

## BS7671 Part 4

### Questions on Protection for Safety

1. A 230 V single phase circuit supplying a pump motor is protected by a 20 A type C circuit breaker to BS EN 60898. The minimum value of fault current to ensure compliance with the thermal and shock requirements is:

- a) 20 A
- b) 140 A
- c) 100 A
- d) 200 A

2. Given that the fault current on a 16A BS 88 fuse is 60A, the corresponding disconnection time is:

- a) 0.5 s
- b) 1 s
- c) 3 s
- d) 10 s

3. From the time/current characteristic for a 30A BS 3036 fuse, the approximate current required to operate this device at a time of 5 s is:

- a) 30 A
- b) 66 A
- c) 87 A
- d) 180 A

4. A 15A protective device to BS3036 when carrying a fault current of 180A has an operating time of:

- a) 0.4 s
- b) 0.2 s
- c) 0.1 s
- d) 5 s

5. A 30A protective device to BS1361 when carrying a fault current of 200A will operate in:

- a) 0.2 s
- b) 4 s
- c) 0.4 s
- d) 5 s

6. The symbol used to denote the operating current of the device protecting a circuit against overload is:

- a)  $I_b$
- b)  $I_2$
- c)  $I_n$
- d)  $I_z$

7. A 230 V 30 A radial circuit is protected by a BS 3036 device. If the value of earth loop impedance for the circuit is  $2.3 \Omega$ , disconnection under Line/earth fault condition will occur in:

- a) 2 s
- b) 4 s
- c) 3 s
- d) 5 s

8. The fault current due to an earth fault of negligible impedance in a 400V, three-phase four-wire circuit having an earth loop impedance of  $0.3 \Omega$  is:

- a) 1383 A
- b) 767 A
- c) 124.5 A
- d) 72 A

9. A single-phase circuit is to be wired using single-core cables having  $90^\circ \text{C}$  thermosetting insulation with copper conductors and protected by a BS 3036 protective device. For an ambient temperature of  $55^\circ \text{C}$ , identify which of the following is the ambient temperature rating factor to be used when determining the size of the conductor.

- a) 0.61
- b) 0.76
- c) 0.88
- d) 0.84

10. A circuit with a design current of 45 A is installed using a cable with a current rating of 50 A. If the voltage drop for the cable is  $8.0 \text{ mV/A/m}$ , the circuit voltage drop for a 10 m run will be:

- a) 2.5 V
- b) 3.6 V
- c) 4 V
- d) 6 V

11. The required current carrying capacity of a circuit conductor has been determined as 22 A. Using the appropriate cable selection table, which of the following is the correct minimum conductor size for three singlecore thermoplastic cover Light Duty mineral insulated cables with copper conductors clipped direct in flat formation?

- a)  $1.0 \text{ mm}^2$
- b)  $1.5 \text{ mm}^2$
- c)  $2.5 \text{ mm}^2$
- d)  $4.0 \text{ mm}^2$

12. For cable selection purposes the rating factors must be applied to the:

- a) current rating of the protective device

- b) tabulated current carrying capacity of the cable
- c) current breaking capacity of the protective device
- d) prospective short circuit current

13. A 230 V heating circuit has a design current of 20 A. Length of run for the 6mm<sup>2</sup> thermoplastic insulated cable is 25 m. The volt drop for the cable is 7.1mV/Am. The volt drop under full load conditions is:

- a) 8.9 V
- b) 3.6 V
- c) 5.7 V
- d) 14.2 V

14. In an installation a conduit from a lighting distribution board contains 8 identical circuits. The grouping factor C<sub>g</sub> to be applied is:

- a) 0.8
- b) 0.65
- c) 0.75
- d) 0.52

15. Table 4A2 – The Schedule of Methods of Installation of cables describes non-sheathed cables in conduit on a wooden or masonry wall. This is classified as Reference Method:

- a) A
- b) B
- c) C
- d) D

16. The required current carrying capacity of a circuit conductor has been determined as 42 A. Using the appropriate cable selection table, which of the following is the correct minimum conductor size for three singlecore thermoplastic covered Heavy Duty mineral insulated cables with copper conductors and sheaths installed on cable tray in flat formation.

- a) 1.5 mm<sup>2</sup>
- b) 2.5 mm<sup>2</sup>
- c) 4.0 mm<sup>2</sup>
- d) 6.0 mm<sup>2</sup>

17. The fault current due to an earth fault of negligible impedance in a 400V, three phase, four wire circuit having an earth loop impedance of 0.3 ohms, is:

- a) 1383 A
- b) 767 A
- c) 124.5 A
- d) 72 A

18. The rating or setting of an overcurrent protection device must be such that it operates at a current which is not greater than that of the conductor capacity by a

factor not exceeding:

- a) 0.725
- b) 1.45
- c) 1.5
- d) 1.8

19. Class II electrical equipment will provide:

- a) basic protection
- b) fault protection
- c) basic and fault protection
- d) short circuit protection

20. Which of the following sources of supply would NOT be accepted as providing separated extra-low voltage?

- a) a Class II safety isolating transformer to BS EN 61558-2-6
- b) a motor generator set giving BS EN 61558-2-6 isolation
- c) a centre tapped transformer giving 55 V to earth
- d) an electric device in which the output voltage cannot exceed E.L.V. in the case of an internal fault

21. A 230 V ac circuit is protected by a 6 A circuit breaker and feeds a number of luminaries. The maximum disconnection time in the event of a fault is:

- a) 1 s
- b) 5 s
- c) 0.2 s
- d) 0.4 s

22. Correct co-ordination between conductors and overcurrent protection device is achieved when:

- a)  $I_n$  is not less than the design current  $I_b$
- b)  $I_n$  exceeds the lowest current carrying capacity  $I_z$
- c) the current causing effective operation ( $I_2$ ) exceeds  $1.45 I_2$
- d)  $I_b$  is greater than  $I_z$

24. The requirements for overload current protection are fulfilled when:

- a)  $I_b = 15A$ ,  $I_n = 20A$ ,  $I_z = 18A$
- b)  $I_b = 20A$ ,  $I_n = 15A$ ,  $I_z = 15A$
- c)  $I_b = 10A$ ,  $I_n = 15A$ ,  $I_z = 18A$
- d)  $I_b = 2.5A$ ,  $I_n = 10A$ ,  $I_z = 8A$

25. In order to comply with IEE Regulations, the current rating of a BS 3036 fuse should NOT exceed that of the lowest rated conductor in the circuit multiplied by:

- a) 0.725
- b) 1.33

- c) 1.45
- d) 2

26. Regulation 434.5.2 gives a maximum time which may be permitted for a fault to be maintained without damaging the conductors. Assume a prospective fault current of 1000 A and a 25 mm<sup>2</sup> 70° C thermoplastic cable with a copper conductor, the maximum permitted fault duration is:

- a) 7.2 s
- b) 8.2 s
- c) 5 s
- d) 0.4s

27. Devices intended to give protection against both overload and short circuit currents must be capable of breaking currents up to:

- a) the design current
- b) 1.45 times the design current
- c) 1.45 times the rating of  $I_n$
- d) the maximum prospective fault current at the point of installation

28. Which one of the following supplies is NOT suitable for a SELV system?

- a) engine-driven generator giving equivalent isolation as BS EN 61558-2-6
- b) an earthed secondary transformer
- c) safety transformer to BS EN 61558-2-6
- d) lead acid battery

29. The temperature limit for non-metallic equipment which is intended to be touched but not hand held is:

- a) 55° C
- b) 65° C
- c) 70° C
- d) 80° C

30. The maximum earth fault loop impedance for a 110 V (55 V to earth) circuit protected by a 32 A type B circuit breaker to BS EN 60898

- a) 0.79 ohm
- b) 0.34 ohm
- c) 0.69 ohm
- d) 0.55 ohm

31. The characteristic to be ascertained for an external supply in order that the breaking capacity of the overload protective device for an installation can be determined is:

- a) external loop impedance
- b) prospective short circuit current
- c) nominal voltage
- d) maximum demand

32. The maximum phase to earth voltage of a “Reduced Low Voltage System” is defined as:

- a) 25 V
- b) 55V
- c) 63.5V
- d) 110V

33. Correct co-ordination between conductors and an over-current protective device is achieved when:

- a)  $I_n$  is less than  $I_b$
- b)  $I_n$  is less than  $I_z$
- c)  $I_z \div I_2 = 1.45$
- d)  $I_z \times 1.45 = I_b$

34. For the purpose of over voltage control, a suspended cable having insulated conductors with earthed metallic covering is deemed to be:

- a) an uninsulated cable
- b) a bare or pvc covered cable
- c) an underground cable
- d) a catenary – supported cable

35. Correct co-ordination between conductors and an over-current protective device is achieved when:

- a)  $I_n$  is not less than the design current  $I_b$
- b)  $I_n$  exceeds the lowest current carrying capacity  $I_z$
- c) the current causing effective option ( $I_2$ ) exceeds  $1.45I_z$
- d)  $I_b$  is greater than  $I_z$

36. When considering over-voltage protection, direct lightning strikes on low voltage lines of the supply network are:

- a) not taken into account
- b) directed to earth
- c) taken into account
- d) directed through a discharge device

37. Which of the following sources of supply would NOT be accepted for Separated Extra-Low Voltage?

- a) a Class II safety isolating transformer
- b) a motor generator set giving BS EN 61558-2-6 isolation
- c) a centre tapped transformer giving 55 V to earth
- d) an electrical device in which the output voltage cannot exceed ELV in the case of an internal fault

38. The MAXIMUM accessible distance that it should be assumed a person can reach when standing on a surface is:

- a) 0.75 m

- b) 1.25 m
- c) 2.50 m
- d) 3.00 m

39. Which one of the following characteristics of the supply to a building could NOT be determined by an enquiry to the supplier?

- a) nature of the current and the frequency
- b) the prospective short circuit at the origin of the installation
- c) the type and rating of the protective device
- d) the value of the earth fault current at the earth acting at the origin of the installation electrode within a TT system

40. An electric cooker may be connected to a ring final circuit providing it:

- a) is in a kitchen
- b) is no more than 2 metres from the nearest socket outlet
- c) has a rating not exceeding 2kW
- d) protected by a 3 A fuse

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