Name: **Enrolment No:**	UPES UNIVERSITY OF TOMORROW

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

Programme Name: B.Tech (APE UP) **Semester : V**
Course Name : Reservoir Surveillance and Management **Time : 3 hours**
Course Code : PEAU 3022 **Max. Marks : 100**
Nos. of page(s) : 2

Instructions: Attempt all the questions. Carefully attempt the questions where the choice is given. Attempt the questions serially.

SECTION A

S. No.		Marks	CO
Q1.	List the different reserve estimation techniques and at which stage they are applicable respectively?	**4**	**1**
Q2.	List the different experimental and mathematical modelling approaches used to forecast reservoir performance.	**4**	**1**
Q3.	Discuss the consequences of availability of large and small amount of data reservoir simulation purpose.	**4**	**2**
Q4.	Complete the following sentences with appropriate answers. _____ refers to the partitioning of the continuous spatial and time variables into discrete segments. _____ of the space variables results in the _____ grid that gives areal and geologic definitions to the simulation model. _____ of model results in timesteps which advance the model through the simulation.	**4**	**1**
Q5.	Complete the following sentences with appropriate answers. _____ refers to the number of model directions in which the fluids can flow in the reservoir. The principal direction of flow in the reservoir is _____. The _____ model considers only reservoir energy and does not distinguish flow in any direction and these types of models form the basis of _____ approach (a type of reserve estimation technique).	**4**	**1**

SECTION B

Q6.	The first step in model construction is the selection of modeling approach. Discuss the model construction based on the following given decision-making parameters required for modelling: 1) Recovery Process 2) Model Dimensionality 3) Model Scope	**10**	**2**

Q7.	Discuss the spatial and time discretization and their importance in model construction.	**10**	**2**
Q8.	Rock curves are sufficient to develop single well simulation model and cross-sectional model. Instead, pseudo functions are used to develop the full field models. Provide reasoning for this statement and with illustration of a type of pseudofunction (diagrammatic approach).	**10**	**3**
Q9.	**Attempt any one out of the two questions given below:** **A.** Give your analysis on the following given topics 1) History Matching Strategies 2) Some practical examples/scenarios of validation of reservoir model using history matching. **OR** **B.** Discuss the purpose of history matching of the reservoir model. Additionally give your analysis of the following given topics 1) Selection of History Matching method 2) Overall Iterative Procedure for History Matching	**10**	**4**
	SECTION C		
Q10.	**A.** Illustrate the basic conservation laws of reservoir simulation with proper examples. **B.** Illustrate the generalized flow equations for fluid flow in porous media for Dispersion, Convection, Source/Sink, Accumulation and Darcy's Law, using proper terminology.	**20**	**3**
Q11.	**Attempt any one out of the two questions given below:** **A.** Investigate the finite difference approach in solving the fluid flow equations for a reservoir simulator. Provide your understanding of the approach, its significance and mathematical expressions. Briefly discuss about the IMPES and Newton Raphson procedures of reservoir simulation. **OR** **B.** Investigate the numerical solution of a single-phase incompressible fluid flow problem in terms of transmissibility by computing the following 1) Generalized flow equation 2) Flow equation for a single phase, incompressible fluid, in heterogeneous and anisotropic formation, and compute it for the horizontal reservoir 3) Finite Difference Approximation of the Fluid Flow Equation by showing gridblocks in x-y plane.	**20**	**4**