UPES
UNIVERSITY OF TOMORROW

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2022

Course: Reservoir Modeling & Simulation
Program: B. Tech. APE UP
Course Code: PEAU 4002

Semester: VII
Time : 03 hrs.
Max. Marks: 100

Instructions:

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Define Reservoir simulation. Explain the different steps in a typical reservoir simulation study.	4	CO1
Q 2	State physical model, mathematical model, numerical and computer model.	4	CO1
Q 3	Write down short notes on transmissibility, wettability, bubble point pressure and aquifer with suitable diagram.	4	CO2
Q 4	Explain volumetric method. Write down the equations of initial oil and gas in place by volumetric method.	4	CO2
Q 5	Explain the forces that makes fluids move in the porous media in detail Describe Partial differential equation and 1 D linear diffusivity equation with suitable figure.	4	CO3

SECTION B
(4Qx10M= 40 Marks)

Q 6	Illustrate capillary pressure-drainage vs imbibition, hysteresis curves. Describe capillary pressure, relative permeability and wettability relationships with suitable diagram.	10	CO2
Q 7	a. Explain upscaling basics. Illustrate different methods of upscaling. **(Marks 5)** b.Describe model initialization during simulation. Write down the techniques of Initialization **(Marks 5)**	10	CO3
Q 8	a. Explain iterative process, Implicit Pressure-Explicit-Saturation and Implicit Pressure-Implicit-Saturation in simulation. **(Marks 5)** b. Discuss Discretization process during reservoir simulation. State the criteria for grid select in reservoir simulation model. **(Marks 5)**	10	CO4
Q 9	Describe the different deliverables for construction of Geo-cellular model in Petrel. Write down the Output and Input Files in Black Oil IMEX Simulator of CMG. **OR**	10	CO6

	Write down the different keywords (in detail) used in Eclipse for RUNSPEC, GRID, EDIT, PROPS, REGIONS, SOLUTIONS, SUMMARY, and SHEDULE Sections. Set 10 cells to have length of 500 feet using **DX** keyword in Eclipse		

SECTION-C
(2Qx20M=40 Marks)

Q 10	a. Discuss the assumptions, limitations and advantages of Material Balance Equation. Describe Discuss Released Gas Volume, Remaining Oil Volume Rock and Connate water expansion volume in Material Balance equation. **(10 Marks)**
	
	b. Given a reservoir with all blocks having the following properties
	  DELX = 50 feet
	  DELY = 1500 feet
	  DELZ = 15 feet
	  POROSITY = 15 PERCENT
	  PERMX = 200 MD
	  PERMY = 3 times PERMX
	  Kz/Kx ratio = 10 percent
	  NET-TO-GROSS RATIO = 0.5
	1. Calculate the bulk rock volume and pore volume of the grid block.
	2. Determine transmissibility in the X, Y and Z directions. **(5 Marks)**
	
	c. Illustrate different types of reserves through flow diagram.**(5 Marks)**
		20	CO2

Q 11	Discuss the various criteria for selecting the prediction cases. Describe the various Input data and output during prediction performances. Apply the prediction case studies of sandstone reservoir for any Indian Field. **OR** Describe iterative procedures for a history match as well as general algorithm for manual history matching along with key reservoir data and additional history matching tools. Discuss uncertainties in history match.	20	CO5