


Name:			
Enrolment No:			
UPES End Semester Examination, December 2023			
Course: Metro Rail Tunneling System Program: B.Tech in Civil Engineering Course Code: CIVL 3068		Semester: V Time: 03 hrs Max. Marks: 100	
Instructions: a) Consider yourself a metro rail engineer while answering the questions. b) Use pencil and scale to draw neat sketches wherever required.			
SECTION A (5Qx4M=20Marks)			
S. No.		Marks	CO
Q 1	Why are metro rails required? Answer in light of Indian Metro Rail Policy of the Government of India drafted in 2017.	4	CO 1
Q 2	Illustrate and discuss the differences between the following:		
a)	Tunnel approaches and portals	2	CO 2
b)	Comprehensive mobility plan and alternatives analysis report	2	CO 2
Q 3	Analyze and interpret the sequence of lining a metro rail tunnel.	4	CO 3
Q 4	Evaluate the usefulness of tunnel ventilation. Why is it required during construction of an underground metro rail tunnel?	4	CO 3
Q 5	Assess the key components of a detailed project report which is prepared during metro rail planning.	4	CO 3
SECTION B (4Qx10M= 40 Marks)			
Q 6	Explain the operational differences between top-down and bottom-up tunnel construction methodologies with neat sketches.	10	CO 2
Q 7	What is mucking? Explain the working of the following three modern tunnel excavation techniques with figures: i) California Crossing ii) Grass Hopper iii) Cherry Picker	10	CO 2

Q 8	Examine the three classifications of drainage arrangements to provide adequate drainage during tunneling with appropriate sketches to explain their functioning.	10	CO 3
Q 9	Describe the operation of New Australian Tunneling Method (NATM) along with its advantages over other tunneling methods.	10	CO 2
SECTION-C (2Qx20M=40 Marks)			
Q 10	Assess and evaluate the operations of pipe jacking and box jacking during metro rail underground construction. As a metro rail engineer, how will you apply both these concepts?	20	CO 4
Q 11	What are the different types of automated train operations have you seen while travelling in a metro? Analyze their applications in real-world.	20	CO 3