

Tunnelling

Q.1 What is the correct sequence of the following events of construction of a shaft in rock?

1. Drilling and blasting
2. Timbering
3. Pumping
4. Mucking

Select the correct answer using the codes given below:

- | | |
|----------------|----------------|
| (a) 1, 2, 3, 4 | (b) 1, 4, 2, 3 |
| (c) 2, 1, 4, 3 | (d) 2, 4, 1, 3 |

Q.2 If 'N' is the number of shafts used, then the total number of faces available for attacking the excavation and construction in tunnels are

- | | |
|--------------|--------------|
| (a) $2N$ | (b) $N + 2$ |
| (c) $2N + 1$ | (d) $2N + 2$ |

Q.3 American method of tunneling

- (i) is suitable for large sized tunnels
- (ii) is not suitable for railway or highway tunnels
- (iii) requires heavy timbers

Of the above statements

- (a) only (i) is correct
- (b) (i) and (iii) are correct
- (c) (ii) and (iii) are correct
- (d) (i) and (ii) are correct

Q.4 If 'D' is the diameter of tunnel in metres, then the thickness of lining in mm, as per the empirical formula is given by

- | | |
|------------|------------|
| (a) $42D$ | (b) $82D$ |
| (c) $104D$ | (d) $124D$ |

Q.5 The needle beam method of tunnelling

- (i) is suitable for soils in which roof can stand for few minutes without support
- (ii) is suitable for brick lining
- (iii) is suitable for concrete lining
- (iv) requires large number of trench jacks

Of the above statements

- (a) only (i) is correct
- (b) (i), (ii) and (iv) are correct
- (c) (i), (iii) and (iv) are correct
- (d) (i) and (ii) are correct

Q.6 In Belgium method of tunnelling

- (a) construction of side walls is completed before invert and roof arch are built.
- (b) construction of roof arch is completed before side walls and invert are built.
- (c) construction of invert is completed before side walls and roof arch are built.
- (d) construction of invert and side walls is completed before roof arch is built.

Q.7 What is the correct sequence of the following events in rock tunnelling?

1. Marking tunnel profile
2. Loading explosives and blasting
3. Checking misfire
4. Mucking
5. Removing foul gas
6. Setting up and drilling
7. Gunning

Select the correct answer using the codes given below.

- | |
|-------------------------|
| (a) 1, 6, 5, 3, 4, 2, 7 |
| (b) 1, 2, 6, 3, 5, 4, 7 |
| (c) 1, 6, 2, 5, 4, 3, 7 |
| (d) 1, 6, 2, 5, 3, 4, 7 |

Q.8 Match List-I (shape of tunnel) with List-II (Attribute for preference) and select the correct answer using the codes given below the lists.

List-I

- A. Horse shoe section
- B. Circular section
- C. Egg shaped
- D. Segmental roof

List-II

1. Gives self cleaning velocity even in dry weather
2. Suitable for soft rocks
3. Best suited for non-cohesive soils
4. Suitable for soft material section
5. Suitable for subways

Codes:

- | | A | B | C | D |
|-----|---|---|---|---|
| (a) | 2 | 3 | 4 | 5 |
| (b) | 5 | 4 | 1 | 3 |
| (c) | 3 | 2 | 4 | 1 |
| (d) | 2 | 3 | 1 | 5 |

Q.9 Match List-I with List-II and select the correct answer using the codes given below the lists.

List-I

- A. Loggings
- B. Collar braces
- C. Wall plates
- D. Segments

List-II

1. To carry roof load under arch action
2. To support arch rib at springing level
3. To prevent the segments twisting out of line
4. To retain the fill

Codes:

- | | A | B | C | D |
|-----|---|---|---|---|
| (a) | 2 | 3 | 4 | 1 |
| (b) | 4 | 3 | 1 | 2 |
| (c) | 3 | 4 | 2 | 1 |
| (d) | 3 | 4 | 1 | 2 |

Q.10 Match List-I with List-II and select the correct answer using the codes given below the lists.

List-I

- A. Ground mould
- B. Leading frame
- C. Trusses

List-II

1. Invert lining
2. Roof arch lining
3. Side wall lining

Codes:

- | | A | B | C |
|-----|---|---|---|
| (a) | 1 | 2 | 3 |
| (b) | 1 | 3 | 2 |
| (c) | 2 | 1 | 3 |
| (d) | 2 | 3 | 1 |

Q.11 Match List-I with List-II and select the correct answer using the codes given below the lists.

List-I

- A. Off-spur tunnels
- B. Saddle or base tunnels
- C. Slope tunnels
- D. Spiral tunnels

List-II

1. Tunnels constructed in the valleys along the natural slope till the slope does not exceed the ruling gradient
2. Tunnels constructed in steep hills
3. Short length tunnels constructed to negotiate minor local obstacles
4. Tunnels provided in narrow valleys to increase the tunnel length to avoid steep slope

Codes:

- | | A | B | C | D |
|-----|---|---|---|---|
| (a) | 3 | 1 | 2 | 4 |
| (b) | 1 | 3 | 2 | 4 |
| (c) | 3 | 1 | 4 | 2 |
| (d) | 1 | 3 | 4 | 2 |

Q.12 Match List-I (Shape of tunnel) with List-II (Suitability for) and select the correct answer using the codes given below the lists.

List-I

- A. Circular section
- B. Horse shoe section
- C. Egg shaped
- D. Segmental roof section

List-II

1. Soft rock
2. Hard rock
3. Carrying water
4. Sewer
5. Subways

Codes:

- | | A | B | C | D |
|-----|---|---|---|---|
| (a) | 3 | 4 | 2 | 1 |
| (b) | 2 | 1 | 4 | 5 |
| (c) | 2 | 1 | 4 | 3 |
| (d) | 1 | 2 | 3 | 5 |

Q.13 Match List-I (Tunnel construction Method) with List-II (Advantages) and select the correct answer using the codes given below the list:

List-I

- A. Full face method
- B. Heading and water bearing soil

C. Drift method

D. Compressed air

List-II

1. Helps in ventilation of tunnel
2. Useful in soft and Bench Method
3. Simultaneous drilling and mucking is possible
4. Tunnelling is continuous

Codes:

- | | A | B | C | D |
|-----|---|---|---|---|
| (a) | 3 | 4 | 2 | 1 |
| (b) | 4 | 3 | 2 | 1 |
| (c) | 4 | 3 | 1 | 2 |
| (d) | 3 | 4 | 2 | 1 |

■■■■

Answers Tunelling

1. (b) 2. (d) 3. (a) 4. (b) 5. (b) 6. (b) 7. (d) 8. (d) 9. (a) 10. (b)
11. (a) 12. (c) 13. (c)

Explanations Tunelling

2. (d)

Each shaft gives two addition faces of attack. So after including two ends, the total number of attacking faces comes to $2N + 2$.

■■■■