SPARKS

ANSWER SHEET
SPARKS MAGAZINE: Autumn Edition 2021

Lighting Symbols:

Covering:
Level 3 (2365-03) Diploma in Electrical Installations (Buildings & Structures) Unit 302 or EAL equivalent

The following task requires completion of the table showing quantity, symbol, unit and unit symbol for lighting terminology.

Solutions:

Quantity	Symbol	Unit	Unit symbol
Luminous Intensity	I	Candela	cd
Luminous flux	Φ	Lumens	lm
Illuminance	E	Lux	lx
Luminance	L	Candela / sq. m	Cd / m^2
Luminous efficacy	N/A	Lumens / watt	Lm / w

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Lighting:
Covering:
Level 2 (2365-02) Diploma in Electrical Installations (Buildings & Structures) Unit 203
Level 3 (2365-03) Diploma in Electrical Installations (Buildings & Structures) Unit 302, 303 and 304 or EAL equivalent

The following questions concern **Luminaires & Lighting** Installations in a range of locations.
You will need BS7671:2018 Requirements for Electrical Installations to help with some of the answers.

1) What is the requirement for the termination of a fixed wiring system to a ceiling rose lighting point?

   Answer:
   Regulation 559.5.1 (i) A ceiling rose to BS67 should be provided.

2) A device designed to support a pendant luminaire must be capable of carrying a mass of how many kg?

   Answer:
   5kg (559.5.2)

3) What is the maximum operating voltage recommended for a standard ceiling rose?

   Answer:
   250V a.c. (559.5.1.201)

4) Explain the meaning of each of the following lamp-holder references:
   B15, B22, E14, E27 and E40

   Answer:
   'B' refers to 'bayonet'
   'E' refers to 'Edison Screw'
   The numbers represent the diameter of the lamp base in mm

5) List **five** examples of outdoor lighting installations identified in BS7671

   Answer:
   Highways or Roads; car parks; public gardens; sporting areas; monuments and floodlighting (See 714.1 (i))

6) Give **two** examples of street furniture

Answer:
Bus shelter, or advertising panels, road signs, telephone kiosk
(See 714.1(ii))

7) What is the recommended type and characteristics of a switch required for the isolation of supplies to high voltage (HV) signs?

Answer:
The type of switch is a Fire-fighters switch.
It should be located in the low voltage circuit supplying the high voltage equipment (537.4.2)
The switch must be easily visible – *usually red in colour*
The 'ON' and 'OFF' positions of the switch must be distinctly and durably marked
The operating handle 'OFF' position must be up.

8) Answer the following questions relating to a low pressure mercury (MCF), luminaire:

a) State the meaning of the abbreviation 'MCF'

Answer:
Mercury Coated Fluorescent *referring to the tube or source of illumination*

b) Explain the purpose and function of the following component found in the circuit of a MCF luminaire.



Figure: 1

Answer:
The component is a 'glow – type' starter and is used to provide the initial switching to allow the discharge, striking or start-up of the fluorescent tube.
(See a typical single-tube luminaire circuit diagram for starter location)

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Lighting Terminology

Answers:

1	**F**
2	**B**
3	**G**
4	**H**
5	**D**
6	**A**
7	**E**
8	**C**

Protection against thermal effects: Practice multiple-choice questions.
(Covering elements of Unit 604 & 605 (Level 3 NVQ Diploma in Installing Electro-Technical Systems and Equipment 2357-13 / 91 or EAL equivalent)

You may need to refer to the IET BS7671:2018 Requirements for Electrical Installations, to help answer the following multiple-choice questions.

No 1	Persons, livestock and property must be protected against	**Answer**
a	Harmful effects of heat	
b	The generation of fire	
c	The propagation of fire	
d	All of the above	**X**

No 2	Electric arc fault detection is recommended to provide?	**Answer**
a	Protection	
b	Additional protection	**X**
c	Basic protection	
d	Fault protection	

No 3	Where a risk of fire exists, all temperature cut-out devices must be?	**Answer**
a	Placed at the origin of the circuit	
b	Capable of resetting automatically	
c	Reset manually	**X**
d	Reset by an authorised person	

No 4	Luminaires installed in locations where flammable materials may be stored, should be?	**Answer**

a	Designed so lamp components cannot fall from the luminaire	**X**
b	Rated at 230V maximum	
c	Limited to extra-low voltage only	
d	Protected by an enclosure of IP1X rating	

No 5	An electrical heating appliance must be?	**Answer**
a	Suitably earthed	
b	Positioned to provide maximum heat	
c	Of the storage type	
d	Suitably fixed	**X**

No 6	The temperature limit for a metallic hand-held item of electrical equipment is?	**Answer**
a	55°C	**X**
b	65°C	
c	70°C	
d	90°C	

No 7	The classification code CA2 refers to which one of the following?	**Answer**
a	A building is mainly constructed of combustible material	**X**
b	A building is constructed in stone	
c	An item of electrical equipment is suitable for use in buildings constructed of timber	
d	An item of electrical equipment is suitable for use in a building constructed from stone	

No 8	An electric motor that is automatically or remotely controlled, and not supervised, must be protected against over-temperature	**Answer**
a	When running normally	**X**
b	When stopped temporarily	
c	During periods of high ambient temperature	
d	During maintenance procedures	

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True or False:
Protective Measures:
(Covering elements of Unit 604 & 605 (Level 3 NVQ Diploma in Installing Electro-Technical Systems and Equipment 2357-13 / 91 or EAL equivalent)

For each question decide if the answer or statement is true or false and consider why. Reference can be made to the IET BS7671: 2018 Requirements for Electrical Installations.

1) A protective measure consists of a combination of basic and additional protection?

A protective measure consists of a combination of basic and an independent provision for fault protection. 410.3.2 Or An enhanced provision providing both basic and fault protection	

TRUE	
FALSE	✓

2) Examples of <u>three</u> protective measures that could be used in an installation are: Automatic disconnection of the supply (ADS); Double or reinforced insulation; Electrical separation?

410.3.3

TRUE	✓
FALSE	

3) Fault protection can be omitted for earthed street furniture supplied from an underground cable.

Fault protection can be omitted for unearthed street furniture supplied from an overhead line inaccessible in normal use. 410.3.9 (v)

TRUE	
FALSE	✓

4) Insulation of live parts, barriers and enclosures provide fault protection?

Insulation, barriers and enclosures provide **basic protection** not fault protection 411.1 (i)

TRUE	
FALSE	✓

5) Exposed conductive parts of an electrical installation must be connected to a protective conductor

411.3.1.1

TRUE	✓
FALSE	

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6) Conductive parts that do not form part of the electrical installation, such as metallic gas and water pipes, must be connected to the main earthing terminal by means of a protective conductor?

411.3.1.2

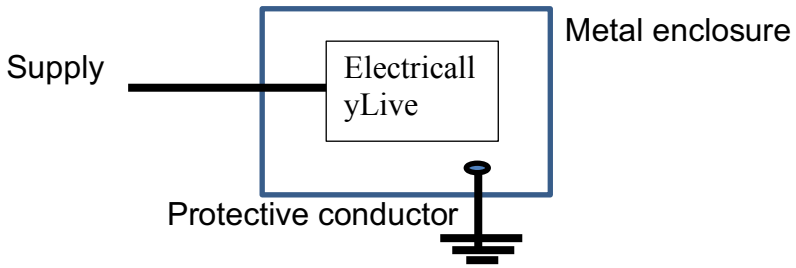
TRUE	✓
FALSE	

7) In a TT system automatic disconnection of the supply in the event of an electrical fault to earth must occur in not more than 5 seconds?

The maximum permitted disconnection time is 1 second
411.3.2.4

TRUE	
FALSE	✓

8) The illustration shows an example of equipotential bonding?



This is an example of protective bonding
411.3.1.1

TRUE	
FALSE	✓

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Practice multiple-choice questions for wiring containment:
(Covering: Outcome 4 of Unit 304 (Level 3 NVQ Diploma in Installing Electro-Technical Systems and Equipment 2357-13 / 91 or EAL equivalent)

No 1	20mm, 25mm and 32mm are diameters of	**Answer**
a	Standard power cables	
b	Standard metal or pvc conduits	**X**
c	Ducting	
d	MICC cables	

No 2	Stainless steel, galvanised and enamel are surface finishes for which one of the following	**Answer**
a	Conduit, trunking and cable tray	**X**
b	Conduit only	
c	Trunking only	
d	Cable tray only	

No 3	The application of the cable capacity rating for a conduit allows for	**Answer**
a	Additional cables to be installed at a later date	
b	Expansion of cables when in use	
c	Sufficient cable temperature rise without damage	
d	Air space allowing cables to dissipate heat in use	**X**

No 4	Joints in trunking, cable tray or metal ducting will require	**Answer**
a	Sufficient set-screws and nuts to secure the joint	
b	The ends of the containment to be pushed together	
c	Protective bonding conductors or straps across each joint	**X**
d	Labels to indicate the position of the joint	

No 5	The accessory used to join lengths of metal conduit is a	**Answer**
a	Connector	
b	Screwed sleeve	
c	Joiner	
d	Coupler	**X**

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No 6	A running – coupler is sometimes found in	Answer
a	PVC conduit systems	
b	Trunking installations	
c	Underground ducting	
d	Steel conduit installations	X

No 7	The best practice method for connecting fixed metal conduit to an electric motor terminal box is by use of	Answer
a	PVC SWA	
b	PVC conduit	
c	Direct connection of the conduit with the terminal box	
d	Flexible conduit and suitable adaptors	X

No 8	Spacer-bar, distance and hospital, are all types of	Answer
a	Conduit	
b	Trunking support mechanisms	
c	Conduit saddle	X
d	Support bracket	

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Health & Safety Quiz

Number	Answer letter
1	J
2	E
3	G
4	A
5	C
6	I
7	B
8	D
9	H
10	F

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WORDSEARCH

The following words all relate to cable containment systems, their associated components and tools that may be required. Words can be left to right or top to bottom of the grid.

Conduit	Trunking	Duct	Basket	Cutter
Coupler	Flange	Channel	Tray	Vice
Bush	Lid	Ladder	Support	File
Galvanised	Bend	Bracket	Tap	Hacksaw
Thread	Enamel	Tee	Washer	Reamer
Inspection	Screw	Stock	Die	Tape

A	B	C	O	N	T	A	C	T	O	R	B	O	N	I	Y	S	M	T	G
U	A	A	L	I	D	Y	G	N	I	I	N	S	P	E	C	T	I	O	N
T	E	U	A	R	I	D	S	S	E	C	U	C	I	T	Y	O	E	E	O
B	E	N	D	A	E	A	T	M	B	F	E	R	F	V	I	C	E	M	U
A	E	M	D	C	G	Q	E	A	O	T	T	E	I	N	F	K	A	C	N
S	L	F	E	N	A	M	E	L	B	N	O	W	A	E	A	E	I	L	D
K	M	C	R	U	E	D	A	T	A	R	O	V	E	R	D	D	B	T	S
E	W	X	O	A	D	M	M	O	L	B	T	I	F	I	L	E	I	I	O
T	A	P	N	T	E	C	O	N	D	U	I	T	A	L	I	T	T	Z	U
N	S	T	W	O	R	O	V	A	V	S	B	D	U	T	W	E	I	T	R
D	H	P	T	R	A	U	O	K	A	H	A	C	K	S	A	W	U	P	B
A	E	U	I	Y	L	P	S	C	O	N	T	R	O	L	L	E	R	T	E
G	R	M	R	G	A	L	V	A	N	I	S	E	D	V	C	V	A	R	A
R	I	P	A	S	S	E	V	E	U	D	U	E	U	I	H	E	E	U	C
E	D	D	U	T	H	R	E	A	D	R	P	N	C	T	A	P	H	N	X
B	U	T	S	N	C	C	P	R	N	E	P	A	T	R	N	Y	W	K	T
R	E	A	M	E	R	S	A	R	N	E	O	T	I	O	N	E	S	I	Y
Y	L	P	H	O	I	A	N	A	F	P	R	F	N	M	E	A	T	N	N
M	E	E	E	R	B	R	A	C	K	E	T	T	I	F	L	A	N	G	E
P	S	F	T	E	S	V	L	Q	S	E	B	V	J	U	Y	K	L	E	S