

Name:  
Enrolment No:



**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**End-Semester Examination, December 2019**

**Programme: B.Tech. (Mining Engineering)**  
**Course: Rock Mechanics**  
**Course Code: PEGS 3008**

**Semester: V**  
**Time: 03 hrs.**  
**Max. Marks: 100**

**SECTION A: 20 MARKS**

S. No.	Statement of the Questions:	Marks	CO
Q1.	Statement: Unsupported excavations are Principal stress plane, justify.	4	CO1
Q2.	Illustrate the different strain rosette.	4	CO1
Q3.	Differentiate between UCS and TCS tests on rock.	4	CO2
Q4.	What are the different stabilization principles? Differentiate stabilization methods.	4	CO4
Q5.	Evaluate challenges in hydraulic fracturing method?	4	CO6

**SECTION B: 40 MARKS**

Q6. a) b)	Explain the Hoek-Brown failure criteria. Discuss the environmental effects on rock.	6+4	CO2
Q7. a) b)	What are the differences of RMR and Q-system of rock classification? How JRC and JCS are estimated in the field in relation to rock discontinuity?	4+6	CO3
Q8. a) b)	Examine the various factors responsible for Subsidence. What is role of Point of Inflection in subsidence study?	8+2	CO5
Q9. a) b)	Illustrate the three aspects of excavation. How the stress-strain graph is interpreted with the excavation surface?	6+4	CO4
OR			
c) d)	What are the geotechnical aspects of Excavation? Explain the concepts of stability for transitional rock masses.	6+4	CO4

**SECTION-C : 40 MARKS**

<p>Q10. a) b)</p>	<p>Briefly explain ground response curve for different method of excavation. Determine and Construct the subsidence for a <b>full-width of excavation</b> based on the following information: Width of excavation=150m, depth=500m, seam thickness=1.5m, subsidence factor=0.40, the excavation is horizontal with critical width of excavation.</p> <table border="1" data-bbox="305 485 1211 632"> <tr> <td>S/S<sub>max</sub></td> <td>0</td> <td>0.05</td> <td>0.1</td> <td>0.2</td> <td>0.4</td> <td>0.6</td> <td>0.8</td> <td>1.0</td> </tr> <tr> <td></td> <td align="center" colspan="8"><b>Distances from the panel centre in terms of depth</b></td> </tr> <tr> <td>w/h</td> <td>0.90</td> <td>0.59</td> <td>0.47</td> <td>0.34</td> <td>0.24</td> <td>0.18</td> <td>0.12</td> <td>0</td> </tr> </table>	S/S <sub>max</sub>	0	0.05	0.1	0.2	0.4	0.6	0.8	1.0		<b>Distances from the panel centre in terms of depth</b>								w/h	0.90	0.59	0.47	0.34	0.24	0.18	0.12	0	<p align="center"><b>5</b></p>	<p align="center"><b>CO4</b></p>
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<p>Q11. a) b) c)  d) e) f)</p>	<p>Discuss the Rock reinforcement in continuous rock. What are the different components of subsidence? How the components will vary at Point of Inflection? Write down the assumptions needed to open a circular opening in massive rock.</p> <p align="center">OR</p> <p>Discuss how the support is chosen based on ground response curve. Explain Brazilian test for rocks. Discuss the inter-dependency of rock structure, in-situ stress and water condition of rock mechanics concepts</p>	<p align="center"><b>6</b></p> <p align="center"><b>6</b></p> <p align="center"><b>8</b></p>	<p align="center"><b>CO4</b></p> <p align="center"><b>CO5</b></p> <p align="center"><b>CO6</b></p>																											
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