

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2692

Roll No.

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**B. Tech.**

(SEM. VII) ODD SEMESTER THEORY

EXAMINATION 2012-13

**TUNNEL ENGINEERING**

*Time : 3 Hours*

*Total Marks : 100*

**Note** :—Attempt **all** the questions. All questions carry equal marks.

1. Attempt any **two** parts : (10×2=20)

- (a) What is a Tunnel ? Discuss the advantages and disadvantages of tunnels as a means of communication.
- (b) Classify the tunnels according to their alignment and purposes. Also describe the tunnel construction in independent India.
- (c) How will you preliminary explore the location of a tunnel ? Also discuss why the preliminary exploration for a tunnel is very necessary.

2. Attempt any **two** parts : (10×2=20)

- (a) With the help of their neat sketches write about the cross sections of tunnel. Also write their comparative advantages and disadvantages.

- (b) Define portals and discuss the points to be observed while designing a portal. Also discuss the factors which decide the size of a tunnel.
- (c) Design the drilling pattern for blasting a quartzite rock 90 m wide and of unlimited length for drilling a 15 m diameter tunnel in the above rock to complete the work in time, it is required to drive about 60 m tunnel per month. Find out the quantity of explosives required per month.

3. Attempt any **two** parts : (10×2=20)

- (a) Define the following terms: *blasting; explosive; safety fuse; blasting cap; primer and detonators*. Write a detailed note on detonators with neat sketch wherever possible.
- (b) Enumerate different types of explosives used for blasting of rocks. Also discuss how a borehole loaded with explosives and what precautions you will take during the blasting.
- (c) The method of tunnelling in soft grounds depends upon which factors ? Enumerate the methods of tunnelling in soft grounds. Discuss in detail the linear plate method of tunnelling in soft grounds with neat sketches.

4. Attempt any **two** parts : (10×2=20)

- (a) Enumerate the methods which can be adopted while tunnelling in hard strata. Explain full face method with neat sketch.

- (b) At the time of tunnel driving, it is very necessary to support the ground adjacent to tunnel, why ? Also discuss the various methods to support the ground at the time of tunnel driving.
- (c) What is the role of shafts in rocks ? With the help of their neat sketches discuss the shaft sinking in the soft soils.

5. Attempt any two parts : (10×2=20)

- (a) What is the objective of providing proper ventilation to the tunnel interior during the construction ? Give the requirement of air also. Name the factors which affect the length of tunnel upto which natural ventilation would suffice.
- (b) Name the two operations which are involved in the drainage of a tunnel. Describe the well point drainage system with the help of its neat sketch.
- (c) Enumerate the safety measures to be adopted under the following situations :
  - (i) During loading and hauling muck
  - (ii) While working in a cramped working space
  - (iii) During shaft operations
  - (iv) While handling explosives.