


Name:			
Enrolment No:			
<b>UPES</b> <b>End Semester Examination, May 2024</b>			
<b>Course: Sedimentary and Petroleum Geology</b> <b>Program: B.Tech APE-UP</b> <b>Course Code: PEGS 2002</b> <b>Instructions: Q9 and Q11 have internal choices.</b>		<b>Semester: IV</b> <b>Time 03 hrs.</b> <b>Max. Marks: 100</b>	
<b>SECTION A</b>		<b>(5Q x 4M = 20 Marks)</b>	
S. N.		Marks	CO
Q1	Define lead and prospect within the context of petroleum system analysis.	2+2	CO1
Q2	Describe the primary and secondary migration of hydrocarbons.	4	CO1
Q3	Explain the process of primary and secondary migration of hydrocarbon.	4	CO2
Q4	Explain the Maximum regressive surface (MRS) and Maximum flooding surface (MFS).	2+2	CO2
Q5	<b>Identify True or False from the given statements-</b> a) The coarsening upward sequences are formed during regression. b) Drill core having finely laminated silty mud represents to aeolian environment. c) Herring-bone cross-bedding is formed in the lacustrine environment. d) Top-down observation in the prospect risk matrix is related to geophysical analysis.	1x4= 4	CO1
<b>SECTION B</b>		<b>(4Q x 10M = 40 Marks)</b>	
Q6	Describe the primary factors influencing the texture of sedimentary rocks, and how texture contributes to our understanding of the paleoenvironment conditions.	5+5	CO1
Q7	Explain the key components of the Dunham classification scheme. Illustrate how does it categorizes different types of carbonate rocks.	5+5	CO2
Q8	Illustrate Walther's law of facies correlation and its importance in sequence stratigraphy and petroleum system analysis.	10	CO3
Q9	Describe the fluvial depositional environment. Draw a longitudinal profile of a river, annotate three distinct stages and compare the reservoir characters in different zones.	10	CO4
	<b>OR</b>		
	Draw an Aeolian dune cross-section, annotate its geometries and explain textural properties relevant to hydrocarbon reservoirs. Additionally, draw and explain the formation mechanisms of any three types of dunes.		

**SECTION-C**

**(2Q x 20M = 40 Marks)**

<b>Q10</b>	a) Explain the role of sequence stratigraphy in improving hydrocarbon exploration strategies and understanding subsurface reservoir architectures. b) Draw a diagram illustrating one cycle of sea-level change, annotate depositional sequences, system tracts, flooding surfaces, and sequence boundaries and provide their respective definitions. c) Additionally, explain the four sediment stacking patterns, and make a correlation with system tracts in terms of sediment deposition pattern and the development of petroleum systems.	<b>5+5+10</b>	<b>CO3</b>																								
<b>Q11</b>	(a) Illustrate and explain six key petroleum system elements in detail (supported by annotated diagram). (b) Explain their significance in hydrocarbon propectivity analysis of any basin analysis.	<b>10+10</b>																									
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	<p><b>Case study background,</b></p> (c) MoonPetro, an Indian E&P company, has identified two promising prospects within the sedimentary basin of the Rajasthan region. These prospects lie in the southeastern part of the Cambay basin and are characterized by promising geological formations and potential hydrocarbon reserves. The company appointed you as a consultant to carry out a risk and probability assessment of these prospects. You need to draw the Risk matrix and calculate the GCoS using the given probability data (mentioned in the table) of the prospects and make their ranking for drilling.                 (d) Additionally, furnish a critical review report comparing the petroleum system and primary risks associated with each of these prospects. Justify your recommendation of drilling a potential prospect. Your analysis will enable MoonPetro to make informed decisions regarding resource allocation and drilling investments. <table border="1" data-bbox="354 1339 1279 1661"> <thead> <tr> <th></th> <th><b>Prospect Mangala</b></th> <th><b>Prospect Gangotri</b></th> </tr> <tr> <th><i>Elements</i></th> <th><i>Probability</i></th> <th><i>Probability</i></th> </tr> </thead> <tbody> <tr> <td><b>RP</b></td> <td align="center">0.95</td> <td align="center">0.85</td> </tr> <tr> <td><b>RD</b></td> <td align="center">0.85</td> <td align="center">0.85</td> </tr> <tr> <td><b>SC</b></td> <td align="center">1</td> <td align="center">0.90</td> </tr> <tr> <td><b>A</b></td> <td align="center">0.75</td> <td align="center">0.96</td> </tr> <tr> <td><b>T</b></td> <td align="center">0.70</td> <td align="center">0.75</td> </tr> <tr> <td><b>SP</b></td> <td align="center">0.80</td> <td align="center">0.80</td> </tr> </tbody> </table>		<b>Prospect Mangala</b>	<b>Prospect Gangotri</b>	<i>Elements</i>	<i>Probability</i>	<i>Probability</i>	<b>RP</b>	0.95	0.85	<b>RD</b>	0.85	0.85	<b>SC</b>	1	0.90	<b>A</b>	0.75	0.96	<b>T</b>	0.70	0.75	<b>SP</b>	0.80	0.80	<b>10+10</b>	<b>CO4</b>
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