Name: **Enrolment No:**	

UPES

End Semester Examination, December 2024

Course: Metro Rail Tunneling System **Semester:** V

Program: B.Tech in Civil Engineering **Time :** 03 hrs

Course Code: CIVL 3068P **Max. Marks:** 100

Instructions: Draw neat sketches using pencil wherever required.

SECTION A
(5Qx4M=20Marks)

S. No.	List of questions	Marks	CO
Q 1	**Differentiate between the following terms:** a) Tunnel and open cut b) OCC and BCC	**2 + 2**	**CO1**
Q 2	**Define the following terms**: a) Viaduct b) SCADA	**2 + 2**	**CO1**
Q 3	Elaborate the various financing approaches in a metro rail project.	**4**	**CO1**
Q 4	Illustrate the working of traction system and rolling stock in Metro Rails.	**4**	**CO2**
Q 5	List down the steps followed in the preparation of a comprehensive mobility plan according to the metro rail policy framework of India.	**4**	**CO1**

SECTION B
(4Qx10M= 40 Marks)

Q 6	Discuss the different materials used in tunnel lining, along with various approaches and advantages of tunnel lining.	**10**	**CO2**
Q 7	Explain the operation of tunnel boring machine along with its advantages over other tunneling methods.	**10**	**CO2**
Q 8	Examine the importance of temporary and permanent ventilation in the context of metro tunnel construction.	**10**	**CO3**
Q 9	Analyze and illustrate the three classifications of drainage arrangements to provide adequate drainage during tunneling with suitable diagrams and sketches. OR Describe the operation of New Australian Tunneling Method (NATM) along with its advantages over other tunneling methods.	**10**	**CO3**

SECTION-C (2Qx20M=40 Marks)			
Q 10	Analyze the top down and bottom-up tunnel construction methodologies. Evaluate and interpret all the steps in construction with neat figures. Further, examine the operational differences between both the methodologies in detail.	**20**	**CO4**
Q 11	Assess and evaluate the operations of pipe jacking and box jacking during metro rail underground construction. OR Examine the different types of automated train operations you have seen while travelling in a metro. Analyze their applications in real-world.	**20**	**CO3**