

Electrical Questions

Portable electric equipment, for use at work, should be in good condition and free from defects

(a) **Outline** the features of portable electric equipment that should be checked by the user before use. (6)

(b) **Identify** additional features of portable electric equipment that should be inspected during periodic formal inspection by an appointed person. (2)

Dec 10

Features of portable electrical equipment that should be checked by the user before use include the condition of the cable which should be free from damage, contain no taped joints and be routed safely; the connecting plug to ensure the casing is not cracked or the pins bent; the outer sheath of the cable which should be secured where it enters the plug or the equipment; the external casing of the equipment which should be free from damage with no evidence to suggest that it has been subjected to wet or contaminated conditions for which it is not suitable and finally the test label which should not be out of date. Some candidates seemed to have little comprehension of a pre-use check and found difficulty in identifying the required features. Others were content to list features such as cable and plug without giving any indication of the faults that might be present.

For part (b), additional features to be checked during the periodic formal inspection include the fuse which should be of the correct rating; the cord grip in the plug which should be firmly in place; and the terminations which should be correct and secure. Again many candidates did not seem to understand the purpose of the question and identified features of a portable appliance test (PAT) rather than the additional features of the equipment that should receive attention during a periodic formal inspection.

Outline the factors to consider when determining the frequency for the inspection and testing of electrical equipment. (8)

June 10

Factors to be considered include the type of equipment whether portable or fixed and its voltage; the integrity and age of the equipment including the likelihood of it becoming damaged and the frequency and duration of its use; the environment in which it is to be used; its previous maintenance and repair history; and any recommendations made by the manufacturers or in guidance published by the Health and Safety Executive.

This question was not well answered. There was a general failure to recognise the basic requirements for the monitoring of electrical equipment. Some candidates dealt only with portable equipment and only a few referred to voltage and the integrity of equipment. Others outlined how to carry out a test rather than outlining the factors that would determine its frequency. Examiners suspected that candidates had not paid too much attention to the wording of the question since many concentrated solely on portable appliance testing (PAT).

(a) **Identify** the possible effects of electricity on the body. (4)

(b) **Identify FOUR** factors that may affect the severity of injury from contact with electricity. (4)

Sep 10

Answers to part (a) of the question were of a good standard with most candidates identifying possible effects of electricity on the body such as a tingling sensation and/or pain; cardio-respiratory effects, in particular the risk of fatal injury due to disruption to heart rhythm; muscular contraction resulting in an involuntary grip on the live conductor, thus prolonging current flow through the body; and tissue burns with the main sites of damage being the entry and exit points with the possibility of damage to internal organs.

Good answers to part (b) would have identified factors such as: the level of the current; the voltage involved; the nature of the current passing through the body whether AC or DC; the path taken through the body by the current; the length of contact time, regulated by the speed of action of the protection system in operation; individual body resistance involving personal factors such as sex, age and the dryness of the skin; and environmental factors such as ground conditions, and the type of clothing and footwear being worn. Whilst many candidates mentioned voltage as a factor, they did not add a reference to the level and nature of the current nor did they refer to the speed of protection devices provided. A few wrote of factors such as the need for PAT testing and pre-use checks which were irrelevant.

Identify examples of faults and bad practices that could contribute to electrical accidents when using portable electrical equipment in the workplace. (8)

June 11

Better answers to this question, and there were many, identified faults and bad practices including: an initial failure to select the right equipment for the job and/or environment; inadequate checks on the equipment before use to ensure it was not damaged and a lack of procedures for its regular maintenance; incorrect fuse rating and a failure to use residual current devices; poor earth protection; the overloading of sockets; the use of cables which were split, twisted, kinked or jointed; poor cable management resulting in trailing cables; the use of coiled extension cables and cables that were insufficiently protected and liable to damage particularly in workshop or construction environments; plugs with bent pins or broken cases; unauthorised repairs to the appliances and misuse and abuse of the equipment by employees. There were occasional omissions such as the need for earth protection and the carrying out of unauthorised repairs and again a few candidates did not appreciate what was required by the question and identified control measures rather than faults and bad practices. Other candidates identified faults and not bad practices.

Outline a range of checks that should be made to improve electrical safety in an office. (8)

Mar 11

Answers could have included reference to visual inspections for damage to cables, plugs and sockets, the need to ensure that all fuses are of the correct rating, that means of isolation are provided and that equipment is switched off after use and checking that equipment is sited such that outlets are not overloaded, cables are not in vulnerable positions and extension cables are fully uncoiled. The equipment itself should be checked to ensure suitability and conformity with recognised standards, for example CE or BS marking. A specific testing procedure for portable appliances should be in place together with a procedure for reporting defects or damage. This question attracted a good response though checks such as 'feel the pins of a plug' might have been better expressed even though one could guess what the candidate had in mind.

Outline practical measures that reduce risk from electricity when using a portable electrical appliance. (8)

Mar 12

Candidates were expected to outline practical measures such as the use of undamaged and properly routed cables; the use of reduced voltage by means of a 110v step down transformer centre tapped to earth; the use of double insulated (class II equipment) or battery operated (cordless) equipment; the use of the appliance in association with a residual current device protecting individuals by rapidly disconnecting the power in the event of a fault occurring; ensuring earth continuity particularly when class 1 equipment is used; and carrying out regular visual inspections and user checks.

This was an 'outline' question which too often provided lists or bullet point answers. These mentioned the use of RCDs and double insulation without ever suggesting that the authors were aware of the purpose of these measures. Some candidates concentrated solely on pre-user checks whilst one or two relied on the hierarchy of control involving the elimination of the use of portable equipment and ending up with personal protective equipment as a last resort.

(a) **Identify** the possible effects of electricity on the body. (4)

(b) **Identify** the emergency action to take if a person suffers a severe electric shock. (4)

Sep 12

Contact with electricity can have a number of effects on the body and in part (a) of this question, effects from mild sensation to cardiac arrest and death, would have been awarded marks. Again, non relevant points associated with questions set in previous NEBOSH National General Certificate examinations were given, including secondary effects such as fall from height. This would be as a result of receiving an electric shock, not an effect on the body of electricity.

Part (b) was very well answered by the majority of candidates who could identify the main points of action required if a person receives an electric shock. Although the order of action to be taken was not requested or required, it was pleasing to see that most answers identified calling for help first and staying with the casualty last and therefore indicated a satisfactory understanding of this important, yet seldom practiced, emergency action.