

Name:

Enrolment No:



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

Course: B.Tech Applied Petroleum + Sp Upstream
Programme: Petro. Exp-Geological & Geophysical Methods

Semester: V
Code: PEGS 3001

Time: 03 hrs.

Max. Marks: 100

Instructions:

SECTION A [20 marks]

S. No.		Marks	CO
Q 1	Classify the petroleum source rocks based on their hydrocarbon generation potential.	5	CO1
Q 2	Mention how to calculate original HI and OI from rock eval data.	5	CO1
Q 3	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).	5	CO6
Q 4	Briefly describe about Geomagnetism.	5	CO4

SECTION B [10x4=40 marks]

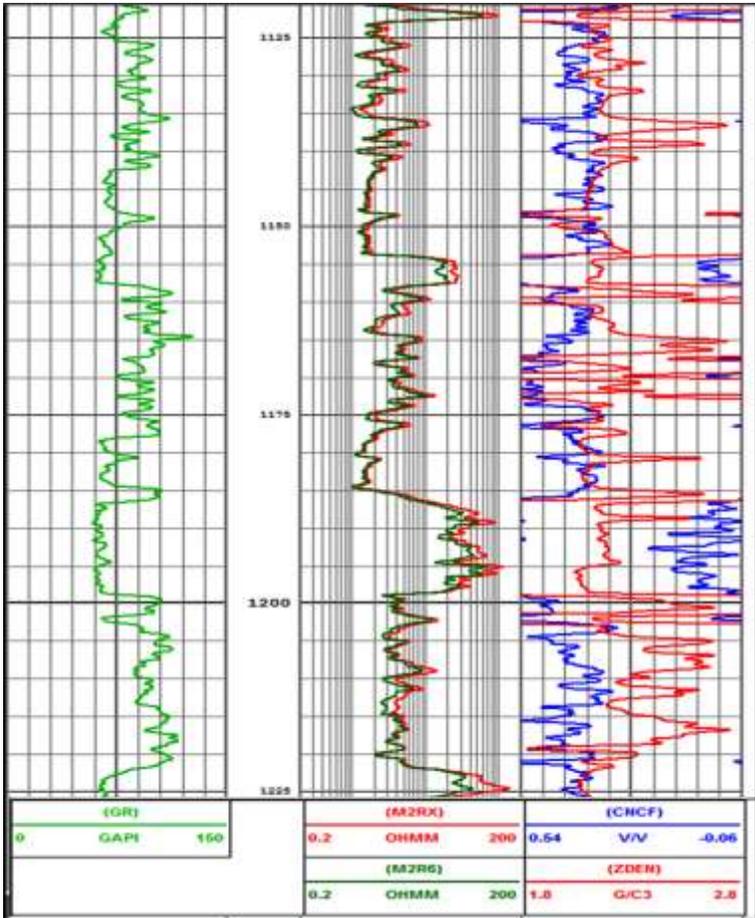
Q 5	Discuss different methods to separate gravity anomalies.	10	CO2
Q 6	Define Larmour Frequency. Briefly describe the working of Proton Precession Magnetometer and Magnetic data acquisition.	10	CO4
Q7	The following data are given for the X Oil Field: [Area = 26,700 acres Net productive thickness = 49 ft Porosity = 8% Average Sw = 45% Initial reservoir pressure, pi = 2980 psia Abandonment pressure, pa = 300 psia Bo at pi = 1.68 bbl/STB Bo at pa = 1.15 bbl/STB Sg at pa = 34% Sor after water invasion = 20%] Calculate the following: 1) Initial oil in place 2) Oil in place after volumetric depletion to abandonment pressure 3) Oil in place after water invasion at initial pressure. Discuss your answers	10	CO5

Q8	(a) Explain how to determine the provenance of organic rich shales in a petroliferous basin. (b) Trace element composition of kerogen from Niger Delta are given below. Interpret the types of kerogen and depositional environment of the source rock. Justify your answer.	5+5=10	CO3																																
	<table border="1"> <thead> <tr> <th>Sample</th> <th>V</th> <th>Cr</th> <th>Co</th> <th>Ni</th> <th>Mn</th> <th>Fe</th> <th>Cu</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>209</td> <td>31</td> <td>21</td> <td>104</td> <td>231</td> <td>3452</td> <td>55</td> </tr> <tr> <td>2</td> <td>145</td> <td>31</td> <td>20</td> <td>69</td> <td>167</td> <td>4489</td> <td>33</td> </tr> <tr> <td>3</td> <td>98</td> <td>16</td> <td>15</td> <td>56</td> <td>131</td> <td>3309</td> <td>65</td> </tr> </tbody> </table>			Sample	V	Cr	Co	Ni	Mn	Fe	Cu	1	209	31	21	104	231	3452	55	2	145	31	20	69	167	4489	33	3	98	16	15	56	131	3309	65
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	OR		
Q8	a) Describe the stages of geochemical prospecting for hydrocarbon. b) Analyze the significance of micro and macro seepages in new petroleum prospect identification.	5+5=10	CO3

SECTION-C [20x2=40 marks]

- Q 9
- (a) Elaborate how the geological factors control the reservoir quality.
 - (b) Illustrate the techniques of facies analysis and identify the challenges.
 - (c) Analyze how the shape of logs can help in identification of reservoir facies and interpretation of depositional environment.
 - (d) Refer the log **image** and answer the questions below:
 - (i) Identify the subsurface lithology and analyze different facies.
 - (ii) Analyze the reservoir zones, calculate shaliness and assess the reservoir quality



4+4+4+8=
20

CO5

Q10	<p>A seismic survey carried out over an area for an oil company. They found the velocity variation in three different layers as 3.2km/s, 6.8km/s and 4.5km/s respectively. Consider the amplitude of incident wave as unity and density of all the layers as 2.7g/cm³, depth to the first and second interfaces are 600m 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 three waves in the geophone.</p>	20	
OR			
Q10	<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:</p> <ol style="list-style-type: none"> a) Significance of survey design. [4] b) Formation of database. [6] c) Optimization of parameters. [6] d) Type of spread. [4] 	<p>4+6+6+4= 20</p>	CO6