


Name:			
Enrolment No:			
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES End Semester Examination, December 2022			
Course: Geological and Geophysical Method of Exploration Program: B. Tech APE-UP Course Code: PEGS2035		Semester: III Time : 03 hrs. Max. Marks: 100	
Instructions: All Questions are compulsory. Internal choices are given in Question No. 6 & 10.			
SECTION A (5Qx4M=20Marks)			
S. No.		Marks	CO
Q 1	Illustrate the application of magnetic method in hydrocarbon exploration.	4	CO1
Q 2	Explain the remanent magnetization in igneous, sedimentary and metamorphic rocks	4	CO4
Q 3	Differentiate among Seal, Cap rock and Trap.	4	CO1
Q 4	Describe the importance of HI and OI. Mention how to calculate original HI and OI from rock eval data.	4	CO3
Q 5	Calculate the porosity of the formation if the P wave velocity in the water saturated formation and matrix is 2500 m/sec and 3000 m/sec respectively. (Given: Velocity of P wave in water is 1450m/sec).	4	CO6
SECTION B (4Qx10M= 40 Marks)			
Q 6	Discuss different methods to separate gravity anomalies. Or Discuss the effect of size, depth and density contrast of target body on anomaly curve with suitable diagrams.	10	CO2
Q 7	Illustrate secondary migration and accumulation of hydrocarbons in a system.	10	CO5
Q 8	Discuss various direct and indirect methods of surface Geochemical prospecting for hydrocarbons.	10	CO3
Q 9	Differentiate between working principle of PPM & Fluxgate magnetometer with appropriate diagram.	10	CO4
SECTION-C (2Qx20M=40 Marks)			
Q 10	Eastern Geophysical carried out seismic survey over an area for an oil company. They found the velocity variation in three different layers as 4.5Km/s, 5.5Km/s and 6.5Km/s respectively. Consider the amplitude of	20	CO6

	<p>incident wave as unity and density of all the layers as 2.7g/cm^3, depth to the first and second interfaces are 500m and 1500m respectively and that there is no geometrical spreading, attenuation, or scattering. Construct the seismic record of amplitude versus time of the arrival of first two reflected waves and a multiple in the geophone.</p> <p>OR</p> <p>Seabird Exploration, a global provider for high-end seismic services, require doing a seismic survey for an oil company. As a global company, they want to ensure best quality results and for that, they believe in better acquisition. Therefore, they contacted you for designing the survey. Construct the report defining: significance of survey design, Formation of database, Optimization of parameters, and Type of spread.</p>																																												
Q 11	<p>Refer the Table 1 that presents Rock Eval Pyrolysis data for various samples obtained at different depths. Analyze the data for Rock evaluation and characterization, calculating required indices, plotting diagrams/cross-plots etc.</p> <p>Table 1: Rock-Eval Pyrolysis data for different wells</p> <table border="1"> <thead> <tr> <th>S. No.</th> <th>Depth (m)</th> <th>TOC (%)</th> <th>S1 (mgHC /gTOC)</th> <th>S2 (mgHC /gTOC)</th> <th>S3 (mgCO₂/gTOC)</th> <th>Tmax (°C)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1700</td> <td>0.1</td> <td>0.19</td> <td>0.37</td> <td>0.25</td> <td>380</td> </tr> <tr> <td>2</td> <td>1800</td> <td>0.13</td> <td>0.22</td> <td>0.15</td> <td>0.23</td> <td>394</td> </tr> <tr> <td>3</td> <td>2400</td> <td>0.23</td> <td>0.49</td> <td>0.35</td> <td>0.36</td> <td>422</td> </tr> <tr> <td>4</td> <td>2600</td> <td>0.12</td> <td>0.22</td> <td>0.13</td> <td>0.21</td> <td>401</td> </tr> <tr> <td>5</td> <td>2800</td> <td>0.78</td> <td>0.37</td> <td>1.22</td> <td>0.49</td> <td>418</td> </tr> </tbody> </table>	S. No.	Depth (m)	TOC (%)	S1 (mgHC /gTOC)	S2 (mgHC /gTOC)	S3 (mgCO ₂ /gTOC)	Tmax (°C)	1	1700	0.1	0.19	0.37	0.25	380	2	1800	0.13	0.22	0.15	0.23	394	3	2400	0.23	0.49	0.35	0.36	422	4	2600	0.12	0.22	0.13	0.21	401	5	2800	0.78	0.37	1.22	0.49	418	20	CO5
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