

20PEB323					Reservoir Modelling and Simulation					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	1	0	4	4	25	50	25	--	--	100

COURSE OBJECTIVES

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**10 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**10 Hrs.**

Introduction, Historical Background, Application of Simulator, Different models, Flow Conditions: Single phase, two phase & multiphase equations for one two- & three-dimensional models Special Concept: Explicit & implicit grid system, Finite difference & finite element method, Matrix solution, iterative method, stability criteria

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

UNIT 4 History Matching**10 Hrs.**

Mechanics and Parameter match Special Concepts: Coning and Compositional Models Simulation Optimization using Economic and Techno economic Evaluation Computation of Economic Indices viz. different variants based on technical and economic considerations Introduction to streamline simulation and comparison of conventional / streamline simulation

Max. 39 Hrs.**COURSE OUTCOMES**

On completion of the course, student 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)