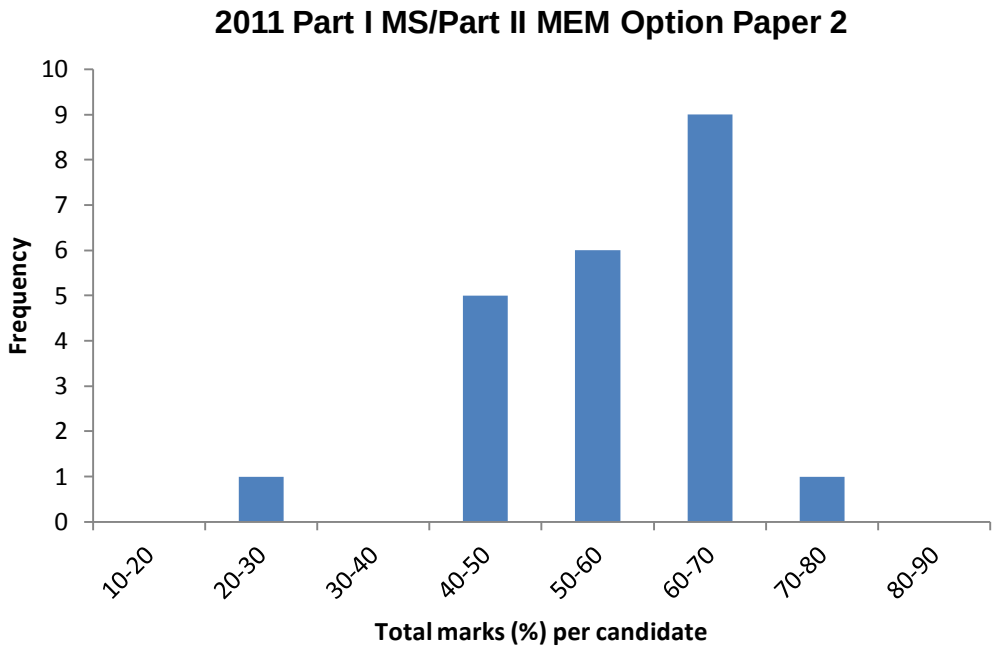
Attachments: Examination Conventions 2011
Comments on Materials Option Paper 2
Comments on Economics paper

Materials Options Paper 2

Examiner: **Prof Chris Grovenor**
Candidates: **22 (20 MS / 2 MEM)**
Mean mark: **57.45%**
Maximum mark: **76%**
Minimum mark: **28%**

Detailed comments on the paper are as follows:

Question	No of Answers	Average Mark	Highest Mark	Lowest Mark	Topic
1	6	9.08	12	1	Microstructures in eng. alloys
2	7	14.79	20.5	6.5	Ordering, and uses of beta Ti alloys
3	12	15.17	19	3.5	Ni alloy turbine blades
4	5	13.50	17	11.5	Fabrication of components
5	4	11.88	17.5	7	Magnetoresistive devices
6	8	12.56	16.5	9	Silicon crystal growth
7	9	14.67	18.5	11.5	Bioreactivity and drug delivery
8	10	16.60	21.5	10.5	THR materials and fixation
9	5	12.10	14.5	9.5	Polymer based PV devices
10	2	14.25	16	12.5	Analysing polymers/PET life cycle
11	7	15.71	19.5	7	Nuclear fuel cycle
12	13	15.85	19.5	10	Alternative power generation



General Comments

The paper average of 57.5% is rather below what the examiners were aiming at, although the fact that one candidate was able to score 76% suggests that it was not inappropriately difficult. On all questions except Q1 the average score was above 40%, and the highest average mark was 66.4 on question 8. The questions required mostly discursive essay type answers, and the most common reason for poor marks was simply a lack of enough specific, relevant information.

Specific Comments

ADVANCED ENGINEERING ALLOYS AND COMPOSITES

Question 1. Microstructures in engineering alloys.

A relatively unpopular and poorly done question. Even the introductory section on basic definitions of key concepts in martensitic transformations seemed beyond the students, and the TiAl and maraging steel micrographs only elicited general and vague answers with very little detail of the kind explicitly requested.

Question 2. Ordering, and uses of beta Ti alloys

Several candidates showed good recall of the equations governing the thermodynamics of ordering, but the amount of detail they were able to contribute to a discussion of the manufacture, microstructure and applications of beta Ti alloys was very limited.

ADVANCED MANUFACTURE WITH METALS AND ALLOYS

Question 3. Solidification of Ni alloy turbine blades

A relatively popular question, with one of the better average scores. Candidates had a reasonable grasp of the processes involved in controlling nucleation and growth to achieve single crystal blades, including in the better scripts a description of constitutional supercooling. The discussion of thermal barrier coatings varied from the non-existent to quite detailed and informed answers.

Question 4. Fabrication of metallic components

An essay question that was attempted by few candidates and no one produced a really good answer. The discussion of casting, extruding and welding techniques was mostly superficial and lacking in detail, and in particular it was rarely obvious that the candidates understood that a manufacturing process needs to be thought about as a whole, rather than as a single operation.

DEVICES, MEMORY AND STORAGE

Question 5. Magnetoresistive devices

Only 4 answers to this very detailed question on magnetoresistance phenomena and the kind of devices that can exploit it, but at least one candidate achieved a respectable mark. Other candidates clearly had rather little understanding of the subject at the level of detail that was required.

Question 6. Silicon crystal growth

Eight answers to a standard question on the growth of large Si crystals by the Czochralski or the float zone process. While several candidates knew the basics of the growth processes, they were unable with any confidence to select material from the two processes for the application areas specified, and knew rather little about COP defects. The calculation was a simple one once the concentrations had been correctly identified from the question, but several candidates did not do this correctly.

BIOMATERIALS AND NATURAL MATERIALS

Question 7. Bioreactivity and drug delivery

Relatively popular question on a topic where a lot of students attend the lectures. Almost all the answers showed some understanding of the key issues, but no one answer could bring together all the information needed to generate a really good mark. The main failing was in giving insufficient information on specific materials choices for the different applications.

Question 8. THR materials and fixation

Another popular question, on hip replacement materials, and with the best overall average on this paper. Almost all the answers showed understanding of the components and materials involved, and some were extremely complete and well argued. The most common reason for losing marks was, as for Q7, failing to give sufficient information on specific materials choices for the different applications.

ADVANCED POLYMERS

Question 9. Polymer based PV devices

5 attempts at this question from the Advanced Polymers course, none of which scored better than 14.5/25. There were few convincing descriptions of the key morphological issues in a P3HT-PCBM solar cell, and only generic descriptions of spinodal decomposition in this system rather than showing an understanding of the asymmetry of the phase diagram.

Question 10. Characterisation of polymers and PET life cycle

Only two attempts at this question on diffraction analysis of polymers and the PET life cycle, both showing some understanding. In both cases it was the lack of detail that limited the marks awarded, especially in the differences between X-ray and neutron scattering from polymers and the value of deuteration in neutron experiments, and in the full breadth of the PET life cycle.

MATERIALS FOR ENERGY (New course)

Question 11. Nuclear fuel cycle

Several good answers to a question on the nuclear fuel cycle and components in different designs of reactor. The candidates were not able to accurately select materials for cladding, control rods and moderators, but were able to describe reprocessing strategies and to classify waste with much more confidence.

Question 12. Alternative power generation

A very popular question on wind power and fuel cells that also produced some good scripts and a high average mark. The section on fuel cells was fairly straightforward, but the answers were confident and comprehensive. The section on materials aspects of wind generators was not done as well, but a good deal of understanding of the issues was demonstrated.

Examiners Report for MEM 2011---Economics Papers.

Howard Smith 25th October 2011

Part I

Five (5) MEM candidates were entered for Introductory Economics, which they sat in 2010. The Introductory Economics scripts were double marked for EEM and MEM students. The paper is also taken as a Prelims exam by PPE and E&M students, and for those students the paper is single marked. A detailed report on this paper was produced by the Prelims Examiners for PPE in 2010, including comments on individual questions.

The mark for the MEM (year 2010) candidates is compared with the E&M (year 2010) candidates below:

MEM (5 candidates) mean [redacted]. E&M candidates: Mean 62.

Part II

Five economics papers are available to MEM Part II candidates, of which Microeconomics is compulsory.

Only two of these Microeconomics and Economic Decisions within the Firm were taken this year by MEM candidates. For these two papers the means for the MEM candidates are compared with the E&M candidates below:

Microeconomics
MEM (5 candidates): Mean [redacted] E&M (81 candidates): Mean 62.9

Note that for Microeconomics the paper taken by EEM candidates was the same as that for E&M (and PPE) candidates; however as EEM candidates had 3 hours and E&M candidates only 2 hours 15 minutes, the EEM candidates were asked to answer an extra question. The Microeconomics paper is taken in large numbers by PPE and E&M students, and full reports on these papers can be found in the Examiners Report for PPE.

Economic Decisions within the Firm
MEM (1 candidate): Mark [redacted]. Note that this paper is mainly taken by EEM students. The report below is reproduced from the EEM examiner report:

19 candidates sat the paper: 15 EEM, 1 MEM and 3 EM students. Performances were on the whole very strong. There were 17 First Class marks, 1 Upper Second Class mark and 1 failing mark. Answers were more evenly spread between the Linear Programming and Applied Probability parts of the course than in some years.

Comments on Individual Questions

1. (Duality)(10 attempts) On the whole answered well but students were not always able to state results accurately.
2. (Simplex)(17 attempts) A standard question which attracted very good answers.
3. (Transportation/Assignment)(18 attempts) Answered well.
4. (Zero-Sum Games)(2 attempts) Not popular.
5. (Decision Trees)(18 attempts) As ever a popular topic. Not as straightforward as some decision tree problems in past exams but still very good answers.
6. (Queues)(10 attempts) Mostly standard material and answered well.
7. (Dynamic Programming)(15 attempts) A fairly standard problem, which was answered well.
8. (Inventories/Dynamic Programming)(5 attempts) Not popular but on the whole answered well.

END

Examination Conventions 2010/11

Final Honours School
Materials, Economics and Management

1. INTRODUCTION

The formal procedures determining the conduct of examinations are established and enforced by the University Proctors. These conventions are a guide to the examiners and candidates but the regulations set out in the Examination Regulations have precedence. The examiners are nominated by the Nominating Committee* in the Department of Materials and those nominations are submitted for approval by the Vice-Chancellor and the Proctors. Formally, examiners are independent of the Department and of those who lecture courses. However for written papers on Materials Science in Part I and Part II, examiners are expected to consult with course lecturers in the process of setting questions. The paragraphs below indicate the conventions to which the examiners usually adhere, subject to the guidance of the appointed external examiners, and other bodies such as the Academic Committee in the Department, the E(M)EM Standing Committee, the Mathematical, Physical and Life Sciences Division, the Social Sciences Division, the Education Committee of the University and the Proctors who may offer advice or make recommendations to examiners. It must be stressed that to preserve the independence of the examiners, candidates are not allowed to make contact directly about matters relating to the content or marking of papers. Any communication must be via the Senior Tutor of your college, who will, if he or she deems the matter of importance, contact the Proctors. The Proctors in turn communicate with the Chairman of Examiners.

Marking criteria for the Team Design Project are published in the FHS course handbook.

During the marking process the scripts of all written papers remain anonymous to the markers.
[In some of the descriptions of marking for individual elements of coursework that are given later in this document the term 'double marked, blind,' is used; this refers to the fact that the second marker does not see the marks awarded by the first marker until he or she has recorded his or her own assessment, and does not indicate that the candidate is anonymous to the markers.]

Late Submission of or Failure to Submit Coursework
The Examination Regulations stipulate specific dates for submission of the required pieces of coursework to the Examiners (1. A set of detailed reports of practical work; 2. A Team Design Project Report; 3. Industrial Visit Reports as specified in the course handbook; and 4. A Part II Management Project Report). Rules governing late submission and any consequent penalties are set out in the 'Late submission of work' sub-section of the 'Regulations for the Conduct of University Examinations' section of the Examination Regulations (pp45-46 of the 2006, 2007 & 2008 Regulations and pp46-47 of the 2009 Regulations).

Under the provisions permitted by the regulation, late submission of coursework for Materials Science or Materials, Economics & Management examinations will normally result in the following penalties:

(d) With permission from the Proctors under clause (1) of para 16.8, no penalty.
(e) With permission from the Proctors under clauses (3) + (4) of para 16.8, for the first day or part of the first day that the work is late a penalty of a reduction in the mark for the coursework in question of up to 10% of the maximum mark available for the piece of work, and for each subsequent day or part of a day that the work is late a further penalty of up to 5% of the maximum mark available for the piece of work; the exact penalty to be set by the Examiners with due consideration given to any advice given in the Proctors' "Notes for the Guidance of Examiners and Chairmen of Examiners".
(f) Where the candidate is not permitted by the Proctors to remain in the examination he or she will be deemed to have failed the examination as a whole.

* for 2010-11 the Nominating Committee comprises Dr Czernuszka (Chair), Professor Grovenor and Dr Taylor.

Where no work is submitted or it is proffered so late that it would be impractical to accept it for assessment the Proctors may, under their general authority, and after (i) making due enquiries into the circumstances and (ii) consultation with the Chairman of the Examiners, permit the candidate to remain in the examination. In this case the Examiners will award a mark of zero for the piece of coursework in question.

Penalties for late submission of individual practical reports are set out in the MS/MEM FHS Handbook and are separate to the provisions described above.

2. PARTS I & II

Candidates taking Ec1: Introductory Economics in the 2nd year.
MEM candidates sit the compulsory Ec1: Introductory Economics paper in Trinity Term of their second year. This paper will be set and examined as for all other Part I and Part II Economics papers (see below) and contributes to the Part I mark. The marks for this paper will be formally ratified by the Board of examiners for Part I examinations held in the Trinity Term following that in which the Ec1 paper is sat.

Candidates for Part I (3rd year)
Part I candidates take four compulsory Materials papers (General Papers 1 – 4); one compulsory Economics paper; and one compulsory Management paper. In addition, candidates are assessed on their Materials coursework (practical work, the team design project, and industrial visits). Marks from the Ec1 paper sat in Trinity Term of the 2nd year are included in the Part I total.

Candidates for Part II (4th year)
Part II candidates take one compulsory Materials Options paper and one paper from a range of Management and Economics options. In addition they are assessed on their report of a six-month industrial placement, which carries the weight of two papers.

(1) *Setting of papers*

Part I Materials General Papers 1 – 4 are set by the materials examiners in consultation with course lecturers. The responsibility for the setting of each examination paper is assigned to an examiner, and a second examiner is assigned as a checker. The Materials Option paper in Part II is set by lecturers of option courses and two examiners, the examiners acting as checkers. For the Materials papers, the examiners, in consultation with lecturers, produce model answers for every question set and the wording and content of all examination questions set, and the model answers, are scrutinised by all examiners, including, in particular, the external examiners.
The Economics and Management papers are set by examiners nominated respectively by the Economics Faculty and the Said Business School.

(2) *Paper format*

Materials Papers
All Materials general papers comprise eight questions from which candidates attempt five and are taken in Part I. Each question is worth 20 marks. The total number of marks available on each general paper is 100. Materials Option papers comprise one section for each twelve-hour Options lecture course, each section containing two questions: candidates are required to answer one question from each of any three sections and a fourth question drawn from any one of the same three sections. The total number of marks available on each option paper is 100, and all questions carry equal marks. Questions are often divided into parts, with the marks for each part indicated on the question paper.

Economics and Management papers
Candidates are advised to read particularly carefully the specific instructions on the front of each paper as to the number of questions they should submit, since the rubrics on Economics and Management papers differ slightly from those for the Materials papers.

(3) *Marking of papers*

Materials Papers
All scripts are double marked, blind, by the setter and the checker. After individual marking the two examiners meet to agree marks question by question. If the differences in marks are small (~10%, 2-3 marks for most questions), the two marks are averaged, with no rounding applied. Otherwise the examiners identify the discrepancy and read the answer again, either in whole or in part, to reconcile the differences. If after this process the examiners still cannot agree, they seek the help of the Chairman, or another examiner as appropriate, to adjudicate. An integer total mark for each paper is awarded, where necessary rounding up to achieve this.

The Materials Options paper is marked by course lecturers acting as assessors and an examiner acting as a checker.
The Materials external examiner provides an independent check on the whole process of setting and marking.
The rubric on each paper indicates a prescribed number of answers required (e.g. "candidates are required to submit answers to no more than five questions"). Candidates will be asked to indicate on their cover sheet which questions, up to the prescribed number, they are submitting for marking. If the cover slip is not completed then the examiners will mark the first five questions in numerical order by question number. The examiners will NOT mark questions in excess of the prescribed number. If fewer questions than the prescribed number are attempted, (i) each missing attempt will be assigned a mark of zero, (ii) for those questions that are attempted **no** marks beyond the maximum per question indicated under section 2(2) above will be awarded and (iii) the mark for the paper will still be calculated out of 100.

As the total number of students sitting some papers is small, it is not unusual for mean marks to vary from paper to paper, or year to year. It is not therefore normal practice to adjust marks to fit any particular distribution. However, where marks for papers are unusually high or low, the examiners may, having reviewed the difficulty of the paper set or other circumstances, decide with the agreement of the external examiner to adjust all marks for those papers. For the Materials papers such adjustment is referred to as 'scaling' and the normal procedure will be as follows:

a. Papers with a *mean taken over all candidates* of less than 55% or more than 75% are normally adjusted to bring the *mean* respectively up to 55% or down to 75%. Normally this is achieved by adding/subtracting the same fixed number of marks to/from each candidate's score for the paper.
b. For papers with a mean in the ranges either of 55-60% or 70-75%, including those scaled under (i) above, the questions and typical answers are compared in order to ascertain, with the help of the external examiners, whether the marks are a fair reflection of the performance of the candidates as measured against the class descriptors. If not, the marks are adjusted. Normally this is achieved by adding/subtracting the same fixed number of marks to/from each candidate's score for the question or for the paper.
c. The mean mark and the distribution of marks, both taken over all written papers, are considered, again with the help of the external examiners, in order to ascertain whether these overall marks are a fair reflection of the performance of the candidates as measured against the class descriptors. If not, the overall marks are adjusted. Normally this is achieved by adding/subtracting the same fixed number of marks to/from each candidate's overall score.

Economics and Management Papers
The rubrics on Management and Economics papers differ slightly from the above, but numerical marking is used and all examiners mark to the standard class boundaries [see section on classification] and range of marks (0-100). All scripts in Economics and Management are double-marked. Management examiners mark on a question-by-question basis, whereas in Economics a mark is awarded for the performance on the paper as a whole. Economics and Management examiners mark papers and then consider the marks distribution for the whole cohort taking the paper (including candidates from other joint schools). After careful consideration of such factors as: the marks, the candidate's overall performance and the level of difficulty of the questions, they may make adjustments for each candidate. The adjusted marks for papers and half papers are then forwarded to the Chairman of the MEM Examination Board.

(4) *Marking of Practicals for Part I*

Practicals are assessed continually by senior demonstrators in the teaching laboratory and in total are allocated 50 marks. Part I examiners have the authority to set a practical examination.

(5) *Marking Industrial Visits*

Four industrial visit reports should be submitted during Part I. Reports are assessed by the Industrial Visits Academic Organiser on a satisfactory / non-satisfactory basis, and are allocated a total of 20 marks.

(6) *Marking the Team Design Projects*

The team design project is double marked, blind, by two of the Part I Examiners. They then compare marks and analyse any significant disagreement between these marks before arriving at a final agreed mark for each project and each team member. Supervisors of the projects submit a written report to the examiners on the work carried out by their teams and these are taken into consideration when the examiners decide the final agreed marks. Industrial representatives may be asked to contribute to the assessment process. The project is allocated 50 marks, of which 25 are for the written report and 25 for the oral presentation. The same two examiners assess both the reports and the presentations.

(7) *Part I and II vivas*

There will be no Part I or Part II vivas in the 2010/11 Examination.

(8) *Marking the 4th Year Management Project*

The management project is allocated 200 marks and is marked by the Saïd Business School.

The projects are assessed and graded independently by two Assessors. The supervisor's comments on the performance of the candidate are provided to the Assessors. The marks provided by the Assessors are moderated by an Examiner, and the final mark is ratified by the Board of Examiners.

The process is:

- Supervisors provide a report on the performance of the student, indicating any special circumstances that could have affected the student's performance on the project and report preparation.
- The project reports are graded blind by two Assessors, taking account of the Supervisor's comments. At least one of the Assessors will have knowledge of the area of the project.
- The Supervisor's report, and Assessors' reports and marks are provided to an Examiner, who moderates the marks and provides a final mark for ratification by the Board of Examiners.
- Supervisors may not act as Assessor or Examiner for a project they have supervised.
- An Assessor may also act as Examiner for a project. The Assessor should assess and mark the report before having sight of the other Assessor's report and marks.

3. CLASSIFICATION

The following boundaries (CVCP) and descriptors (MPLSD) are used as guidelines:

Class I Honours 70 – 100	The candidate shows excellent problem-solving skills and excellent knowledge of the material over a wide range of topics, and is able to use that knowledge innovatively and/or in unfamiliar contexts.
Class IIi Honours 60 – 69	The candidate shows good or very good problem-solving skills, and good or very good knowledge of much of the material over a wide range of topics.
Class IIii Honours 50 – 59	The candidate shows basic problem-solving skills and adequate knowledge of most of the material.
Class III Honours 40 - 49	The candidate shows reasonable understanding of at least part of the basic material and some problem solving skills. Although there may be a few good answers, the majority of answers will contain errors in calculations and/or show incomplete understanding of the topics.
Pass 30 - 39	The candidate shows some limited grasp of basic material over a restricted range of topics, but with large gaps in understanding. There need not be any good quality answers, but there will be indications of some competence.
Fail 0 - 29	The candidate shows inadequate grasp of the basic material. The work is likely to show major misunderstanding and confusion, and/or inaccurate calculations; the answers to most of the questions attempted are likely to be fragmentary only.

In borderline cases the examiners use their discretion and consider the overall quality of the work the candidate has presented for examination. The external examiner often plays a key role in such cases.

Part I:

Unclassified Honours – The examiners are required to classify each candidate according to her/his overall average mark in Part I as (a) worthy of Honours, (b) Pass or (c) Fail. A candidate is allowed to proceed to Part II only if he/she has been adjudged worthy of honours by the examiners in Part I. The examiners do not divide the categories further but tutors and students may infer how well they have done from their marks. Candidates adjudged worthy of honours normally proceed to Part II but they may, if they wish and subject to approval from the relevant bodies, leave after Part I in which case an Unclassified Honours B.A. degree will be awarded.

Pass – The examiners consider that the candidate is not worthy of honours and therefore will not be allowed to proceed to Part II. The candidate may leave with a B.A. (without honours) or may retake Part I the following year (subject to college approval).

Fail – The examiners consider that the candidate is not worthy of a B.A. The candidate either leaves without a degree or may retake Part I the following year (subject to college approval).

Part II:

Classified Honours – Once marking is completed for both Parts I and II an overall percentage mark is computed for each candidate and classification then takes place. Subject to the requirement that Part II be adjudged worthy of honours (see below), classification is based solely on the overall percentage mark; the candidate's profile of marks from each element of assessment is only taken into account in borderline cases. However, a candidate cannot be awarded an M.Eng. degree unless his/her performance in Part II is adjudged worthy of honours i.e. a candidate must be

adjudged worthy of honours both in Part I and in Part II to be awarded the M.Eng. degree. Failure to achieve honours in Part II will result in the candidate leaving with an unclassified B.A. (Hons) irrespective of the aggregate mark.

Pass – Notwithstanding the award of unclassified honours in Part I, the examiners consider that the candidate's overall performance is not worthy of an M.Eng. The candidate is listed as a Pass on the class list and is awarded an unclassified B.A. (Hons) on the basis of Part I performance.

Fail – The examiners consider that the candidate's overall performance is not worthy of an M.Eng. *and* that the performance in Part II is not worthy of a Pass. The candidate is excluded from the class list but is nevertheless awarded an unclassified B.A. (Hons) on the basis of Part I performance.

- The examiners cannot award unclassified honours on the basis of Part II performance unless permitted to do so by the Proctors.
- Nevertheless, candidates awarded a Pass or a Fail by the Part II examiners leave with an unclassified B.A. (Hons) because they were judged worthy of that in Part I (i.e. their degree is the same as if they had left immediately after Part I).
- In terms of the degree awarded, there is no difference between a Pass and a Fail in Part II. The only difference is whether or not the name appears on the class list.
- Candidates cannot normally retake Part II because the Examination Regulations require that they must pass Part II within one year of passing Part I. This rule can only be waived in exceptional circumstances, with permission from the Education Committee.

Annex: Summary of marks awarded for different components of the MEM Final Examination in 2011 (For Part I and Part II students who embarked on the FHS respectively in 2009/10 and 2008/09)

	Component	**Mark**
Part I	General Paper 1	100
	General Paper 2	100
	General Paper 3	100
	General Paper 4	100
	Introductory Economics (Ec1)	100
	Paper M1	100
	Microeconomics	100
	Practicals & Industrial visits	70
	Team Design Project	50
Part I Total		*820*
Part II	Management Project	200
	Options Paper 1	100
	One paper from a choice of Economics and Management Papers.	100
Part II Total		*400*
Overall Total		*1220*

MATERIALS EXTERNAL EXAMINERS' REPORTS

Jon Binner
Head of Department (now Dean of School) and Professor of Ceramic Materials
Loughborough University
4th August 2011

External Examiners' Report

Department of Materials, Oxford University

Part I and Part II

(i) Whether the academic standards set for its awards, or part thereof, are appropriate;

The standards set by the examiners were entirely appropriate.

(ii) The extent to which its assessment processes are rigorous, ensure equity of treatment for students and have been fairly conducted within institutional regulations and guidance;

From my observation, all students were treated equitably and the assessment process was rigorous. When an issue arose that required careful consideration of the institutional regulations, this was undertaken with great care and attention. The two recommendations that I would make are that:

1. The question of the viva affecting the mark of the final year project report be considered. Officially, I believe that the viva does not affect the project report mark. Observation suggests that in practice it does. A student who performs well during the viva can see their mark for the report raised and, of course, vice versa. Ostensibly this is because it allows the examiners a clearer view of what the student has achieved. I think that it would be fairer to the students if the link between the viva and the project mark was made more open and transparent and I would encourage the academic staff to debate this point over the next year for the 2012-13 Part II cohort.
2. The reports on the industrial site visits either get a mark of 100% or zero (the latter if they are not submitted). Given the rather variable quality of the reports (some appear to be largely downloaded from the web pages of the company visited), I don't think that it would be a huge amount of extra effort for them to be marked in a slightly more demanding manner, even if this just involved giving them a mark of 0 to 5 out of 5 (with no half marks).

(iii) The standards of student performance in the programmes or parts of programmes which they have been appointed to examine;

It is clear that some students are more capable than others but the result of the examination process was very much in keeping with the ability they displayed. The provision of a viva to all final year students is excellent since it provides every student with the opportunity to demonstrate their ability to the examiners and, in particular, the External Examiners who have not met them before.

(iv) Where appropriate, the comparability of the standards and student achievements with those in some other higher education institutions;

As I have indicated previously:

- For the Part I students, the examinations that were set, the answers that were provided by the students and the marking of those answers were entirely comparable with the standards and achievements of students in the other higher education institutions with which I am familiar.
- It is more difficult for me to make direct comparisons for the Part II students. Our Part II students at Loughborough follow a different path; their individual project is in their 3rd year and their group project in their 4th year. At Oxford, this is reversed allowing the students to really 'go to town' on

their individual project. Clearly some students have very much risen to the challenge and some excellent work has been done. I believe, therefore, that the marks awarded are entirely appropriate.

(v) Issues which should be brought to the attention of supervising committees in the faculty/department, division or wider University;

None

(vi) Good practice that should be noted and disseminated more widely as appropriate.

I believe that the whole process is performed rigorously and with passion. I always appreciate the chance to meet all of the Part II students and be present at an interview conducted in some depth. I would also like to thank all of the staff involved in the process, who made the experience, which is pretty intense and requires a tremendous amount of reading, as much fun as these things ever can be!

Jon Binner
Head of Department (now Dean of School) and Professor of Ceramic Materials
Loughborough University
4th August 2011

THE UNIVERSITY OF SHEFFIELD
Department of Materials Science and Engineering
Sir Robert Hadfield Building
Mappin Street
Sheffield, S1 3JD
United Kingdom
Tel: 0114 222 5978
Fax: 0114 222 5943
E-Mail: m.rainforth@sheffield.ac.uk

Professor WM Rainforth, BMet, PhD, FIMMM, FRMS, FInstP, CEng, CPhys
25/7/11

External Examiners Report: Honour School of Materials Science (XMET/DMTA/DMTB) and Honour School of Materials, Economics, and Management (XMMA/DMMA/DMMB), Academic Year 2010/11

In summary, I found the examination procedures, standards and conventions to be all highly satisfactory. The overall standards were excellent. There are some minor comments, addressed below under the specific topics:

(i) Whether the academic standards set for its awards, or part thereof, are appropriate

The academic standard set is entirely appropriate. The standard within the written examination papers was generally very high. The standard of marking of the written examination papers was rigorous and set high standards. The standard of the Part II theses was largely excellent.

(ii) The extent to which its assessment processes are rigorous, ensure equity of treatment for students and been fairly conducted within institutional regulations and guidance

All examination material is marked blind by two independent markers, which ensures absolute equity of treatment for all students. Where marks awarded by the two examiners differed significantly (which was relatively uncommon) appropriate procedures were in place for the moderation. The careful reporting of project management in Part II theses allows a much better comparison of projects concerned with very different topics (e.g. setting standards in a range of theoretical and experimental research topics). The examination process is rigorous and transparent and should be thoroughly commended.

(iii) The standards of student performance in the programmes or parts of programmes which they have been appointed to examine

In general, the student performance was excellent. The top students, who were awarded the highest level of degree, were without doubt of outstanding standard and will undoubtedly be a tribute to Oxford University.

The standard of marking was equitable across the all papers. Marking carefully discriminated the difference between standard, good and exceptional students. In the latter case, the student needed to show substantial in-depth knowledge of the subject. Attaining a first class degree certainly required an excellent level of achievement.

The Part II theses produced were of variable standard, but could be classed as satisfactory to outstanding. Indeed, the top theses were simply excellent, and I would judge to be of the standard of an MPhil degree. I commented last year that students had often left insufficient time to adequately discuss their work, rather concentrating on the volume of data produced to the detriment of the analysis of the data, which had resulted in a lower level of final achievement. I felt that this year there was a clearer indication of close project management, that the student had devoted sufficient time to discuss their results and consequently the resultant thesis accurately reflected the student ability. However, there was at least one instance of an extensive analysis by the student which was found to contain extensive flaws by the examiners, but for which the supervisor considered that they had corrected the thesis. The examiners rightly debate the precision in marking the theses, but it is, of course, far more difficult to assess the supervisors input into the quality of the student's thesis. However, I believe the current procedures in place are excellent, and the student's achievement is thoroughly assessed in a fair and equitable manner.

(iv) Where appropriate, the comparability of the standards and student achievements with those in some other higher education institutions

In general, the level of attainment by the students is in-line with that expected of Oxford University, namely at a higher level that many other higher education institutions. It is difficult to make an absolute comparison as most other Material Science and Engineering degree courses have quite a different structure, specifically they do not include a Part II thesis which involves a full academic year. In any event, I am confident that the student achievement of Materials students at Oxford University is outstanding. Moreover, the depth and breadth of knowledge of the students, resulting from a wide range of challenges set, is without question, excellent.

(v) Issues which should be brought to the attention of supervising committees in the faculty/department, division or wider University

I have no issues this year.

(vi) Good practice that should be noted and disseminated more widely as appropriate

I remain impressed by the manner in which students are trained on research equipment for their part II projects, which means that the students present as far as is possible, work that is entirely their own. The examination committee, that blind marks examination papers and Part II projects, is an example of excellent practice in ensuring high standards and

equitable treatment of all examiners.

In summary, I would like to congratulate the department on the high standards that they have maintained.

Professor WM Rainforth

Faculty of Materials
Department of Materials Academic Committee

RESPONSE TO EXAMINERS' REPORTS 2011

Honour School of Materials Science (MS) Parts I & II

Honour School of Materials, Economics & Management (MEM) Parts I & II – Materials elements only, main response will be made by the E(M)EM Standing Committee

Following a preparatory meeting between the Chair of DMAC, The Deputy Administrator (Academic) and the incoming Chair of FHS Examiners, the External Examiners' reports, the FHS Chairperson's report and internal reports on all of the individual Materials papers were considered by the Chairman of Department of Materials Academic Committee (DMAC). Being aware that no major issues had been raised in the Examiners' reports for 2011 DMAC authorized the present response to be made by Chair's action.

1. Summary of major points

There were no major issues arising from the 2011 Examinations.

2. Points for inclusion in Responses to the External Examiners

MS & MEM Parts I & II: Professor J. Binner

We thank Professor Binner for his positive report and the time and effort devoted to his role as an External Examiner, not least in reading the Part II MS theses.

Our Teaching Committee will consider his suggestion that the marking of the Industrial Visit Reports might be more differentiated than the present Pass (5 marks) or Fail (0 marks).

He has also suggested that we clarify the link between the Part II MS viva and the final project mark – this link is in fact set out in our Exam Conventions (the relevant section is copied below) but in liaison with the 2012 Chairman of Examiners our Teaching Committee will consider if this statement needs refinement:

> "A *viva voce* examination is held: the purpose of the viva is to clarify any points the readers believe should be explored, and to ascertain the extent to which the work reported is the candidate's. An examiners' discussion is held after the viva, involving all Part II examiners, and at which time Part B of the supervisor's report is taken into account. The outcome of the discussion is an agreed mark for the project. It is stressed that it is the scientific content of the project that is being considered in the viva. In the overwhelming majority of cases, the viva has only a small influence on the agreed mark awarded to a Part II thesis."

The Conventions also make it clear that it is at the viva that the Examiners first consider (i) any mitigating circumstances raised via the Proctors and (ii) Part B of the project supervisor's report on the candidate. These too may influence the final mark:

> "Subject to guidance from the Proctors, if appropriate the Board of Examiners will take into account these mitigating circumstances in their discussion after the viva.

The Supervisor's report is divided into Parts A & B: Part A provides simple factual information that is of significance to the examiners, such as availability of equipment, and is seen by the two markers before they read and assess the thesis. Part A does **not** include personal mitigating circumstances which, subject to guidance from the Proctors, normally are considered only in discussion with **all** Part II examiners thus ensuring equitable treatment of all candidates with mitigating circumstances. Part B of the supervisor's report provides her/his opinion of the candidate's engagement with the project and covers matters such as initiative and independence; it is not seen by the examiners until the discussion held after the viva."

MS & MEM Parts I & II: Professor M. Rainforth

We thank Professor Rainforth for his positive report and the time and effort devoted to his role as an External Examiner, not least in reading the Part II MS theses.

MEM Parts I & II, Management Papers: Professor P.D. Cousins

We thank Professor Cousins for his constructive and positive comments and for his careful scrutiny of scripts and reports over the period for which he has been an MEM external examiner. We concur with his desire to see the full range of marks used where appropriate.

MEM Parts I & II, Economics Papers: Prof R. Mason

We thank Professor Mason for his positive report and for his careful scrutiny of scripts.

3. Further Points

(a) We have no major comments to make on trends in FHS statistics. Noting the importance of considering averages over five or six years when dealing with small cohorts of students we observe that the proportions of first class and upper second class degrees awarded do not differ greatly from the MPLSD averages. In Materials there continues to be no significant gender gap in the proportions of male and female candidates who gain first class degrees**.**

(b) The Chairman of Examiners has requested clarification of the procedure by which the SBS examiners scrutinise the management components of the MEM degree, not least how decisions are taken regarding any scaling that might be needed. We request the EMEM Standing Committee to discuss this matter.

(c) The Department's Teaching Committee (DMAC) is concerned that in most years its ability to deliver its Q&A function in terms of scrutinising the Examiners' Reports is delayed by (often very) late submission of reports by either an external examiner or, as this year, the internal examiners. Fortunately the ability to take Chair's action in these matters means that, although delayed, the Q&A function is not in the end significantly compromised.

(d) As per the recommendation of the examiners, it will now become standard practice for an individual marker to award only integer marks for each question on a written paper and to round up marks for each paper and each main element of coursework (described in more detail on page 14, section B, of the present document).

4. Examination Conventions

We confirm that DMAC in revising our Examination Conventions we consider the points in the EdC notes of guidance on Examinations & Assessment, para 3.12, as reproduced in the July 2011 letter from the MPLSD headed 'External examiners' reports 2011'. DMAC and the incoming Board of Examiners will jointly approve the updated conventions

.A.O. Taylor, Chairman of DMAC, 7/12/11

E(M)EM Standing Committee

Reports from the External Examiners for the Economics & Management Components of MEM Part I & II

SS & MPLS

UNIVERSITY OF EXETER | BUSINESS SCHOOL

University of Exeter Business School
Building One
Rennes Drive
Exeter
UK EX4 4ST

Telephone: +44 (0)7786 464456
Fax: +44 (0)1392 723210
Web: www.exeter.ac.uk/business-school
Email: R.A.Mason@exeter.ac.uk

21 July 2011

RECEIVED
26 JUL 2011

Vice-Chancellor
c/o Mrs Sally Powell
Assistant Registrar,
University Offices,
Wellington Square,
Oxford OX1 2JD

Dear Mrs Powell,

External examiner's report for Engineering, Economics and Management, and Materials, Economics and Management, academic year 2010-2011

I acted as external examiner (Economics) for these programmes during 2010-2011. Following the guidelines set for examiners, my report covers five main issues.

Whether the academic standards set for its awards, or part thereof, are appropriate.

In my view, the academic standards are entirely appropriate.

The extent to which its assessment processes are rigorous, ensure equity of treatment for students and have been fairly conducted within institutional regulations and guidance.

I am satisfied that the assessment processes met all of these conditions. As last year, there was a potential concern on the paper *Economic Decisions within the Firm*, where the average mark was very high. I looked carefully at the examination paper and scripts. I found no evidence that the scripts had been marked incorrectly. I think the paper could have been set spread students a little more. For example, questions with multiple parts could be set so that each part becomes progressively more difficult. In a number of cases, later parts of a question were no more difficult than earlier parts. I understand, however, that this is the last year in which this paper will be set, so the issue is moot.

The standards of student performance in the programmes or parts of programmes which they have been appointed to examine (those examining in joint schools are particularly asked to comment on their subject in relation to the whole award).

I was favourably impressed by the standards shown in those scripts that I reviewed. The very best answers were technically very strong indeed.

Where appropriate, the comparability of the standards and student achievements with those in some other higher education institutions.

The students are, on average, as strong as any that I have encountered when examining at other institutions.

UNIVERSITY OF EXETER | BUSINESS SCHOOL

Issues which should be brought to the attention of supervising committees in the faculty/department, division or wider University.

Both Exam Boards were very well run this year.

Please do not hesitate to contact me if there is anything else on which you would like me to comment.

Yours sincerely,

RAMason.

Professor Robin Mason
Dean

Examiner's Report – University of Oxford.

Said Business School, The University of Oxford.
Professor Paul D Cousins.
University of Manchester, Manchester Business School.

Dear Daniel, I am sorry for the confusion over my examiner's report, this was due to a technical hitch in our email system.
This is my final report as the external examiner for Said Business School on the management and joint honours engineering and management degrees. As this is my final report, and all of my specific comments regarding students have been followed up in the various exam boards, I thought that I would give a few final general observations and suggestions.

1. Marking standards. The standard of marking at Oxford is extremely high. The blind marking process and moderation processes are the most thorough that I have come across. I can honestly say that this makes the job of an external at Oxford very easy indeed. My only comment here is that there should be a stretching of the range of marks. Up as well as down. The standard deviation of marks is generally quite small.

2. Indication of degree. I noticed this year that the 'at fear' etc classifications were removed. I would request that these should be put back in place. I found this a useful way of thinking about the student and their overall performance.

3. Timing. This year there was some confusion over administration of the joint honours programme. This led to me not being able to attend one of the examiner's meetings. Please could I request that you liaise closely with the Business School for next year's examination preparation? I would also like to request a bit more time for turning around the examination paper, this tends to be very tight.

Overall, I feel that your processes and standards are very high, your procedures are very thorough and as such your treatment of students is fair and comprehensive. I have thoroughly enjoyed my time as an external examiner at Oxford.

Kind Regards

Paul D Cousins

Minutes of the discussion of Examiners' Reports at the EMEM Standing Committee

STANDING COMMITTEE FOR EEM AND RELATED STUDIES

Part II – Reserved Minutes of the meeting held on 2 February 2012

13 Examiners' Reports for MEM

The Standing Committee received the internal and external examiners' reports for MEM – these had not been available for the Michaelmas Term meeting.

During the marking of MEM scripts a possible anomaly had been revealed, in that in previous years MEM marks might have been confirmed for release prior to the final meeting of the Management examiners, including their externals. It had been suggested that in future this issue should be addressed either by agreeing that the MEM marks would be delayed until the final meeting of the management board of examiners or by a mechanism by which the management examiners would agree to the release of the MEM marks prior to their meeting. There was a particular concern here should the aforesaid final meeting decide to scale a paper taken by MEM candidates.

The Standing Committee commented that this was in fact an issue for both EEM and MEM candidates, but agreed that it would not be reasonable to delay the release of the EEM and/or MEM marks until later in July. It was noted that whilst in the case of the General Management paper, a shift of +5 had been applied to the marks for all EEM candidates no such shift had been applied in the case of MEM candidates. The MEM examiners had not been aware of the shift for EEM candidates. Next time around it would be ensured that MEM examiners were made aware of any such shifts.

No concerns had been raised by the external examiners.