



b)	What are the different components of subsidence? How the components will vary at Point of Inflection?	[7]	<b>CO5</b>
c)	Write down the assumptions needed to open a circular opening in massive rock.	[8]	<b>CO6</b>
OR			
Q9. a)	Discuss how the support is chosen based on ground response curve.	[5]	<b>CO4</b>
b)	Discuss Principal of Superposition and Principal of Equivalence.	[7]	<b>CO5</b>
c)	Discuss the inter-dependency of rock structure, in-situ stress and water condition of rock mechanics concepts	[8]	<b>CO6</b>

<b>Name:</b>	
<b>Enrolment No:</b>	

**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**End Semester Examination, December 2018**

<b>Course: ROCK MECHANICS (GSEG 324)</b>	<b>Semester: V</b>
<b>Programme: B.TECH. IN MINING ENGG. (Indian)</b>	<b>Time: 03 hrs.</b>
<b>Max. Marks: 100</b>	
<b>Instructions: Answers must be brief and to the point.</b>	

**SECTION A: 20 MARKS (ANSWER ALL)**

S. No.	Statement of the Questions	Marks	CO
Q1. a)	Write the features of Mohr's circle.	[4]	CO1
b)	How the size of rock affect during in intact rock testing.	[4]	CO1
c)	Explain various environmental effects on rock.	[4]	CO2
d)	What are the different stabilization principles? Differentiate them.	[4]	CO4
e)	Compare Flatjack and Hydraulic fracturing method.	[4]	CO6

**SECTION B: 40 MARKS (ANSWER 2, 3, 4 AND EITHER 5 OR 6)**

Q2. a)	Discuss the loading conditions in rock testing.	[6+4]	CO2
b)	Distinguish between Mohr-Coulomb and Hoek-Brown failure criteria.		
Q3. a)	Discuss the RMR system of rock classification.	[6+4]	CO3
b)	What is scale effect of rock?		
Q4. a)	Discuss the FIVE components of Subsidence.	[5+5]	CO5
b)	Write the Profile function and elaborate.		
Q5. a)	Discuss the three aspects of excavation.	[6+4]	CO4
b)	How the stress-strain graph is correlated with the excavation?		
OR			
Q6. a)	Discuss the various effects of Excavation.	[6+4]	CO4
b)	What are the concepts of stability for transitional rock masses?		

**SECTION-C: : 40 MARKS (ANSWER 7 AND EITHER 8 OR 9)**

Q7. a)	<p>Given: <math>\sigma_x = 20</math> MPa, <math>\sigma_y = 10</math> MPa, <math>\tau_{xy} = 10</math> MPa, <math>\tau_{yx} = 10</math> MPa, <math>\theta = 20^\circ</math> rotation in clockwise direction.</p> <p>Calculate the values of stresses after rotation.</p> <p>Calculate the principal stresses and principal stress directions.</p> <p>Draw the Mohr's circle on graph paper</p>	[5] [5] [5]	CO1
b)	Discuss ANY FIVE properties of the discontinuities	[5]	CO3
Q8. a)	Write ANY SIX properties of the discontinuities.	[6]	CO4
b)	Explain the different factors for subsidence.	[7]	CO5
c)	Discuss hydraulic fracturing method briefly. What are the problems with this method?	[7]	CO6
OR			
Q9. a)	Discuss the how the support is chosen based on ground response curve.	[6]	CO4
b)	Explain Principal of Superposition and Principal of Equivalence.	[7]	CO5
c)	Elaborate effect of a single discontinuity on the state of stress and stress direction.	[7]	CO6