SPARKS EXERCISES

We've been lucky enough to collaborate with electrical expert Mike Davies, who has been in the industry since the 1970s. Mike became a qualified electrical engineer after completing an apprenticeship when he left school at 16.

He became a college lecturer in 1980 after completing a Further Education teacher training qualification. Now retired, Mike works as a self-employed lecturer and training consultant.



OVERCURRENT PROTECTION: FUSES

In the following tasks you will need access to the BS7671:2018, IET Wiring Regulations, 'Requirements for Electrical Installations' 18th Edition including amendments.

Covering: Outcome 2 & 3 of Unit 304 (Level 3 NVQ Diploma in Installing Electro-Technical Systems and Equipment 2357-13 / 91) or EAL equivalent

SEMI – ENCLOSED FUSES TO BS3036:

Q1 The current required to operate a BS3036, 60A rated semi-enclosed fuse in a maximum time of 1 second is?

Answer: 360A (Figure 3A2 (a))

Q2 The semi-enclosed fuse operates on which specific effect of electric current?

Answer: The heating effect

Q3 The material used in a semi-enclosed fuse element is?

Answer: Tinned copper wire

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Q4 A 45A rated BS3036 semi-enclosed fuse protects a circuit in which a fault current of 100A develops. How long will it take, in seconds, for the fuse to operate?

Answer: 600 seconds (Figure 3A2 (b))

Q5 Identify two types of overcurrent that may occur in an electric circuit.

Answer: Overload

Short – circuit

Q6 For each of the following supply systems state in which conductor a fuse or circuit-breaker is located:

a) 3 phase and neutral (TP&N) **Answer:** Each line of the supply. (L1, L2 and L3)

b) 1 phase and neutral (SP&N) **Answer:** The line conductor

c) 2 – wire direct current **Answer:** The positive (+) conductor, although sometimes both (+) and (-)

BS88-2 FUSES

Q7 Describe the characteristics and typical application of the following types of BS88 fuses:

a) BS88 – 3 fuse system C **Answer:** Enclosed, cartridge type fuse that is designed to push-fit into the fuse-carrier. One example of the BS88 - 3 type of fuse is the 13A plug-top fuse.

b) BS88 – 2 fuse system E **Answer:** Enclosed, cartridge type fuses that are bolted into the fuse-carrier. Often used in commercial and industrial situations, typically in the main switch.

c) BS88 – 2 fuse system G **Answer:** Enclosed, cartridge type fuses that clip into the fuse-carrier. This type of fuse can be found in commercial and industrial distribution boards.

Q8 State the maximum operating current for a BS88-2 fuse rated at 80A used for circuits where the disconnection times are 0.4 seconds and 5 seconds.

Answer: 0.4 seconds – maximum current is 750A

5.0 seconds – maximum current is 400A

Q9 An industrial sub-main distribution circuit is protected by 100A rated BS88-2 fuse-system E protective device. If a line earth fault occurs and the current that flows is 1000Amps, how long will it take for the fuse to operate?

Answer: For a 100A rated fuse with a fault current of 1000A flowing, disconnection will be a maximum of 0.4 seconds.

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ELECTRICAL FAULT DIAGNOSIS & RECTIFICATION OF FAULTS

Covering: Outcome 3 'Understand how to complete the preparatory work prior to fault diagnosis and correction work' Unit 608 NVQ Level 3 Diploma 2357 – 13 and EAL equivalent

Try to answer the following multiple-choice questions.

Q1	A fault is reported on an electrical circuit. The first action to be taken when investigating the fault is to?	Ans.
A	Check the condition of the circuit	
B	Carry out safe isolation of the circuit	X
C	Remove the electrical load	
D	Remove any protective covers on wiring accessories	

Q2	A single - tube fluorescent luminaire flashes on and off repeatedly and fails to light correctly when switched on. The most likely cause of this fault is?	Ans.
A	The wrong wattage tube was fitted	
B	The tube is old and needs replacing	
C	There is a wiring fault to one of the tube connections	
D	The starter has failed and needs replacing	X

Q3	Following redecoration work in the hall and landing of a domestic house, the two-way operated landing light no longer works correctly from the hall or landing. What is the most likely cause of the fault?	Ans.
A	The switches have been removed and not reconnected correctly	X
B	The light fittings were removed and not reconnected to the switches	
C	The hall light switch has been replaced with a dimmer switch	
D	The landing luminaire has failed	

Q4	When the supply is connected to a capacitor-start, single-phase electric motor, the motor fails to start and produces a continuous humming sound and the motor shaft oscillates. The most likely fault is due to?	Ans.
A	A loose neutral connection to the motor	
B	An open-circuit run winding in the motor	
C	A blown fuse	
D	An open-circuit start winding in the motor	X

Q5	When carrying out continuity checks on the windings of a single-phase, capacitor-start electric motor, which of the following is most likely to be found?	Ans.
A	Start winding will have a lower resistance than the run winding	
B	The capacitor will give a resistance reading that indicates a short-circuit	
C	Start winding will have a higher resistance than the run winding	X
D	Run winding will have a higher resistance than the starting capacitor	

Q6	A domestic customer reports that an outside PIR security light fails to operate. The lamp has been replaced with no effect. Which one of the following is NOT likely to be the cause?	Ans.
A	The protective device for the circuit has operated	
B	The PIR has developed a fault	
C	Both the old and new lamps are broken	X
D	There is a broken connection at the security lamp or PIR	

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Q7	Which one of the following statements is TRUE?	Ans.
A	A neutral conductor is connected to the centre pin of an Edison Screw lamp-holder	
B	When viewed from the front the line output of a BS1363 socket outlet is on the left	
C	The BS EN 60309-2 plug used on 230V ac supplies is coloured blue	X
D	A solar photovoltaic array can be connected directly into a domestic consumer unit	

Q8	A domestic central heating system fails to operate following an Electrical Installation Condition Report being undertaken on the property. What is the most likely cause of this failure?	Ans.
A	The heating system needs to be overhauled	
B	The electronic control panel has been damaged due to insulation resistance test voltages being applied	
C	The power supply has been isolated at the fused-connection unit for insulation tests to be made on the circuit	X
D	There is a closed circuit on the phase conductor	

Q9	A fluorescent tube glows at each end but fails to start. The cause of this fault is most likely to be?	Ans.
A	Failure of the choke	
B	The tube has come to the end of its useful life	X
C	Incorrect tube has been fitted	
D	Failure of the starter	

Q10	A customer reports that hot water supplied from a tank with an immersion heater is hotter than usual. What is the probable cause of this fault?	Ans.
A	The immersion heater has failed and is open circuit	
B	The immersion heater thermostat is permanently closed	X
C	Insufficient hot water is being used by the customer	
D	Water pressure has increased in the supply mains	

Q11	A customer reports that the dimmer switch fails to dim the new replacement luminaire. They noticed that if the dimmer switch is operated from the full-on position the lamp dims slightly then goes out. What is the most likely reason for this?	Ans.
A	The wiring has become disconnected at the ceiling rose	
B	The dimmer switch has developed a fault	
C	The replacement lamp is not compatible with the dimmer	X
D	The new lamp is the wrong voltage	

Q12	On inspection it is found the main neutral connection at a distribution board is discoloured and the insulation has bubbled. The most probable cause of this condition is?	Ans.
A	A loose neutral connection	X
B	Prolonged overcurrent	
C	Too many loads connected to the distribution board	
D	A short-circuit fault on one of the final circuits	

Q13	When locating a circuit fault it was found that the circuit cable had been damaged. Which of the following must be issued following the replacement of a damaged cable?	Ans.
A	Electrical Installation Certificate	
B	Minor Electrical Installation Works Certificate	X
C	Permit to Work	
D	Electrical Installation Condition Report	

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ELECTRICAL INSTALLATION: BUILDINGS & STRUCTURES

For each question, decide if the answer or statement is true or false. You may need to refer to your notes or suitable text books.

General revision Level II
Covering: Unit 201 / 202 / 203 / 204 of C&G 2365-02 or EAL equivalent

		TRUE	FALSE
Q1	Personal injury caused by unplanned or undesirable events is generally called an 'accident'.	X	
Q2	Health & Safety signs that are coloured RED are mandatory and must be obeyed.		X
Q3	In local electrical power distribution, the term 'Ring-Main' refers to the high voltage cable feeding and linking a group of local sub-stations.	X	
Q4	The device that ensures disconnection or separation of electrical equipment from every source of electrical energy is called a 'Safety Switch'.		X
Q5	The main earthing terminal located inside a consumer control unit is designed to provide a common connection point for all final circuit protective conductors and protective bonding conductors to the means of earthing for the installation.	X	
Q6	The metallic enclosure forming part of any electrical equipment is called an 'extraneous conductive part'.		X
Q7	The wording found on the label of a BS951 earth clamp is 'Electrical Earth Connection Do Not Remove'.		X
Q8	Four fixed value resistors each have a resistance of 8Ω. If the four resistors are connected in parallel the combined resistance will be 32Ω.		X

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