UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, May 2018

Program: M. Tech. Petroleum Engineering	**Semester – II**
Subject (Course): Petroleum Reservoir Modeling & Simulation	**Max. Marks : 100**
Course Code : PEAU 7007	**Duration : 3 Hrs.**
No. of page/s: 3	

Instructions:

a.   Answers must carry the supporting material such as equations and diagrams
b.   Abbreviations used in the questions are standard and have their usual meaning
c.   Make appropriate assumptions where data is not supplied

SECTION A

Answer all five questions. Each Question carries 4 Marks   5x4= 20 Marks

Question 1   What are the objectives of reservoir simulation studies? What are the uses and misusage of Reservoir Simulation model?   (4 Marks)

Question 2   What are the differences between the Classical and Numerical Simulation Methods. What are the sources of errors in a numerical model?   (4 Marks)

Question 3   What is a Computer Model? What Questions Can a Computer Model Answer?
(4 Marks)

Question 4   What are the Numerical methods used in Reservoir Simulation? What is Black Oil Model?   (4 Marks)

Question 5   What is Reserve? Explain Probable, Possible and Proved Reserves.   (4Marks)

SECTION B

Answer all five questions. Question No. 1 to 4 are compulsory. Answer any one question

from Questions No.5.   Each Question carries 8 Marks   5x8= 40 Marks

Question 1   Write down the use of geological modeling in reservoir simulation. Write down the use of core data in reservoir simulation.   (8 Marks)

Question 2   What is Material Balance equation (MBE)? Write down the advantages, limitations and sources of data use in Material Balance equation.   (8 Marks)

Question 3   What are 0, 1, 2, and 3 dimensional models? Write down the conditions where you can use.   (8 Marks)

Question 4   What are the basic steps in formulation of Reservoir Simulator Equation? Explain each step in brief. Write down the name of two commercial simulators for Black Oil reservoir.   (8 Marks)

Question 5   Explain Discretization, Initialization, Productivity Index and Finite Difference Method.   (8 Marks)

OR

Question 5   Explain different types of Decline Curve Analysis.

Solve the following from the given the data of oil field, calculate the Initial Oil in Place.

Area = 26,500 acres
Net productive thickness = 60 ft.
Porosity = 25%
Average S_{wi} = 55%
Bo at pi = 1.35 bbl/STB   (8 Marks)

SECTION C
Answer all two questions. Question No. 1 is compulsory. Answer any one question from Questions No.2.   Each Question carries 20 Marks   2x20 = 40 Marks

Question 1   **(20 Marks)**

    1-a   What is Simulator? Write the types of simulators. What are the criteria of simulator selection?   (10 Marks)

    1-b   What are the different deliverables for construction of Geo-cellular model in Petrel? For CMG write down the Pre-processor and Post Processor files.   (10 Marks)

Question 2   **(20 Marks)**

    2-a   What is meant by "History Match" and how is it done? Why is it important to do a history match? What sort of data should matched in a history match? What data not changed during the "History Match" process?   (10 Marks)

2-b Define the material balance equation for gas reservoirs.

Solve the following if :

Cumulative oil production for reservoir was 14.73×10^6 STB at the time when reservoir pressure was 900 psig. At the same time, cumulative production of solution gas was 4.05×10^9 SCF. Calculate the reservoir volume occupied by released gas.

Given Data:
$N = 90.46 \times 10^6$ [STB]
R_{si} at 1225 psig = 230 [SCF/STB]
R_s at 900 psig = 169 [SCF/STB]
Bg at 900 psig = 0.002905 [RB/SCF]   (10 Marks)

OR

Question 2   **(20 Marks)**

2-a What is differential equation? Write down the classification of differential equation. Explain Partial Differential Equation in detail.   (10 Marks)

2-b What is the different File Section in eclipse data File?   .

Define a box as follows:

X direction - cell 1 to cell 5
Y direction - cell 1 to cell 5
Z direction - cell 1 to cell 1 (top layer only)

Set the depth below sea level of the tops of each cell in the box to 5,000 feet using the **BOX**, **TOPS** and **ENDBOX** keywords in Eclipse.   (10 Marks)