Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

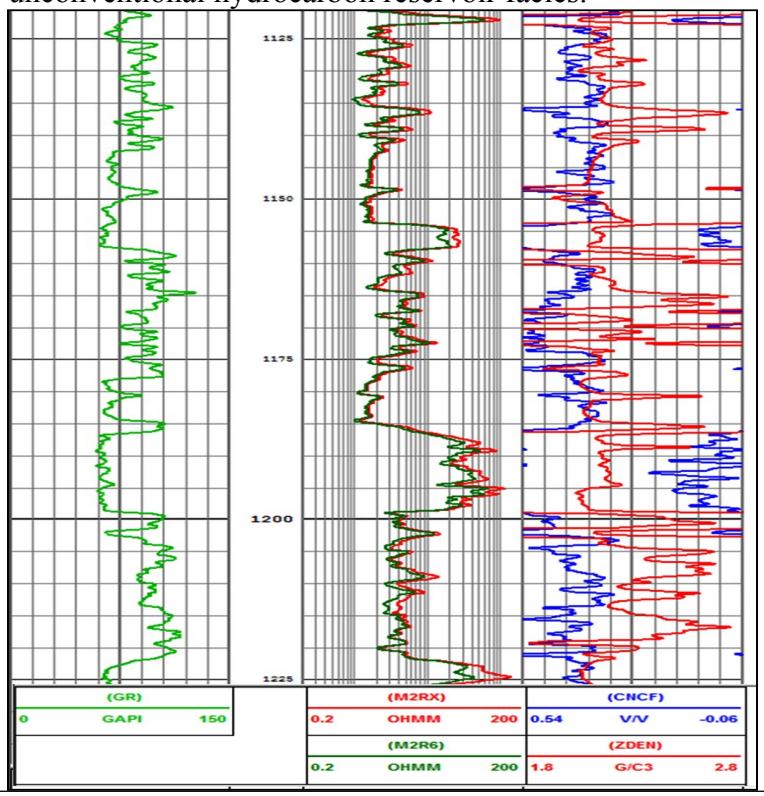
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2019

Course: Methods of Petroleum Exploration
Semester: IV
Program: B. Tech GSE & GIE **Time 03 hrs.**
Course Code: PEGS2009 **Max. Marks: 100**

Instructions: student may attached the log image along with answer sheets.

SECTION A [5X4marks=20]

S. No.		Marks	CO
Q 1	Define the terms: a) Kerogen; b) Bitumen.	**4**	**CO1**
Q 2	Describe about Isopach and Isolith maps.	**4**	**CO3**
Q 3	Explain how can you determine the specific time of sedimentary rock formation.	**4**	**CO2**
Q 4	Discuss the importance of micropaleontology in hydrocarbon exploration.	**4**	**CO2**
Q 5	Explain the concept of facies with examples.	**4**	**CO3**
	SECTION B [4x10=40marks]		
Q 6	The following data are derived from Facies A and are measurements of foresets of large-scale trough cross stratification. Interpret and analyze the Palaeocurrent direction with the help of rose diagram. [Data Set 1(degree of measurement): 103 151 148 119 134 101 152 119 130 87 99 116 92 71 142 106 135 138 65 115 107	**10**	**CO3**
Q 7	(a) Discuss about the petroleum system of Cambay Basin (b) Explain the tectonic phases and the depositional history of Cambay Basin.	**4+6=10**	**CO4**
Q 8	(a) Explain how the petroleum generation and accumulation processes are controlled by depositional environments. (b) Analyze the hydrocarbon source rock potential in alluvial fan and delta depositional system. Justify your comments.	**5+5=10**	**CO5**
Q 9	(a) Discuss the types of primary porosity and secondary porosity. (b) Analyze how the porosity in clastic and non-clastic rocks are controlled by geological factors.	**5+5=10**	**CO6**
	OR (a) Analyze how petrographic and XRD studies can help in micro facies analysis. (b) Discuss the role of sedimentary diagenesis in reservoir facies development.	**5+5=10**	**CO6**
	SECTION-C [2x20=40marks]		

Q 10	(a) Discuss about cratonic basins, convergence boundary related basins and strike slip related basin. (b) Analyze the processes of global tectonics and sedimentary basin dynamics in relation to occurrence of petroleum systems. (c) Create a flowchart to represent the sedimentary basin types and explain with suitable examples	5+10+5=**20**	**CO5**
Q 11	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 (iii) Analyze the implication of well log data in identification of conventional and unconventional hydrocarbon reservoir facies. 	5+10+5=**20**	**CO6**
	OR "*Understanding the accurate reservoir quality is a key challenge in petroleum exploration and development*". (a) Discuss how the geological factors control the reservoir quality. [5] (b) Discuss the techniques of facies analysis and elaborate the challenges.[5] (c) Analyze how the shape of logs can help in identification of reservoir facies and interpretation of depositional environment. [5] (d) In a clean sandstone formation, ρb is the measured bulk density 2.24 gms/cc, ϕe is porosity in fraction, ρf is fluid density in gm/cc and ρma is matrix density for appropriate lithology. If we assume ρf equal to 1gm/cc for water, then by measuring bulk density of clean water bearing formations derive the porosity of the rock.[5]	**20**	**CO6**

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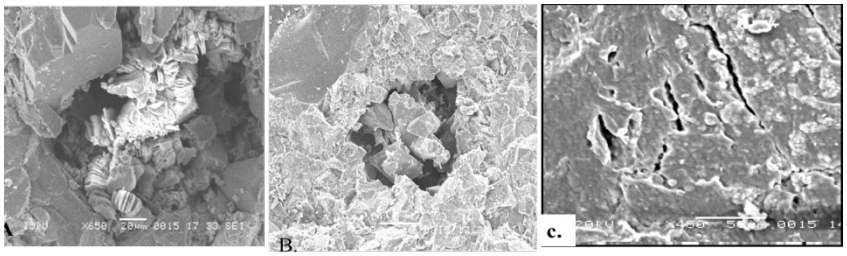
Instructions:

SECTION A [5X4=20marks]

S. No.		Marks	CO
Q 1	Define the terms: a) Catagenesis b) Diagenesis	**4**	**CO1**
Q 2	Compare kerogen type I and kerogen type II.	**4**	**CO1**
Q 3	Explain how you can determine the shale volume of a reservoir zone.	**4**	**CO5**
Q 4	Discuss the importance of Foraminifera in hydrocarbon exploration.	**4**	**CO2**
Q 5	Explain on what basis Indian sedimentary basins are categorized as Category I, II, III and IV.	**4**	**CO3**
	SECTION B [4x10=40marks]		
Q 6	(a)Describe about hydrocarbon seepages. (b)Explain how will you identify and map seepages using remote sensing.	**5+5=10**	**CO1**
Q 7	Give an account of petroleum system of Assam Arakan or Cambay Basin	**10**	**CO4**
Q 8	(c) Explain how the Petroleum reservoir quality is controlled by sediment texture. (d) Analyze the hydrocarbon source rock potential in lacustrine paleo environment. Justify your comments	**5+5=10**	**CO3**
Q 9	Draw the 2 D facies model of meandering depositional system and discuss its significance for petroleum exploration.	**10**	**CO5 CO6**
	[OR] The following data are the measurements of Palaeocurrent data from the trough and tabular cross-beddings. Find out the Palaeocurrent direction with the help of rose diagram. 2 18 13 10 23 27 33 33 46 52 53 67 70 300 305 307 308 315 221 322 67 333 334 55 338 338 221 347 347 348 221	**10**	**CO5, CO6**

SECTION-C [2x20=40marks]			
Q 10	(a) Discuss about rift basin, foreland basin and forearc basin formation processes. (b) Analyze the processes of global tectonics in relation to occurrence of petroleum systems. (e) Create a geological model to depict the depositional history of Cambay Basin	**5+10+5= 20**	**CO5**
Q 11	(a) Analyze how the well logs can be used to assess the hydrocarbon reservoir quality. [10] (b) Analyze the implication of well log data and shape of logs in identification of conventional hydrocarbon reservoir facies and .interpretation of depositional environment. [10] **[OR]** (b)Refer the following photomicrographs  Analyze the photomicrographs and assess the reservoir quality based on your interpretation.[10+10=20]	**20**	**CO6**