


Name:			
Enrolment No:			
UPES End Semester Examination, May 2024			
Course: Engineering Geology Programme: B. Sc. – H (Geology) Course Code: PEGS 3033 Instructions: All questions are compulsory		Semester: VI Time: 3 hrs. Max. Marks: 100	
SECTION A (5Qx4M=20Marks)			
S. No.		Marks	CO
Q 1	Describe different types of weathering and their products	4	CO1
Q 2	The sandstone recovered from Kalsi Area Dehradun has bulk volume of 145 m ³ and estimated to have a pore space volume of 27.76 m ³ . Calculate the porosity of the sandstone.	4	CO3
Q 3	What are rock joints? How do they differ from geological faults?	4	CO2
Q 4	What are landslides? Discuss the role of human beings in accelerating landslides	4	CO3
Q 5	Enumerate the importance of engineering geology in civil engineering practice	4	CO2
SECTION B (4Qx10M=40Marks)			
Q 6	<p>(a) Determine the RQD of the rock if the core recovered from a 13m borehole is retrieved in the following core lengths: 3 x 24 mm, 4 x 30.5 cm, 9 x 12 mm, 4 x 7.5 cm, 6 x 350 mm, 14 x 5.5 cm, 16 x 25 cm, 12 x 330 mm, 1 x 47mm</p> <p>(b) List the six parameters that are used to classify a rock mass according to the Bieniawski Rock Mass Rating.</p> <p style="text-align: center;">OR</p> <p>Show on a load/deformation graph the following support characteristics, namely:</p> <ul style="list-style-type: none"> • Pre-tension • Yield load • Brittle failure • Energy absorption 	10	CO3
Q 7	List five detailed points to take into consideration when designing access tunnels in medium to deep stress conditions.	10	CO2

Q 8	Explain rock cycle with the help of a neat sketch	10	CO2
Q 9	Discuss the earthquake, its cause and classification in detail.	10	CO1
SECTION-C (2Qx20M=20Marks)			
Q 10	<p>Illustrate the following geological condition necessary for construction of Dam:</p> <p>(a) Selection of site (b) Geological characters for investigation</p> <p style="text-align: center;">OR</p> <p>Examine the most important structural features for the construction of Dam.</p>	20	CO3
Q 11	<p>A development end on a mine has intersected poor ground which has slowed advances. A 60 m long exploration diamond drill hole, with an orientated drill core, has been drilled ahead of the face to gather information on expected ground conditions. You must analyze the orientated core recovered from the hole. You record a total of 380 joints in the core. There appears to be two distinct sets of strike joints, dipping at roughly 20 and 80 degrees respectively. While one set is rough and undulating, the other is smooth, planar and slickensides. Traces of micaceous filling, varying in thickness from 0 – 3 mm, are visible in the joint planes. No water seems to be present. There also appears to be a 3.0-metre-thick weathered dyke running through the middle of this zone, at an angle of 45 degrees.</p> <p>Calculate the rock mass quality based on the Q-system, using the tables provided below. Motivate your reason for each value chosen for use in the rock mass rating.</p>	20	CO4

STRESS REDUCTION FACTOR		
A	No shear, faults, dyke or weakness zone	1
B	One shear, fault, dyke or weakness zone	2.5
C	One shear, fault, dyke or weakness zone with blocky ground conditions	4
D	Curved joints or dome structure approaching a pothole, reef roll or OPL's	7.5
E	Curved joints or dome structure approaching a pothole, reef roll, OPL's with blocky ground conditions	8
F	Many faults, dyke and weakness zones.	9
G	Wide shear zone	10

JOINT ALTERATION NUMBER		
A	Tightly healed, hard rockwall joints, no filling	0.5
B	Slight infill, coating < 1mm	1
C	Joint filling > 1 mm	2
D	Joint filling > 3 mm	4
E	Zones or bands of disintegrated or crushed filling, open joints.	8

JOINT SET NUMBER		
A	Massive, no to few joints	1
B	One joint set	2
C	One joint set plus random joints	3
D	Two joint sets	4
E	Two joint sets plus random joints	6
F	Three joint sets	9
G	Three joint sets plus random joints.	12
H	Four or more joint sets, random, heavily jointed.	15
I	Crushed rock	20

JOINT WATER		
A	Dry	1
B	Dripping water	0.5

JOINT ROUGHNESS NUMBER		
A	Discontinuous joints	4
B	Rough or irregular undulating	3
C	Smooth undulating	2
D	Slickensided, undulating	1.5
E	Rough or irregular planar	1.5
F	Smooth planar	1
G	Slickensided planar	0.5