

23PEB303T					Reservoir Modelling and Simulation					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hours/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/VIVA	
3	0	0	3	3	25	50	25	--	--	100

COURSE OBJECTIVE:

1. To provide an overview of reservoir simulation software to conceptualize the complex nature of the reservoirs
2. To provide the concepts on how to create an algorithm to solve the model by applying numerical methods using the developed mathematical model & numerical model
3. To explain how to apply the conceptual, mathematical and numerical skills attained on field-scale problems; and classify limitations of the conventional techniques

UNIT 1 Reservoir Modelling**9 Hrs.**

Introduction to Modelling – Geological Modelling, Types of Model & designing of various models depending on reservoir complexities, rock properties, fluid properties etc., Concept of Black Model and Compositional Model.

UNIT 2 Reservoir Simulation**9 Hrs.**

Introduction, Historical Background, Application of Simulator, Conservation of Mass and Momentum; Continuity Equation, Equation of Motion, Darcy and Non-Darcy Flow; Flow Conditions: Single phase, two phase & multiphase equations for one two- & three-dimensional models Special Concept: Finite difference, Explicit & implicit grid system, Matrix solution, iterative method.

UNIT 3 Data Preparation**9 Hrs.**

Pseudo functions, Reservoir Model Solution Techniques: Implicit pressure and Explicit Saturation (IMPES); Implicit pressure & Implicit Saturation (IMPIS), Preview of Numerical Solution Methods: Direct & Iterative method, stability criteria, Well Representation.

UNIT 4 History Matching**9 Hrs.**

Model validation/verification: History Matching, Optimization algorithms in History Matching, performance prediction; Introduction to reactive transport modelling; Introduction to streamline simulation, comparison of conventional / streamline simulation.

Max. 36 Hrs.**COURSE OUTCOMES:**

On completion of the course, students will be able to,

CO1: Apply the fundamentals of reservoir modelling and simulation

CO2: Differentiate between Black oil and compositional model for its application in reservoir engineering

CO3: Create Reservoir simulation models for various scenarios for visualization and implementation

CO4: Analyse and assess the required reservoir data for understanding the fluid flow in the reservoir

CO5: Validate the History matching concept for reservoir performance and production optimization.

CO6: Examine the robustness of reservoir model for performance prediction of oil and gas field reservoirs.

Text & Reference Books:

1. Crichlow, H. B. (1977) Modern Reservoir Engineering, A Simulation Approach, Prentice-Hall.
2. Franchi, J R. (2006) Principles of Applied reservoir Simulation, 3rd Edition. Gulf Professional Publication.
3. Aziz, K and Sattari, A (1979) Petroleum reservoir simulation, Applied Science Publishers
4. Peaceman, D. W. (1977) Fundamentals of numerical reservoir simulation, Elsevier Publication.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks: 100**

Part A/Question: <Short Notes, Problems, Numerical>

Part B/Question: <Justification, Criticism, Long answers, Interpretation >

Exam Duration: 3 Hrs

<5-7 > Marks (each)

<8-10> Marks (each)