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# UNIVERSITY OF PETROLEUM & ENERGY STUDIES DEHRADUN

## End Semester Examination, May 2018

**Program/course:** B. Tech GSE &GIE                          **Semester** – VI
**Subject**: Basin Analysis                                        **Max. Marks   : 100**
**Code    : GSEG 303**                                         **Duration      : 3 Hrs**
**No. of page/s:02**

**Note- Attempt all the questions from Section A and Section B.**

   **Attempt any one questions from Section C.**

## SECTION A [5X4=20 Marks]

**1-**  Define Petroliferous basin, Kerogen, Oil Window and petroleum system. [5]        [CO3]

**2-**  Differentiate sedimentary cycle from rock cycle. [5]                                       [CO2]

3-  Illustrate marine realm and morphology. [5]                                                       [CO1]

**4-**  Define the Clastic and Carbonate Reservoirs. [5]                                         [CO1]

## SECTION B [5X12=60 Marks]

**5-**  Write short notes on **Any Three** following-           [3x4=12]        [CO4]

   a.      Pull apart Basin

   b.      Rift Basin

   c.      Foreland Basin

   d.      Island Arch


6-  An exploratory well is showing a 300m thick shale horizon that is now at a depth of 2km. The porosity of shale is 27% at 2 km and 70% at the surface. Calculate the decompacted thickness of the unit. Define dynamic topography. [12]                          [CO1]

7-  Define Deltas. Give the Galway's  classification of deltas. Describe briefly, with example ancient deltaic deposition. [12]                                                                             [CO1]

**8-**  How high will a fluid rise (Density =1.10 gm/cc) in a cylindrical tube of inner radius of 0.5 mm. The air fluid contact angle, is 30 degrees and the fluid interfacial tension is 72 dynes/cm. The density of air is 0.00122gm/cc. [12]                                      [CO3]

**9- Differentiate any three- [4X3=12]**                     **[CO2]**

        i.   Gilbert type delta & Herringbone structure

        ii. Relative sea level and Base Level

        iii. Growth Fault and Normal fault

        iv- Alluvial Fan Deposition & Deep Sea Fan deposition

## SECTION C [1X20=20 Marks]

**10- a-** How do sediment supply, sea level change and subsidence affect the characteristics of depositional basin? [10]                     **[CO2]**

**b-** Define the various component of integrated basin analysis.   [10]         **[CO2]**

11- **(a)** What is the geological significance of Contour Maps and Fence Diagram? Write the Principles of Contouring?[10]                     **[CO3]**

**(b)**The following data recorded from an Oil Field: Calculate the original oil in place-Area = 26,000 acres,   Net productive thickness = 50 ft, Porosity = 15%, Average Sw = 30%, Initial reservoir pressure, pi = 3000 psia, Bo at pi = 1.68 bbl/STB.     [10]       **[CO4]**

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| Name of the College<br>(Please tick, symbol is given) | : | SOE | ✔ | SOB | | SOL | |
| Program/Course | : | B. Tech GSE &GIE | | | | | |
| Semester | : | VI | | | | | |
| Name of the Subject (course) | : | Basin Analysis | | | | | |
| Course Code | : | GSEG 303 | | | | | |
| Name of Question Paper Setter | : | Dr. Uday Bhan | | | | | |
| Employee Code | : | 40000445 | | | | | |
| Mobile & Extension | : | 8765432128/332 | | | | | |

**Note: Please mention additional Stationery to be provided, during examination such as Table/Graph Sheet etc. else mention "NOT APPLICABLE":**



## FOR SRE DEPARTMENT

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**Note: - Pl. start your question paper from next page**

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## SECTION A [5X4=20 Marks]

1   Define the sea floor spreading, Continental Shelf, Slope and Bathyal zone. [5]      [CO3]

2   Explain the hydrothermal minerals precipitation in Rift Basins. [5]                    [CO2]

3   Define the petroleum system and preservation condition for Organic Matter. [5]    [CO1]

4   Calculate the compacted porosity at 3 km depth of the given lithology and records.[5]

   [CO1]

|              | **Shale**       | **Sandstone**   | **Limestone**   |
| ------------ | --------------- | --------------- | --------------- |
| $\Theta_0$   | 40%             | 30%             | 40%             |
| **C m$^{-1}$** | $5\times10^{-4}$ | $3\times10^{-4}$ | $7\times10^{-4}$ |

## SECTION B [5X12=60 Marks]

5   **Write short notes on Any Three :     [3x4=12]**                                     [CO3]

            a-  System Tracts

            b-  Subsidence mechanism

            c-  Storm wave base

            d-  Isopach maps

6   Discuss the back stripping techniques. Write the component of basin modeling. Relate the

    basin subsidence and sedimentation.  [12]                                      [CO4]

7   Differentiate the Followings **[Any Three]-**     **[4x3=12]**                          [CO2]

            a)  Delta and Estuary

b) Braded and Meandering River

c) Porosity and Permeability

d) Isostasy and Eustasy

8 Explain the roll of buoyancy force and capillary pressure in Hydrocarbon Migration. [12] [CO2]

9 How high will a fluid rise (Density =1.10 gm/cc) in a cylindrical tube of inner radius of 0.5 mm. The air fluid contact angle is 30 degrees and the fluid interfacial tension is 72 dynes/cm. The density of air is 0.00122gm/cc. [12]                    [CO1]

## SECTION C [1X20=20 Marks]

10 Describe in brief the System Tracts. In a basin analysis how the system tracts help to demarcate the sequence boundaries. Illustrate the type of unconformity. [20]        [CO4]

11 Discuss the back stripping techniques in basin analysis. Illustrate and classify the basins related to plate margin. [20]                                   [CO3]

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