

Principal Learning
Engineering

Unit **F548**: The engineered world

OCR Level 2 Principal Learning

Mark Scheme for January 2015

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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Question	Question/Answer	Mark	Guidance
1	<p>For one engineering sector, state the name of the engineer you have researched and then tell me about their engineering achievements</p> <p>Band 1 Limited explanation – award one mark for naming an engineer and up to a further two marks for a response giving details about their engineering achievements.</p> <p>Band 2 Adequate explanation – award one mark for naming an engineer and up to a further five marks for a response giving details in depth or breadth describing their engineering achievements.</p> <p>Band 3 Detailed explanation – award one mark for naming an engineer and up to a further nine marks for a response giving details in depth and breadth describing their engineering achievements.</p> <p>The assessment criteria 1.1 asks for one engineer to be named and an explanation of their achievements. The exemplification gives the names of over twenty engineers, so notes will be provided for Michael Faraday and his achievement.</p> <p>Reference acknowledged: http://web311.pavilion.net/SCfaraday.htm Engineer - Michael Faraday Born in London in 1791. After becoming interested in science, Faraday applied to Humphry Davy for a job. In 1813 Faraday became his temporary assistant and spent the next 18 months touring Europe while during Davy's investigations into his theory of volcanic action. Davy gave Faraday a valuable scientific education and also introduced him to important scientists in Europe. After Davy retired in 1827, Faraday replaced him as professor of chemistry at the Royal Institution. Faraday began to publish details of his research including condensation of gases, optical deceptions and the isolation of benzene from gas oils. Faraday's greatest contribution to science was in the field of electricity. In 1821 he began experimenting with electromagnetism and by demonstrating the conversion of electrical energy into motive force, invented the electric motor. In 1831 Faraday discovered the induction of electric currents and made the first dynamo. In 1837 he demonstrated that electrostatic force consists of a field of curved lines of force, and conceived a specific inductive capacity. This led to Faraday being able to develop his theories on light and gravitational systems.</p>	<p>Up to [3]</p> <p>Up to [6]</p> <p>Up to [10]</p>	<p>For all questions. For answers marked by level of response: To determine the level – Start at the highest level and work down until you reach the level that matches the answer To determine the mark within this level, refer to the chart in paragraph 10.</p>

Question	Question/Answer	Mark	Guidance
2	<p>The government recognized his contribution to science by granting him a pension and giving him a house in Hampton Court. However, Faraday was unwilling to use his scientific knowledge to help military action and in 1853 refused to help develop poison gases to be used in the Crimean War. Michael Faraday died in 1867</p> <p>Depth: Expansion of a single achievement. Breadth: Expansion involving multiple achievements.</p> <p>Lower end of mark band just meets criteria. Middle of mark band adequately meets criteria. Upper end of mark band convincingly meets criteria.</p> <p>.....</p> <p>For the engineer you have researched please identify and assess the technical issues they faced and any technical advances they relied or acted upon</p> <p>Band 1 Limited explanation – award one mark for identifying a technical issue and up to a further two marks for relevant points.</p> <p>Band 2 Adequate explanation – award one mark for identifying a technical issue and up to a further five marks for an assessment of a technical issues in depth or breadth.</p> <p>Band 3 Detailed explanation – award one mark for identifying a technical issue and up to a further nine marks for an assessment of technical issues which includes logical and relevant supporting evidence that demonstrates both depth and breadth.</p> <p>Technical issues could be concerned with an understanding of electricity, a definition of electromagnetism and electrostatics, conversion of energy into a force, the dynamo and motor.</p> <p>Depth: Expansion of a single technical issue. Breadth: Expansion covering multiple technical issues.</p> <p>Lower end of mark band just meets criteria. Middle of mark band adequately meets criteria. Upper end of mark band convincingly meets criteria.</p>	<p>Up to [3]</p> <p>Up to [6]</p> <p>Up to [10]</p>	

Question	Question/Answer	Mark	Guidance
3	<p>Please name an engineering registration scheme OR a professional engineering body, and then for the one you have chosen, explain the nature of the work they do</p> <p>Band 1 Limited information – award one mark for identifying a registration scheme or a professional engineering body and up to a further two marks for explaining the nature of the work they do.</p> <p>Band 2 Adequate information – award one mark for identifying a registration scheme or a professional engineering body and up to a further five marks for explaining in breadth or depth the nature of the work they do.</p> <p>Band 3 Detailed information – award one mark for identifying a registration scheme or a professional engineering body and up to a further nine marks for explaining in breadth and depth the nature of the work they do.</p> <p>Depth: Expansion of a registration scheme in a single sector eg. Gas Safe. Breadth: Expansion of multiple registration schemes within a single sector eg. Gas Safe and UK Plumbing Heating & Mechanical Engineering Services (UK-PHMES) Registration Scheme..</p> <p>Reference acknowledged: http://www.epolitix.com/stakeholder-websites/stakeholder-website-page/sites/institution-of-engineering-and-technology/</p> <p>With some 160,000 members, the Institution of Engineering and Technology is Europe's premier society for professional engineers. It covers the science, engineering and technology of communications, electronics, computing, software, control, information technology, power engineering and manufacturing. So, if it's the latest in micro-technology, sustainable development or IT, safety critical systems or transport, the Institution can provide the answers. That's because its membership ranges from leading figures in industry, research and development, consultancy and education to students just starting their careers. The Institution's Technical & Professional Networks (TPN's) are world-wide groups of people with common technical or professional needs and interests. Each PN provides a focal point for a community of experts and enables them to network, share knowledge and keep up to</p>	<p>Up to [3]</p> <p>Up to [6]</p> <p>Up to [10]</p>	

Question	Question/Answer	Mark	Guidance
	<p>date in their particular industry or profession. Each TPN is supported by an interactive community Website.</p> <p>The Institution of Engineering and Technology acts as the voice of the profession, making submissions to government and providing advice. In this it is assisted by a range of Sector Panels, made up of high profile opinion leaders/formers. The Institution is taking particular interest in IT, communications, energy, manufacturing, education and research issues, and is seeking to play a major role in influencing government policy in these areas.</p> <p>A major role for the Institution is creating a greater public awareness of the importance of engineering in today's society. Its Education service is aimed at supporting teachers of science and technology. As well as providing curriculum support resources, it runs the annual Faraday Lecture which attracts a live audience of some 25,000, mostly young, people plus three million world-wide via satellite.</p> <p>Members of the Institution are at the forefront of high-technology industry and play a major role in the economic welfare of their countries as well as in the quality of life. The Institution has developed close links with industry through its Business Partners Scheme. It has a number of local networks, including special Younger Members' sections, operating throughout the UK and the world.</p> <p>The Institution of Engineering and Technology:</p> <ul style="list-style-type: none"> Sets standards of conduct for the profession. Organises a range of best-practice Events - from lectures to major conferences. Accredits degree courses and post-graduate industrial training schemes in a wide range of it and engineering disciplines. Publishes 25 technical periodicals, including on-line journals, plus 20 new books annually. Houses the IET Library and Archives, providing access to the latest technical, business, marketing and company news. Operates the world's leading electronics and physics database - INSPEC - plus other information services. Is the technical authority responsible for the IEE Wiring Regulations - BS7671:2001. Has a Professional Development programme including a database of providers. <p>Lower end of mark band just meets criteria. Middle of mark band adequately meets criteria. Upper end of mark band convincingly meets criteria.</p>		

Question	Question/Answer	Mark	Guidance
4	<p>Name an engineering sector you have studied and then describe the job role and responsibilities of a craft person OR a technical person within that sector</p> <p>Band 1 Limited information – award one mark for naming a sector and up to two marks for a relevant point about the job role of a craft or technical person</p> <p>Band 2 Adequate information – award one mark for naming a sector and up to five further marks for a response with depth or breadth about the job role of a craft or technical person</p> <p>Band 3 Detailed information – award one mark for naming a sector and up to nine further marks for a response with depth and breadth about the job role of a craft or technical person</p> <p>Depth: Focussing on a single role in a single sector. Breadth: Multiple roles in a single sector.</p> <p>A craftsman or artisan is a skilled manual worker who makes items that may be functional or strictly decorative.</p> <p>A technical person ie. technician, solve technical problems. They build or set up equipment, conduct experiments, and collect data and calculate results. They might also help to make a model of new equipment. Some technicians work in quality control, where they check products, do tests, and collect data. In manufacturing, they help to design and develop products. They also find ways to produce things efficiently. They may also be persons who produce technical drawings or engineering drawings.</p> <p>Lower end of mark band just meets criteria. Middle of mark band adequately meets criteria. Upper end of mark band convincingly meets criteria.</p> <p>.....</p>	<p>Up to [3]</p> <p>Up to [6]</p> <p>Up to [10]</p>	

Question	Question/Answer	Mark	Guidance
5	<p>State the years in which most incidents and least incidents occurred for each of water, land and air Please now explain what could have led to the difference in the number of incidents over this period of time</p> <p>Band 1 Limited explanation – award one mark for stating the year of most incidents and one mark for stating the year of least incidents and one mark for a very brief comment as to why there is a difference in the number of incidents over this period of time</p> <p>Band 2 Adequate explanation – award one mark for stating the year of most incidents and one mark for stating the year of least incidents and up to four marks for an explanation as to why there is a difference in the number of incidents over this period of time</p> <p>Band 3 Detailed explanation – award one mark for stating the year of most incidents and one mark for stating the year of least incidents and up to eight marks for an in-depth explanation as to why there is a difference in the number of incidents over this period of time</p> <p>Lower end of mark band just meets criteria. Middle of mark band adequately meets criteria. Upper end of mark band convincingly meets criteria.</p> <p>.....</p>	<p>Up to [3]</p> <p>Up to [6]</p> <p>Up to [10]</p>	
6	<p>What can you tell Les about the responsibilities of his employer and his responsibilities as an employee</p> <p>Band 1 Limited explanation – award up to three marks for outlining the responsibilities of an employer or outlining the responsibilities of the 18 year old employee or a combination of both.</p> <p>Band 2 Adequate explanation – award up to three marks for an adequate explanation of the responsibilities of an employer and up to three marks for an adequate explanation of the responsibilities of the 18 year old employee</p>	<p>Up to [3]</p> <p>Up to [6]</p>	

Question	Question/Answer	Mark	Guidance
	<p>Band 3 Detailed explanation – award up to five marks for an in-depth explanation of the responsibilities of an employer and up to five marks for an in-depth explanation of the responsibilities of the 18 year old employee</p> <p>Employers and employees have responsibilities to each other, they should also expect their rights to be upheld. These rights and responsibilities relate to areas such as Health and Safety, the provision of Terms and Conditions of Employment, Equal Opportunities and the right to be paid a Minimum Wage. Employees are expected to carry out their work in a way that has regard to the safety of others. Employers are expected to abide by a range of requirements governing such aspects as providing safe machinery and equipment, carrying out regular health and safety checks, ensuring the training of employees in health and safety issues, and carrying out a risk assessment to assess the dangers of particular work activities. There are also specific regulations about the way in which potentially harmful substances should be used and stored. There are a number of requirements about the minimum temperature at work, and other aspects of working conditions.</p> <p>Employees are expected to receive the terms and conditions of their work setting out when their work commences, what their main duties are, who they are accountable to, rates of pay, and other entitlements.</p> <p>Equal Opportunities legislation sets out that all employees should receive the same pay and conditions for carrying out the same or broadly similar work. There are also laws against sexual, racial and disability discrimination.</p> <p>The Minimum Wage Act sets out the Minimum Wage that workers can expect to receive. The Minimum Wage is regularly reviewed and will increase over time. There are also European Union requirements governing the maximum number of hours that workers will be expected to work in a typical week.</p> <p>Employers and employees are expected to meet minimum legal requirements for such areas as Health and Safety at Work, and minimum standards and conditions related to hours, and the treatment of people in the workplace. Along with rights for employees there are corresponding responsibilities such as the expectation to work in a safe way and to have regard for the safety of work colleagues</p> <p>Lower end of mark band just meets criteria. Middle of mark band adequately meets criteria. Upper end of mark band convincingly meets criteria.</p>	Up to [10]	

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