Name: Enrolment No:	

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

Course: Petroleum Reservoir Modelling & Simulation **Semester: II**
Program: M. Tech. Petroleum Engineering **Time : 03 hrs.**
Course Code: PEAU 7007P **Max. Marks: 100**

Instructions: All question are compulsory.

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
(5Qx4M=20Marks)

S. No.	Statement of question	Marks	CO
Q 1	Define the objectives of reservoir simulation studies. Explain the different steps in a Typical Reservoir Simulation Study.	4	CO1
Q 2	Write down the differences between the Classical and Numerical Simulation.	4	CO1
Q 3	Define Computer Model. Write down the applications of Computer Model.	4	CO2
Q 4	Define Reserve. Write down the names of different Oil & Gas Reserves Estimation methods. .	4	CO2
Q 5	Describe simulator. Explain the types and uses of each simulator.	4	CO2
	SECTION B **(4Qx10M= 40 Marks)**		
Q 6	Explain Partial differential equation, Equation of State (EOS), Diffusivity equation, and Continuity Equation.	10	CO2
Q 7	Describe Gas Deviation Factor and Productivity Index. Explain Darcy's law to calculate the Productivity Index of well.	10	CO3
Q 8	Explain differential form of Darcy's law for single-phase flow. Explain the forces that makes fluids move in the porous media in detail.	10	CO3
Q 9	Write down the names of modeling software for Static modeling and Dynamic Simulation. Discuss the criteria of simulator selection. For IMEX Simulator write the pre-processor and post processor files. **OR** Discuss the common keywords used to enter data for Cartesian grid and corner Point grid entered in IMEX. Explain Pre-processor and Post Processor files for and Eclipse Simulator. Describe different deliverables for Geo-cellular modeling in Petrel.	10	CO6

SECTION-C (2Qx20M=40 Marks)			
Q 10	**A.** Discuss objectives of History Matching. Describe uncertainties in History Matching. What sort of data should be match during history match? Write down the overall steps used in History Matching. **(10 Marks)** **B.** Describe 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. **(10 Marks)**	**20**	**CO5**
Q 11	**A.** Discuss finite-difference method. Explain Through Flow Diagram Overall Solution Methodology of Reservoir Simulation. **(10 Marks)** **B.** Describe MBE in Oil & Gas reservoirs. For a BLACKOIL system list the number of Unknown and the equation required to solve for these at each time step**.** **(10 Marks)** **OR** **A.** Explain Discretization process. Describe the Discretization steps in the reservoir simulator development. **(10 Marks)** **B.** .Describe the ten golden rules of reservoir simulation study. **Given the Data for Oil Field** Area = 26,500 acres Net productive thickness = 54 ft. Porosity = 25% Average S_{wi} = 45% Initial reservoir pressure, pi = 2480 psia Abandonment pressure, pa = 550 psia Bo at pi = 1.54 bbl/STB Bo at pa = 1.15 bbl/STB Sg at pa = 34% S_{or} after water invasion = 24% **Calculate:** 1. Initial oil in place 2. Oil in place after volumetric depletion to abandonment pressure 3. Oil in place after water invasion at initial pressure **(10 Marks)**	**20**	**CO4**