

OCR Level 2 Principal Learning in Engineering

F548

Unit F548: The engineered world

Sample Paper

Candidate
Name

Centre
Number

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Candidate
Number

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INSTRUCTIONS TO CANDIDATES

- Write your name in the space above.
- Write your Centre number and candidate number in the boxes above.

INFORMATION FOR CANDIDATES

- The total number of marks for this paper is 60.

For Examiner's Use

1	
2	
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4	
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6	
Total	

Format for viva voce examination of OCR Level 2 Unit F548 Diploma in Engineering

The examination should be conducted in a quiet location where there will be no interruptions and the learner has no distractions, external contacts or access to unauthorised materials.

The centre is required to provide a digital recorder that can store up to 15 minutes of video of the viva voce. The profiles of the learner and presenter should be clearly visible on camera. An independent invigilator must also be present.

Additionally the presenter is required to record, using brief notes, the key points raised by the learner, using the pages in this answer booklet.

- Before the examination starts the learner should be asked to complete the front cover of this booklet
- The presenter should check the learner has their personal work book compiled for this unit
- Check with the learner which engineer, engineering achievement and sector they are going to talk about

Before recording the viva voce the presenter should:

1. Ask the learner to be seated.
2. Explain the format of the exam to the learner by reading to them the following information:
 - Your examination (the viva voce) will last for 15 minutes
 - Firstly I will ask you to state your name,
 - centre number and your candidate number as soon as we start
 - I will be asking you some specific questions, there are five in all, which you must try to answer
 - You will be talking about some aspects of the research you have undertaken
 - You can refer to your personal workbook if you feel it would help
 - You must remember to speak clearly and confidently
 - While you are talking I will be making brief notes of what you say in this booklet.
3. Ask the learner if they are ready to begin

The presenter will then say -

“You have a maximum of 15 minutes to answer the questions. I will tell you when there is 2 minutes left.”

The camera will then be switched on and an indication will be given to the learner and presenter that the examination has started.

The presenter will then say -

“Can you please tell me your name, centre number and your candidate number and please remember to talk clearly?”

Thank you. Now the first question is -

1. (a) “Please identify the engineering achievement that you have researched.”

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- (b) “Explain the economic effects which have resulted from this engineering achievement.”

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2. “Please tell me about the human or social issues which have driven the development of the engineering achievement you have researched.”

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3. (a) “Now, please tell me which engineering sectors you have studied.”

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(b) “Please explain the merits of registration schemes associated with different engineering trades.”

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4. “Now, for one of the sectors you have studied, please tell me about the basic duties and responsibilities of a professional person.”

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5. “Now, please explain the impact of sustainability on resources and the way engineering considers **green issues**.”

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6. “Finally, I am going to give you a workplace scenario.”

(The presenter gives the learner a printed copy of the workplace scenario and also reads the scenario out)

“Sam works as a semi-skilled production operator and has had thirty-seven days off work in the last six months due to a variety of illnesses. The employer, who has to meet tight delivery deadlines to supply car components, has spoken to Sam on each occasion asking for improved attendance. Due to a recent family bereavement, Sam has been absent for another nine days. The employer has called Sam in to discuss this latest prolonged absence and intends to terminate Sam’s employment.”

“Now I am going to ask you a question about the workplace scenario.”

“What would you advise Sam to do under these circumstances?”

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After the learner has finished speaking the presenter then says –

“The examination is over and the camera will now be switched off.”

At no time should the presenter enter into any discussion on how well a learner has done.

Principal Learning

OCR Level 2 Principal Learning in
Engineering

[F548]

Unit F548: The engineered world

Sample Model Solutions and Mark Scheme

The maximum mark for this paper is [60].

SAMPLE

Marking Criteria

Band 1	Band 2	Band 3
<p>Has briefly identified an engineering achievement and given a limited explanation of the economic effects which resulted from this achievement. [1 2 3]</p>	<p>Has identified an engineering achievement and given some information of the economic effects which resulted from this achievement. [4 5 6]</p>	<p>Has clearly identified an engineering achievement and given detailed information of the economic effects which resulted from this achievement [7 8 9 10]</p>
<p>Has given limited evidence of thinking about human and social issues that drove the achievement. [1 2 3]</p>	<p>Has give some evidence of thinking about human and social issues that drove the achievement. [4 5 6]</p>	<p>Has given detailed evidence of thinking about human and social issues that drove the achievement. [7 8 9 10]</p>
<p>Has briefly identified one sector and briefly explained the basic duties and responsibilities of a professional person. [1 2 3]</p>	<p>Has identified one sector and explained the basic duties and responsibilities of a professional person. [4 5 6]</p>	<p>Has clearly identified one sector and given a detailed explanation of the basic duties and responsibilities of a professional person. [7 8 9 10]</p>
<p>Has briefly identified sectors that have been studied and given a limited explanation of the merits of registration schemes associated with different engineering trades. [1 2 3]</p>	<p>Has identified sectors that have been studied and given an explanation of the merits of registration schemes associated with different engineering trades. [4 5 6]</p>	<p>Has clearly identified sectors that have been studied and given a detailed explanation of the merits of registration schemes associated with different engineering trades. [7 8 9 10]</p>
<p>Has briefly explained the impact of sustainability on resources and one way in which engineering considers 'green' issues. [1 2 3]</p>	<p>Has explained the impact of sustainability on resources and at least two ways in which engineering considers 'green' issues. [4 5 6]</p>	<p>Has given a detailed explanation of the impact of sustainability on resources and two ways in which engineering considers 'green' issues. [7 8 9 10]</p>
<p>Has briefly explained the basic rights and responsibilities of an employee and employer. [1 2 3]</p>	<p>Has explained the basic rights and responsibilities of an employee and employer. [4 5 6]</p>	<p>Has given a detailed explanation of the basic rights and responsibilities of an employee and employer. [7 8 9 10]</p>

Model Sample Assessment

Peter, a learner, chose to research and consider the development of microwave ovens.

Example prompts	Dialogue
Tell me about the achievement you have studied and its economic effects	
	I looked at the development of microwave ovens. I thought it was an everyday item which has had a big impact on the way we live but when I looked into it I found it is based on one of the most important engineering developments of the 20 th century.
OK, Can you explain what this important development was?	
	Microwave ovens use a device called a cavity magnetron to generate microwaves. These high frequency waves can vibrate water molecules in food so fast that they heat up making the food hot. The device now common in kitchens was originally developed for a portable radar system.
What factors drove the original development?	
	In WW2, the early radar system used by Britain used long wave signals. While it worked well it had serious drawbacks. It needed very large aerials and power supplies so it was not portable or directional and could not detect objects smaller than the wavelength of the system. Microwave radar overcame those problems
Why was a new radar so important?	
	Submarines were sinking supply ships and they could easily slip away under cover of night or fog. Harry Randall and John Boot of Birmingham University in February 1940 developed the cavity magnetron which generates radio waves only a few centimetres long. Their device was 100 times more powerful than earlier magnetrons and in May 1940 a plane carrying prototype radar detected a submarine periscope at six miles in darkness.
Tell me about the human or social issues which drove this development	
	This invention made submarines vulnerable to attack everywhere; it turned the tide of the war in the Atlantic and consequently the result of the war. The effects on our lives today are immeasurable. Democracy prevailed but the political map of the entire world changed, Britain lost its empire and the USA became the new superpower.

Example prompts	Dialogue
What about use in cookers?	<p>The heating effect of microwave energy was known from the start but not used in a commercially viable oven until the 1970's; nowadays they sell for a few pounds. They have revolutionised the way we prepare food which can be pre cooked and chilled and then reheated on demand. They take less space than conventional ovens and heat the food very quickly. A whole range of new ready made meals and food products have become available for use in microwave ovens. Some people are concerned that the changes to our diet are not healthy</p>
Did you find anything else about registration schemes	<p>In my research I found the British Agrochemical Standards Inspection Scheme (BASIS) which seemed to me to give the merits of registration schemes.</p> <p>To a business BASIS registration means that:</p> <ul style="list-style-type: none"> ▪ distributors can demonstrate to those enforcing the Food and Environment Protection Act that they are taking all reasonable precautions to abide by the law as it relates to storage, transport and competence of staff involved in the UK Crop Protection Industry ▪ stores and staff are assessed annually with a report sent direct to the distributor, drawing attention to any shortcomings. This minimises the risk of possible prosecution and subsequent fines and/or improvement notices from the enforcement agencies ▪ there is provision of expert advice and regular auditing can help to maintain good management practices and efficiency ▪ companies have access to an independent organisation which acts as a co-ordinator and arbitrator between various regulatory and approving authorities ▪ distributors can keep abreast of current and pending regulations using BASIS as a source of contact to update, clarify, interpret and advise on legislative matters as they relate to the storage, transport, sale and advice of pesticides ▪ distributors ensure that, by their support, their interests are considered in the running of BASIS. <p>To the Agrochemical industry BASIS registration demonstrates an industry which:</p> <ul style="list-style-type: none"> ▪ seriously adopts higher standards, thereby ensuring that the requirements of current legislation are met ▪ invests its own money in maintaining a self-regulatory body to help it keep abreast of standards ▪ takes very seriously all the implications of environmental issues by voluntarily offering its businesses to annual audits.

Example prompts	Dialogue
	<p>After this I found out about the Gas industry in some report which asked the question -</p> <p>What is the Gas Industry Registration Scheme?</p> <p>The given answer was</p> <p>The Gas Industry Registration Scheme (GIRS) has been developed to allow Utility Infrastructure Providers (UIP's) to carry out installation, commissioning and connection of gas mains and services to be adopted by Gas Transporters (GTs). Any UIP wishing to carry out work must be accredited under this scheme. All the GTs on mainland UK recognise this scheme and, provided that UIP's hold the appropriate scope of accreditation, will allow that UIP to tender for, and if successful, undertake installation and commissioning of gas mains and services work. Under the terms of a pre-start adoption agreement, once the work has been completed the host GT will adopt the system for the remainder of its lifetime.</p> <p>I could not do any more on this because I ran out of time.</p>
OK thank you for that. Now can you tell me about jobs you have researched?	
	Well, firstly I looked at a fitter's job.
What do they do?	
	A fitter builds and repairs equipment in a factory such as pumps, conveyors, gearboxes and machinery. They carry out routine maintenance, checking that machines work correctly and changing worn out parts.
What else can you tell me about the job?	
	They have to know about health and safety and work in a safe manner. They sometimes work shifts. It is quite skilled work and people learn on the job and at college as an apprentice. They need some more qualifications to get a higher grade job. It is an important job because they keep factories working.
OK what other jobs have you learnt about?	
	I learnt about electronics technicians, who install or repair instrumentation and control systems, they also create programmes for PLC controllers.
Can you tell me a bit more about the kind of thing they do?	
	This job is changing all the time with the development of new systems though the essential electronic knowledge doesn't change so much. Some technicians get to build prototype systems and products. They need to study electronics and

Example prompts	Dialogue
	similar subjects at college. To understand electronics fully you need to be quite good at maths.
OK <pause>	
	I also found out about production engineers. This is a very important branch of engineering. Designing things is OK but you need to know the best way to make the product. That is the production engineer's job. They need to know about mechanisms, structures and the way materials behave when processed. They have to go to university to get the qualifications they need to do the job. Afterwards they gain experience in a particular industry and have professional recognition.
Can you list the merits of registration schemes associated with different engineering trades?	
	<p>Registration would raise the status of engineers.</p> <p>Provides customers with confidence in the abilities of members of the register.</p> <p>Pre-qualification for some tenders would be simplified.</p> <p>Better employment prospects for members of the register.</p> <p>Registration would restrict the trading ability of unprofessional unqualified engineers.</p> <p>Registration would protect the public interest.</p>
Explain the impact of sustainability on engineering.	
	<p>I thought a good example of this is the effect on the environment in extracting metals and minerals. Mobile phone parts use the rare metal Tantalum for small capacitors and thousands of tons of rock have to be mined to get just a few hundred grams.</p> <p>This uses a lot of energy and damages the landscape.</p> <p>There is no substitute for tantalum so recycling schemes might be the only answer.</p>
OK, so are you talking about conservation?	
	I think energy and energy sources need conserving. Apart from energy used in industry about 30% of energy used in the UK is in homes and most of that goes on heating and lighting. Engineering could develop better building materials and insulators and efficient heating and lighting systems for buildings could save a lot of energy. Some renewable systems such as small scale photovoltaic panels could provide enough energy for lighting in houses.

Example prompts	Dialogue
Will you now explain how engineering can provide a solution?	
	<p>The biggest resource is energy and energy sources. Most engineering processes use massive amounts of energy for heating, or electric motors. Generally conserving energy means not wasting energy or having inefficient processes. Engineering can find more efficient ways to do things like lean manufacturing and better process designs</p>
Please explain the term “green issues” in the context of engineering	<p>Green issues are the ones linked to recycling and using energy more efficiently. We call something green if it is environmentally friendly</p>
Tell me what you think about the rights and responsibilities of employees and employers	
	<p>Well it doesn't look very fair at first. It is not Sam's fault he has been off. But it is not clear how many minor illnesses Sam has had.</p> <ul style="list-style-type: none"> ▪ If he is a member of a Union he could ask for the union representative to go with him. ▪ There is nothing to say that Sam is not competent at doing the job. ▪ There may be reasons for the absence that the employer does not know about. ▪ There are laws about unfair dismissal that the employer must make sure they comply with. The Employment Act of 2002 is one example. ▪ The employer must show that the termination would be fair and for this to be the case the employer must have followed the correct procedures. The procedures might have been three verbal warnings followed by two written warnings. ▪ There ought to be a policy on attendance and a list of steps that the employer should go through in order to terminate someone's employment. ▪ When the employer spoke to Sam about his attendance, did he write this down and explain the possible consequences of continued absence. ▪ We need to know whether the company has an attendance policy that is being used with all employees. ▪ Did an accident at work cause an illness? ▪ If it was a work accident Sam could consider claiming against the company. The employer might want to take this into account. <p>Can Sam's illness be classed as a disability? If so, then the employer would have to make sure he is working within the Disability Discrimination Act. I think this was 1955.</p>

Example prompts	Dialogue
	<ul style="list-style-type: none"> ▪ Sam would have a case if he could show he was being discriminated against because of a disability. <p>Nine days seems a lot of time for a family bereavement but we do not know who in the family died or the circumstances. I would not expect the employer to give Sam nine days extra holiday but the employer does not seem very sympathetic. We do not know if Sam was given permission for the time off or just called in sick. There is no legal amount of time a person should have off, but two or three days are typical amounts for this situation.</p>

SAMPLE

Marking Scheme for the dialogue with Peter

Band 1	Band 2	Band 3	Marks Awarded
Has briefly identified an engineering achievement and given a limited explanation of the economic effects which resulted from this achievement. [1 2 3]	Has identified an engineering achievement and given some information of the economic effects which resulted from this achievement. [4 5 6]	Has clearly identified an engineering achievement and given detailed information of the economic effects which resulted from this achievement [7 8 9 10]	6
Has given limited evidence of thinking about human and social issues that drove the achievement. [1 2 3]	Has give some evidence of thinking about human and social issues that drove the achievement. [4 5 6]	Has given detailed evidence of thinking about human and social issues that drove the achievement. [7 8 9 10]	6
Has briefly identified one sector and briefly explained the basic duties and responsibilities of a professional person. [1 2 3]	Has identified one sector and explained the basic duties and responsibilities of a professional person. [4 5 6]	Has clearly identified one sector and given a detailed explanation of the basic duties and responsibilities of a professional person. [7 8 9 10]	6
Has briefly identified sectors that have been studied and given a limited explanation of the merits of registration schemes associated with different engineering trades. [1 2 3]	Has identified sectors that have been studied and given an explanation of the merits of registration schemes associated with different engineering trades. [4 5 6]	Has clearly identified sectors that have been studied and given a detailed explanation of the merits of registration schemes associated with different engineering trades. [7 8 9 10]	7
Has briefly explained the impact of sustainability on resources and one way in which engineering considers 'green' issues. [1 2 3]	Has explained the impact of sustainability on resources and at least two ways in which engineering considers 'green' issues. [4 5 6]	Has given a detailed explanation of the impact of sustainability on resources and two ways in which engineering considers 'green' issues. [7 8 9 10]	6

<p>Has briefly explained the basic rights and responsibilities of an employee and employer.</p> <p>[1 2 3]</p>	<p>Has explained the basic rights and responsibilities of an employee and employer.</p> <p>[4 5 6]</p>	<p>Has given a detailed explanation of the basic rights and responsibilities of an employee and employer.</p> <p>[7 8 9 10]</p>	<p>9</p>
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Total 40/60

SAMPLE