Exam.		Back	
Level	BE	Full Marks	40
Programme	BCE	Pass Marks	16
Year / Part	II / II	Time	1 ½ hrs.

Subject: - Engineering Geology II (CE 553)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **All** questions.
✓ The figures in the margin indicate **Full Marks**.
✓ Assume suitable data if necessary.

1. What are the main parameter, phases and task of EGS? [1+1+1]

2. What are the geological problems of Higher Himalaya and Tethys Himalaya zone? Highlight the major discontinuities system of Nepal Himalaya. [1+1+1]

3. Differentiate between confined and unconfined aquifers with suitable diagram. [2]

4. a) What are the purposes of site investigation? Described geophysical and geotechnical exploration. [1+3]

   b) Describe the various geological problems and documentation that occurs in tunnel construction. [2+2]

5. a) How mass movement occurred? Classify the landslide according to Varne's. [2+3]

   b) Describe elastic rebound theory. [2]

6. a) Define RMR method and discuss the support system and excavation method in class II rock type. [1+2]

   b) Fourth bore hole is proposal at P, the NE corner of the square land. Calculate at what depth the bore hole encounters the coal seam at P. [4+2]

   c) Analyze the failure mode by using stereographic projection from following data. H.S: 170°/50°, B.P.: 160°/42°, Friction angle: 26° [5]

7. Define reserve. Calculate reserve for aggregate of sandstone bedrock having vertical thickness 300 m at S72°W/43° and in an area of 227 km^2. [1+2]

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Exam.		Back	
Level	BE	Full Marks	40
Programme	BCE	Pass Marks	16
Year / Part	II / II	Time	1 ½ hrs.

Subject: - Engineering Geology II (CE 553)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt All questions.
✓ The figures in the margin indicate Full Marks.
✓ Assume suitable data if necessary.

1. What is engineering geological system (EGS)? Highlights the engineering geological map preparation methods. [1+2]

2. Describe a major discontinuities system of the Nepal Himalaya and their engineering significance. [2]

3. What are the major geological factors that formed a different hydrological condition? [2]

4. What is tunneling? Describe the process for geological site investigation of road, bridges and dams. [1+6]

5. Define a types of mass movement. Describe the major geological hazards of the Himalayas and their mitigation measures. [3+4+2]

6. What is the intact rock? Describe the Bienisawski RMR classification system of the rock mass. [1+6]

7. Highlights the major application of geomorphology in searching of construction materials. [2]

8. Write a short notes on: (Any Four) [4×2]

   a) Over braking
   b) Underground excavations process
   c) Stereographic projection
   d) Discontinuity
   e) Seismicity
   f) Aquifer

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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2078 Chaitra

Exam.		Regular
Level	BE	Full Marks 40
Programme	BCE	Pass Marks 16
Year / Part	II / II	Time 1½

Subject: - Engineering Geology II (CE553)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **All** questions.
✓ The figures in the margin indicate **Full Marks**.
✓ Assume suitable data if necessary.

1. How engineering Geological map prepared? Mention the components of engineering Geological map.   [1.

2. Outline the major engineering geological problems of lesser Himalaya and indo-gangetic plain with mitigating measures.

3. What is Darcy's law? Differentiate between confined and unconfined aquifers.

4. a) Define geophysical exploration

   b) Nepal government is going to construct a new road on the left bank of the Sunkoshi River after the devastating landside. Describe what kinds of Engineering Geological parameters should be consider for selecting road alignment.

5. a) Define mass movement. Classify landslides according to Vernes (1978).   [

   b) How GLOF occurred? Differentiate between magnitude and intensity of earthquake.   [2

6. a) Describe the geo-mechanics classification of rockmass.

   b) Discuss the excavation and support system in fair rock class according to RMR.

   c) Suggest the possible mode of failure from following figure.
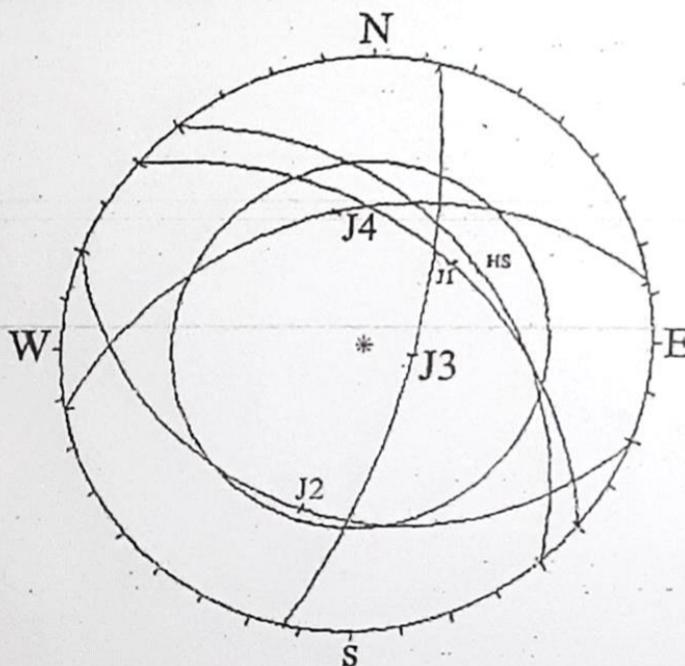
Orientations

ID	Dip/Direction
HS	40 / 050
J1	46 /040
J2	28 / 200
J3	70 / 103
J4	39 /348

Friction angle : 25

Equal Angle
Lower Hemisphere

   d) Three bore holes are sunk at SW, SE and NW corners of square level ground. The side of the square is 300m long. The bore holes are A, B, C respectively. The bore holes meet the coal seam at 15m in A, 45m in B and 60m in C. Determine attitude of the coal seam.   [

7. The attitude of sandstone is N42°W/34°. The difference of top and bottom of bed rock is 80m. Calculate the reserve of aggregate in 2.5 km strike length and 0.5km dip length of rock quarry site.   [

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Exam.		Back	
Level	BE	Full Marks	40
Programme	BCE	Pass Marks	16
Year / Part	II / II	Time	1 ½ hrs.

Subject: - Engineering Geology II (CE 553)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt __All__ questions.
✓ The figures in the margin indicate __Full Marks__.
✓ __Tracing paper and Stereonet should be provided.__
✓ Assume suitable data if necessary.

1. What are rock forming minerals? Describe their engineering significance. [1+2]

2. Discuss major discontinuities system of the Nepal Himalaya with their engineering significance. [2]

3. What are factors that affect ground water movement? Mention types of aquifer system of Nepal. [1.5+1.5]

4. a) Discuss the types and methods of site investigation. [3]

   b) Describe geological condition for the site selection of tunnel and road. [3+3]

5. a) Differentiate GLOF and LDOF. [2]

   b) Justify the statement "Nepal is considered as a seismically active zone". [2]

   c) Discuss the control measures of landslide. [4]

6. a) How is RQD calculated in the absence of drill core data? [1.5]

   b) Discuss the support system and excavation methods in class IV rock type by RMR method. [4.5]

   c) Analyze the stability condition of rock slope from following data by using stereographic projection method. Give your suggestion if necessary for maintaining the stability of rock slope. [6]

   Hill slope: 175°/52°
   Bedding plane: 150°/48°
   Friction angle: 38°

7. What are use of geological map and topographical map in searching of the construction materials? [3]

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Exam.		Back
Level	BE	Full Marks 40
Programme	BCE	Pass Marks 16
Year / Part	II / II	Time 1½

Subject: - Engineering Geology II (CE553)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt _All_ questions.
✓ The figures in the margin indicate _Full Marks_.
✓ Assume suitable data if necessary.

1. What is the major engineering geological task of detail design phases of engineering geological system?

2. Outline the different major discontinuities system of the Nepal Himalaya and write down their engineering significance.

3. Write down the engineering significance of ground water. Mention the different ground water potential zone of Nepal.

4. a) Discuss about the geological investigation of tunnel and road.

   b) Write down the engineering documentation during underground excavation.

5. a) Differentiate between flood and GLOF. What are the main geological hazards? How do they differ from that of manmade hazard?
   [2+2]

   b) Write down the different types of mass movement. State Structural control on Landslide.
   [3]

6. a) Define rock mass and intact rock. Write down the properties of discontinuities for rock mass classification.
   [2]

   b) Discuss the stability analysis based on the following data.

   HS= 202°/65°, F=350°/27°, J1= 180°/81°
   J2=78°/69°, J3= 21°/73°, J4= 293°/50°
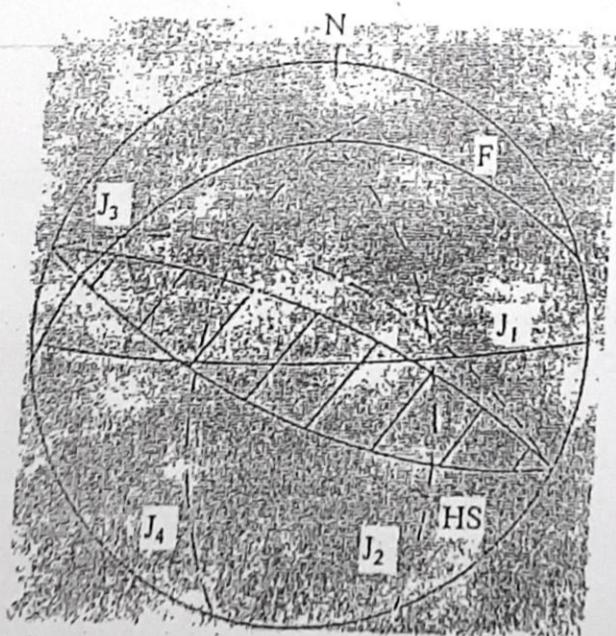
7. Differentiate between reserve and resource. Calculate the true thickness of Limestone bed having vertical thickness 600 m at North 75°E/ 50° NW in an area of 550km².

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Exam.		Back	
Level	BE	Full Marks	40
Programme	BCE	Pass Marks	16
Year / Part	II / II	Time	1½ hrs.

Subject: - Engineering Geology II (CE 553)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt *All* questions.
✓ The figures in the margin indicate *Full Marks*.
✓ Assume suitable data if necessary.

1. What are the major engineering geological task at different phases of engineering geological system? [3]

2. What are the Geological problems of lesser Himalya and Terai zone? Highlight the major discontinuities system of Nepal Himalaya. [1+1+1]

3. Write down the geological factor for formation of different aquifer. Mention the different aquifier system of Nepal. [2+1]

4. a) What is overbreak? Describe the geological consideration for bridge site selection. [1+4]

   b) Describe the various geological problems occur during tunnel construction. [3]

5. a) Differentiate between hazard and risk. What are the main geological hazards? How do they differ from that of manmade hazard? [2+1+1]

   b) Describe the causes and mitigation measure of landslide. [5]

   c) Differentiate between slope failure and debris flow. [1]

6. a) Discuss the stability analysis of the given planes. [5]
   Hill slope = 310°/43°
   Bedding plane (BP) = 306°/31°
   Joint (J1) = 350°/40°
   Joint (J2) = 288°/37°
   Joint (J3) = 237°/32°
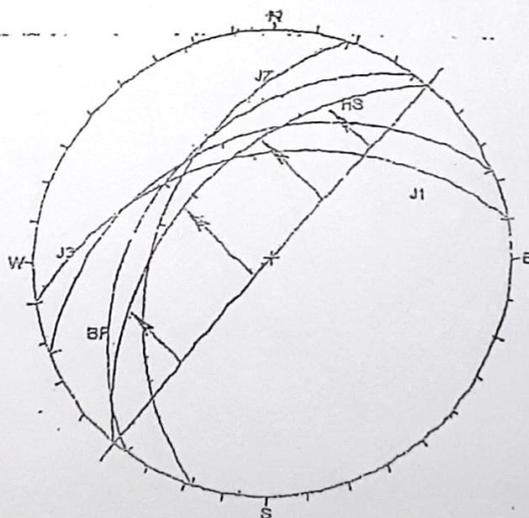
   b) What are the parameters of Q-system of rockmass classification? [3]

   c) Discuss the excavation and support system in fair rock class according to RMR. [2]

7. Define reserve. Calculate reserve for construction of quartizate bed having vertical thickness 400m at S 72°W / 48° SE in an area of 537 km². [3]

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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2077 Chaitra

Exam.		Regular	
Level	BE	Full Marks	40
Programme	BCE	Pass Marks	16
Year / Part	II / II	Time	1½ hrs.

Subject: - Engineering Geology II *(CE 553)*

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt __All__ questions.
✓ The figures in the margin indicate __Full Marks__.
✓ Assume suitable data if necessary.

1. What is engineering geological map? Write down the different phases for evaluation of Engineering geological system (EGS). [1+2]

2. Outline the different major discontinuities system of the Nepal Himalaya and write down their engineering significance. [3]

3. How Darcy's law describes ground water movement? Describe types of aquifer with suitable diagram. [2+2]

4. a) What is overbreak? Write down the engineering documentation during underground excavation. [[1+3]

   b) Why documentation in tunneling should be carried out? What are the purposes of site investigation? [1+3]

5. a) Define Hazard, Risk and Vulnerability. [3]

   b) Classify landslide as per Varnes (1978). [4]

   c) List out the types of mass movement and soil erosion. [2]

6. a) Discuss the stability analysis of given planes. [4]

   H-49/249, F=56/243, J1=58/071, J2=30/175, J3=83/286 and Ø=25.
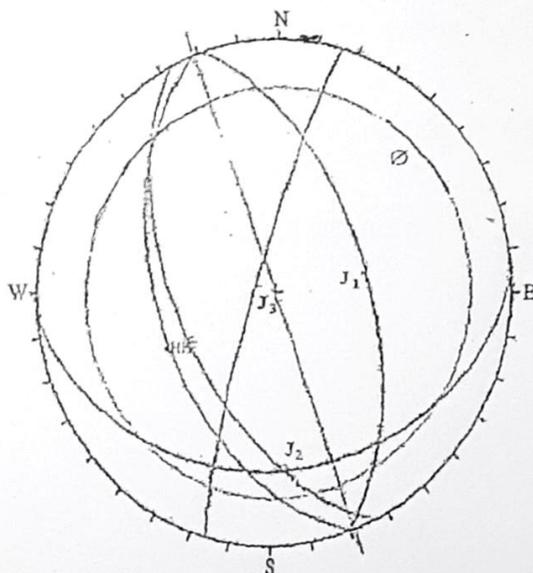
   b) Bore hole A is 900m due to north of Bore hole B and Bore hole C is 800m due to west of bore hole B. The top and bottom of a rock layer are reached at the following altitudes relative to the sea level in the three holes.
   Bore Hole A: -350m and -410m
   Bore Hole B: -310m and -370m
   Bore Hole C: -390m and -450m
   Find the attitude and true thickness of the rock layer. [6]

7. Define reserve. Calculate reserve for Limestone bed having dip amount 30°, apparent thickness of 20m in 1128.5m² area. [1+2]

1

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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2076 Baisakh

Exam.		Back	
Level	BE	Full Marks	40
Programme	BCE	Pass Marks	16
Year / Part	II / II	Time	1½ hrs.

Subject: - Engineering Geology II (CE 553)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **All** questions.
✓ The figures in the margin indicate **Full Marks**.
✓ Assume suitable data if necessary.

1. Define Rock Forming Minerals. In which phase of Civil engineering project, sub-surface site investigation carried out with supplementary core drilling? [1.5+1.5]

2. What are the major discontinuity system of Nepal Himalaya? What are the major engineering geological problems of the Lesser Himalaya zone. [1+2]

3. What are the factors for ground water movement? Describe types of confining beds. [2+1]

4. a) Describe geological consideration in tunnel alignment selection which method is suitable in investigation of bridge foundation? [3+2]

   b) Describe indirect methods of surface site investigation. [3]

5. a) Define geological hazards. How LDOF occurred? [1+2]

   b) Describe VARNE's classification of Landslide. [4]

   c) How strength of earthquake measured? Describe seismic waves. [1+2]

6. a) Describe Q-system of rock mass classification. [2]

   b) What are the support system of Rock class-IV according to RMR-system? How do you calculate RQD from Drill core samples? [3+2]

   c) The vertical thickness of inclined bedrock limestone is 150m & true dip amount is 47°. Calculate True thickness of Limestone bedrock. [3]

7. What is resource? Describe importance of topographical & geological map in searching construction materials? [1+2]

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Exam.		Regular	
Level	BE	Full Marks	40
Programme	BCE	Pass Marks	16
Year / Part	II / II	Time	1 ½ hrs.

Subject: - Engineering Geology II *(CE553)*

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **All** questions.
✓ The figures in the margin indicate **Full Marks**.
✓ Assume suitable data if necessary.

1. What are the parameters of Engineering Geology? Point out major components of engineering geological map. [1.5+1.5]

2. What is an aquifer? Describe Darcy's law with suitable diagram. Mention geological factors for formation of hydrogeological condition. [0.5+1.5+1]

3. Define discontinuity. What are the major engineering geological problems in the siwalik zone? [1+2]

4. a) How do you differentiate between geophysical and geotechnical exploration in site investingations? Describe. [3]

   b) What are the engineering geological parameters should be considered in canal alignment selection? Describe. [5]

5. a) Define hazard, risk and danger. How GLOF occurred? [1+2]

   b) Describe mechanism of mass movement. What are the measures for mitigation of geological hazards? [1+4]

   c) Describe elastic rebound theory. Describe intensity and magnitude of earthquake. [1+1]

6. a) What are the parameters for RMR-system? How do you calculate RQD in the rock out crops? [3+1]

   b) Three boreholes A, B, C were drilled in a flat terrain to investigate depth of bedrock. Borehole a lies N 45°W from borehole B at a distance of 900 m and borehole C lies S 20°E from borehole B at a distance of 700 m. A Sandstone bedrock is encountered in following depth of each borehole. [3+3]

   Borehole A: Top (-350 m), Bottom (-410 m)

   Borehole B: Top (-310 m), Bottom (-370 m)

   Borehole C: Top (-390 m), Bottom (-450 m)

   Find out attitude of sandstone bedrock with true thickness.

7. How do you define reserve? Differentiate between total resource and undiscovered resource. [1+2]

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Exam.		Back	
Level	BE	**Full Marks**	40
Programme	BCE	**Pass Marks**	16
Year / Part	II / II	Time	1 ½ hrs.

Subject: - Engineering Geology II *(CE553)*

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **All** questions.
✓ The figures in the margin indicate **Full Marks**.
✓ Assume suitable data if necessary.

1. What are the rock forming minerals? Mention civil engineering significance of calcite 'w.r.t' reservoir site selection. [2+1]

2. Outline the major engineering Geological problems of Siwalik and Higher Himalaya zone. What are the mitigation measures of erosion? Describe. [1+1+1]

3. Describe relation between hydralic gradient and hydralic conductivity in groundwater movement. How an artesian formed? [2+1]

4. a) What do you mean by geophysical exploration? [3]

   b) For hydropower project, tunnel alignment have to be selected. The overburden material depth is confirmed from drilling of three boreholes, where top of the bedrock is encountered as follow. [5]

Location of borehole	Depths of bedrock at		
	BH ≠ 1	BH ≠ 2	BH ≠ 3
From BH ≠ 1 - BH ≠ 2, at distance of 1000m along N32°E	-200 m	-300 m	-500 m
From BH ≠ 1 - BH ≠ 3 at distance of 800 m along S73°E			

   Select suitable alignment of tunnel, w.r.t. attitude of bedrock.

5. a) What is the mechanism of mass movement? What are the consequences of GLoF as geological hazard, describe. [3+2]

   b) How do you differentiate hazard and risk? Describe relative hazard. [3+2]

6. a) How do you select support type for underground opening? Describe with justification. [4]

   b) What are the support system and excavation method of poor rock class according to RMR system? Mention. [3+3]

7. a) What are the requirements for selection of borrow area for construction material exploration? Mention. Describe types of resource. [1]

   b) The attitude of sandstone bedrock is N44°W / 36°. The difference of top and bottom of bedrock is 82 m. Calculate the reserve of aggregate in 2.7 km strike length and 0.62 km. dip length of rock quarry site. [2]

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Exam.		Regular	
Level	BE	Full Marks	40
Programme	BCE	Pass Marks	16
Year / Part	II / II	Time	1 ½ hrs.

Subject: - Engineering Geology II (CE553)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **All** questions.
✓ The figures in the margin indicate **Full Marks**.
✓ Assume suitable data if necessary.

1. How engineering Geological Map prepared? Mention the components of engineering Geological map. [1+2]

2. What are the geological problems of Lesser Himalaya and Terai zone? What are the Preventive measure for landslide? Describe. [1+1+1]

3. What are the geological factors for formation of hydrogeological condition? How do you differentiate aquifer and confining bed? [1+2]

4. a) Describe direct method of sub-surface site investigation. [3]

   b) What are the geological consideration for selection of road and dam site. How do you investigate the foundation site for building and bridge? Mention in brief. [2+1.5+1.5]

5. a) How GLOF occured? What are the types of movement according to varne? Describe in brief. [2+3]

   b) Classify engineering evaluation of hazard. How absolute hazard assessment carried out? Describe. [3+2]

6. a) What are the parameters for RMR-system of rockmass classification? Describe meaning of rockmass class w.r.t. shear parameter? [4+1]

   b) Intrepretate the stability condition of rock slope where canal alignment have to be pass. The orientation discontinuities and hill slope and internal friction angle are as follow: [5]
   HS = 138°/45°, J_1 = 234°/38°, J_2 = 098°/58°, J_3 = 315°/60° and ϕ = 25°
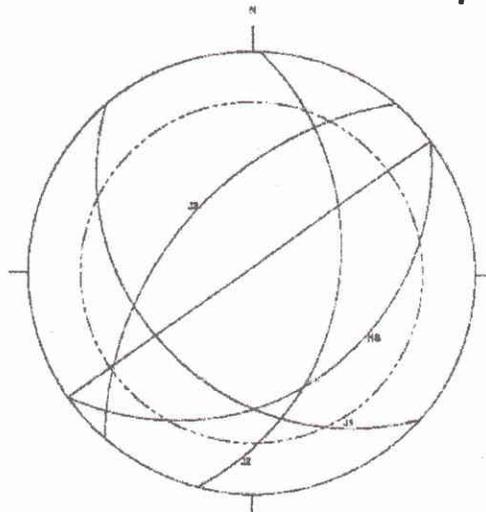
7. a) Define reserve. How do you estimate the reserve for construction material to construct highway project? [1]

   b) Apparent dip amounts of Quartzite bed rock along N20°E and N65°E are 1:9 and 1:12 respectively. The vertical thickness of bedrock is 105 m. Calculate the reserve of construction material for an engineering project at area of 4.6 km² rock quarry site.

Exam.		Regular	
Level	BE	Full Marks	40
Programme	BCE	Pass Marks	16
Year / Part	II / II	Time	1 ½ hrs.

Subject: - Engineering Geology II *(CE553)*

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **All** questions.
✓ The figures in the margin indicate **Full Marks**.
✓ Assume suitable data if necessary.

1. Define engineering geological map. Mention engineering significance of quartz mineral w.r.t hydropower project when sediment analysis has been carried out. [1.5+1.5]

2. Define discontinuity. Outline major engineering problems of lesser Himalaya. [1+2]

3. Differentiate aquifer and confining bed. Mention geological factors for formation of hydrogeological conditions. [1+1]

4. a) What are the purposes of site investigation? Describe geophysical and geotechnical exploration. [2+4]

   b) Describe the geological consideration for reservoir site selection. [3]

5. a) Define Hazard and risk. Describe mechanism of mass movement. [2+2]

   b) Describe parts of landslide with labelled diagram. Mention types of movement with reference to varne's classification. [2+3]

6. a) Three boreholes A, B and C were drilled for limestone reserve calculation. Bore hole A lies at 600 m distance due N28°E from borehole B. Bore hole C lies at 400m distance dues S 10°W from bore hole B. The top and bottom of limestone bed was encountered at the following depth of given bore holes. [5]

| Bore hole	Top (m)	Bottom (m)
A	200	260
B	220	280
C	240	300

   Calculate the true thickness of limestone bed.

   b) What are the conditions of plane failure of rock slope. [2]

   c) What are the parameters of Q-system for rockmass classification? [2]

   d) How do you calculate RQD from drill core method? [2]

7. Define reserve. Calculate reserve for aggregate of quartzite bedrock having vertical thickness 300 m at S 72°W/43° and in an area of 437 km^2. [3]

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Exam.	**New Back (2066 & Later Batch)**		
Level	BE	Full Marks	40
Programme	BCE	Pass Marks	16
Year / Part	II / II	Time	1 ½ hrs.

Subject: - Engineering Geology II *(CE553)*

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt __All__ questions.
✓ The figures in the margin indicate __Full Marks__.
✓ Assume suitable data if necessary.

1. Write down the parameters of engineering geological system. [3]

2. Mention the major engineering geological problems in the lesser Himalaya with mitigation. [3]

3. Describe the different types of aquifer system of Nepal. [2]

4. a) What is site investigation? Mention the different types of site investigation. [3]

   b) What are the engineering geological factors to be considered for dam site selection? [3]

   c) Describe the various geological problems occur during tunnel construction. [3]

5. a) What is the magnitude of earthquake hazard in Nepal? Differentiate between intensity and magnitude. [5]

   b) Describe the geological hazard in Nepal due to GLOF. [5]

6. a) The altitude of different planes are given below. HS = 110°/40°; B = 130°/20°; $J_1 = 100°/40°$; $J_2 = 200°/50°$, $\phi = 32°$. Design cut slope inclination to be stable of given discontinuities from different types of failure. [4]
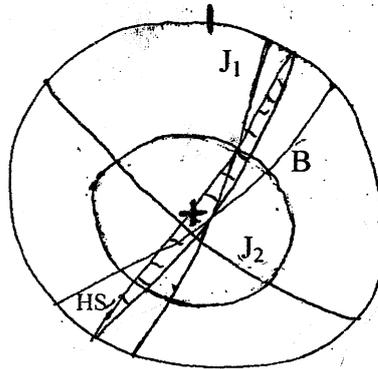
   b) Define stereographic projection and mention the use of stereographic projection in the different field of engineering geology. [3]

   c) Describe the role of RMR system in underground excavation and support design. [3]

7. Mention the different requirements for selecting borrow areas for construction material. [3]

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Subject: - Engineering Geology II (CE553)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt __All__ questions.
✓ The figures in the margin indicate __Full Marks__.
✓ Assume suitable data if necessary.

1. Write main tasks for EGS in detailed design phase of civil engineering projects. [3]

2. Describe mitigation measures of geological problems in Himalaya. [3]

3. Mention geological factors for formation of hydrological conditions. [2]

4. a) Describe geological criteria for selection of road alignment. [3]

   b) How do you explain factor of overbreak? [3]

   c) Describe geophysical exploration. [3]

5. a) What is factor of safety? Describe strength of earthquake. [2+2]

   b) How varne classified landslide? Explain. [3]

   c) Differentiate harzard and risk. [1.5+1.5]

6. a) What are the meaning of Rock mass classification from RMR-system? [2]

   b) How do you measured RQD in rock exposure and drilled core samples? [1+1]

   c) Mention conditions for wedge failure from rock mass. [2]

   d) Three bore holes were drilled to find out stable place for dam foundation of hydroelectric project. The apparent thickness of quartzite was found as 210 m. The Attitude of Quartzite bed was 220°/36° NE. Calculate true thickness of bedrock. [4]

7. How do you estimate reserve for construction materials from soil and rock strata? [3]

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Exam.		Regular / Back	
Level	BE	Full Marks	40
Programme	BCE	Pass Marks	16
Year / Part	II / II	Time	1½ hrs.

Subject: - Engineering Geology II (CE553)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **All** questions.
✓ The figures in the margin indicate **Full Marks**.
✓ Assume suitable data if necessary.

1. Describe about the preparation of engineering geological map in the field? [3]
2. What is the engineering significance of major discontinuities system of the Nepal Himalaya? [3]
3. How Darcy's Law describes ground water movement? Describe characteristics of confining beds? (1+1)
4. Describe main purposes of site investigation? How do you make the site investigation below the ground surface? (2+3)
5. Define overbreak. Describe geological parameters for evaluation of bridge site selection ?(1+3)
6. Define intensity and magnitude of the earthquake. Explain the different types of waves generated during earthquake. [2+3]
7. What is mass movement? Explain why Nepal Himalaya is very prone to Landslide. [1+4]
8. What are differences between intact Rock and Rock Mass? Explain about the importance of Rock quality designation (RQD) in Rock Mass classification system based on Rock Mass Rating (RMR) in underground excavation. [2+3]
9. Discuss the stability analysis of the given planes. [5]
   NS= $320^0/70^0$; F= $155^0/68^0$; J1= $240^0/80^0$; J2=$310^0/35^0$; J3=$10^0/85^0$; $\phi=30^0$
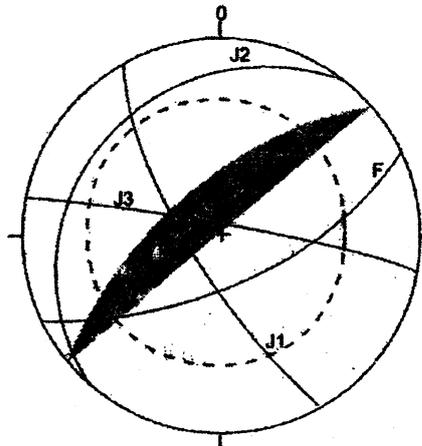
10. How geomorphology, topographical map & engineering geological maps help to searching of construction material? (3)

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Subject: - Engineering Geology II *(CE553)*

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt __All__ questions.
✓ The figures in the margin indicate __Full Marks__.
✓ Assume suitable data if necessary.

1. Describe the engineering significance of the rock forming minerals. [3]
2. Describe types of aquifer with suitable diagram. What are the different engineering geological problems in the Terai zone of the Nepal Himalaya? [2+3]
3. Define Rock Mass Rating (RMR). Discuss the different type and methods of site investigation for the road in the Nepal Himalaya. [2+4]
4. How mass movements occur? Classify the landslide according to varnes (1978). [2+4]
5. Explain the different effects of earthquake and GLOF in the Nepalese context. [3+2]
6. What is rock mass? Describe the rock mass classification based on Q-system and discuss its implication for the tunnel support design. [2+4]
7. Discuss the different conditions for plane failure in the rock slope. [2]
8. Three boreholes A, B and C were drilled for limestone reserve calculation. Bore hole A lies at 600m distance due $N28^0E$ from borehole B. Borehole C lies at 400m distance due $S10^0W$ from borehole B. The top and bottom of limestone bed was encountered at the following depth of give boreholes.

| Borehole	Top (m)	Bottom (m)
A	200	260
B	220	280
C	240	3000

   Calculate the true thickness of the limestone bed. [4]
9. Discuss the use of topographic map and geological map for the survey of aggregates. [3]

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Subject: - Engineering Geology II *(CE553)*

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt __All__ questions.
✓ The figures in the margin indicate __Full Marks__.
✓ Assume suitable data if necessary.

1. Define engineering geological map. What are the main parameters for evaluation of engineering geological system? [1+2]

2. Describe the importance of Darcy's law in groundwater movement. Explain the engineering significance of major discontinuities system of the Nepal Himalaya. [2+3]

3. Describe the different types and methods of site investigation and write down the different engineering geological parameters for the bridge site selection. [3+3]

4. Define Mass movement. Differentiate between landslide and debris flow. [2+2]

5. Describe the mechanism of an earthquake. What are the differences between magnitude and intensity of an earthquake? [2+4]

6. Mention the different types of rock mass classification system. How do you measure RQD from given drill core samples? [2+2]

7. Define reserve. Describe the use of engineering geological map for the construction material survey. [1+2]

8. The apparent dip amount of an inclined bed is 1:12 and 1:16 along N30°W and N10°W respectively. Calculate the true dip amount and direction. [4]

9. Discuss the stability analysis based on the following data: [5]

   $HS= 202^0/65^0$, $F= 350^0/2?^0$, $J_1= 180^0/81^0$, $J_2= 78^0/69^0$, $J_3= 21^0/73^0$, $J_4= 293^0/52^0$
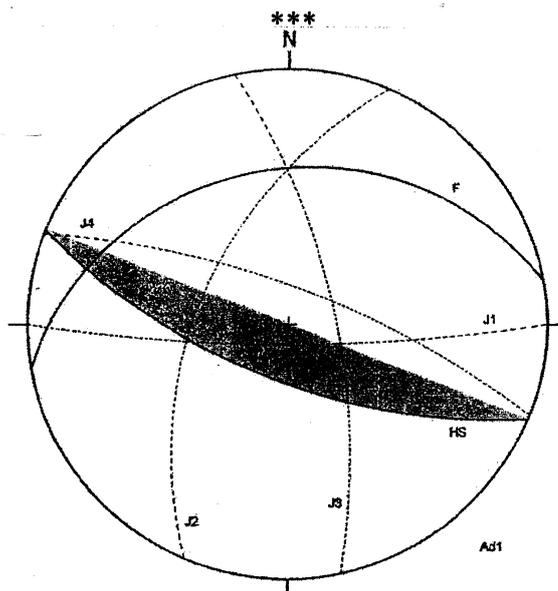
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Subject: - Engineering Geology (CE553)

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **All** questions.
✓ The figures in the margin indicate **Full Marks**.
✓ Assume suitable data if necessary.

1. Describe the engineering significance of the rock forming minerals. [3]

2. Highlight the major discontinuities system of Nepal Himalaya and their engineering significance. [3]

3. What are different aquifer system in terai, hills and mountains of Nepal? [2]

4. a) What are the engineering geological factors to be assessed for the tunnel site selection? [5]

   b) Write down the documentation process for this task. [4]

5. a) How do you differentiate P-wave and S-wave? Describe strength of earthquake. [2+3]

   b) Define mass movement. Describe causes of landslide. [1+4]

6. a) Bore B in an oil field is 5000 feet due north of bore hole A and bore hole C is 10,000 feet due east of bore hole A. The tops and bottoms of a key sandstone bed are reached at the following altitudes relative to sea leveling the three holes: A, –2500 and –2700 feet; B, –2800 and –3000 feet; and C, –3000 and –3200 feet. What is the attitude of the sandstone and how thick is it? [5]

   b) Suggest the possible mode of failure from following figure. [5]
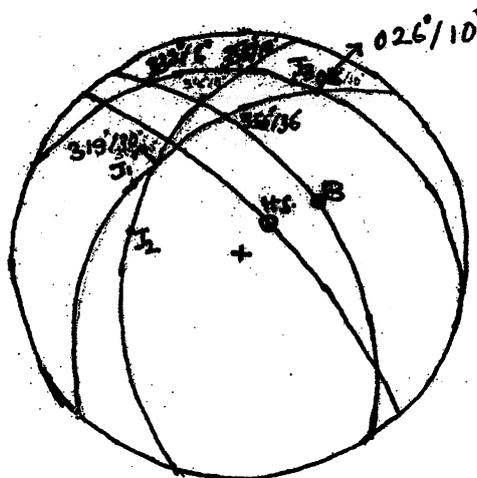
Hill slope: N45°E/70° Bending: N 55°E/45° Joint 1: N47°W/31° Joint 2: N77°E/36°
Joint 3: N20°E/10°

7. What are the major steps involved in estimation of the construction materials? [3]

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Exam.		Regular	
Level	BE	Full Marks	40
Programme	BCE	Pass Marks	16
Year / Part	II / II	Time	1½ hrs.

Subject: - Engineering Geology II

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt *All* questions.
✓ The figures in the margin indicate *Full Marks*.
✓ Assume suitable data if necessary.

1. Define over break. Describe direct methods of surface investigation with reference to selection of road alignment in rock slopes.   [1+3]

2. Describe river channel morphology. Describe geological factors for formation of aquifer system in mountain.   [1.5+2.5]

3. Write down the mechanisms of mass movement. Discuss the control measures against landslide.   [1+4]

4. Describe condition of toppling failure.   [3]

5. What are main parameters of Engineering Geological System? Describe major geological hazards in the Higher Himalayan Zone.   [1.5+2.5]

6. Bore hole A is 700m due north of bore hole B and bore hole C is 600m due west of bore hole B. The tops and bottoms of a rock layer are reached at the following altitudes relative to the sea level in three holes.   [6]

   Bore hole A : −410m and −430m
   Bore hole B : −380m and −400m
   Bore hole C : −430m and −450m

   Find the attitude and thickness of the rock layer.

7. Define rock mass. Discuss geo-mechanics classification of rock mass.   [1+4]

8. What is engineering geological maps? Describe the importance of engineering geological maps in selection of burrow area.   [2.5+2.5]

9. Write short notes on: [2×2]

   a) Ground water movement
   b) Mechanism of Earthquake

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