

(The paper code and roll No. to be filled in your answer book)

Roll No. 

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**B TECH**  
**(SEM VII) THEORY EXAMINATION 2016-17**  
**TUNNEL ENGINEERING**

[Time: 3 Hrs]

[Max marks: 100]

**Note:** Attempt all questions.Q1 Attempt any **FOUR** parts: - (5x4=20)

- a) Discuss with dimension historical tunnels and recently completed tunnels in India.
- b) Draw sketch of double line railway tunnel section in India using horse shoe section.
- c) What information's are collected in Geological investigations for tunnels?
- d) How the centre line of tunnel is transferred from top to inside of tunnel.
- e) Discuss rock mass classification system and explain Q system and RQD system.
- f) Discuss machine mucking systems.

Q2 Attempt any **FOUR** parts: - (5x4=20)

- a) Discuss functional requirements of tunnels.
- b) What are various types of shafts? Give construction method for making a shaft in soft and hard rock.
- c) What are factors affecting selection of drilling equipments used in tunneling? Explain with sketch percussion drilling machines.
- d) What are various types of mountings for drill? When each type is used?
- e) What are possible modes of failure of tunnels?

Q3 Attempt any **TWO** parts: - (10x2=20)

- a) Discuss criterion for selection of section for water and road tunnel
- b) Explain the following
  1. English method ( crown bar method)
  2. Faces of attack in tunnels and explain with sketch heading and bench method.
- c) Types of explosives used in tunneling

Q4 Attempt any **TWO** parts: - (10x2=20)

- a) What do you know by shield tunneling .Discuss various types of shield boring machines.
- b) What do you mean by trenchless technology? Give main areas in it. Also list the methods of trenchless installation.
- c) Write notes on:
  1. Differentiate between pipe jacking and micro tunneling
  2. Name various types of TBMs and compare between compressed air and earth pressure balance TBM.

Q5 Attempt any **FOUR** parts: - (5x4=20)

- a) Discuss hazards under human control.
- b) What are different systems in mechanical ventilation? Draw schematic diagram of combined system.
- c) How dust is controlled in tunnels? Discuss different types of lights used in tunnel works
- d) Discuss construction hazards.

e) Discuss guidelines for design of ventilation pipes.

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