Name: **Enrolment No:**	

UPES
End Semester Examination, May 2025

Course: Oil Field Development — **Semester: IV**
Program: M. Sc. Petroleum Geosciences — **Time : 03 hrs.**
Course Code: PEGS 8034 — **Max. Marks: 100**
Nos. of page(s): 3

Instructions:
(a) All Questions are Compulsory in Sections A, B and C.
(b) Choices are given in Section B (Question 9) and Section C (Question 11).
(c) Answers must carry supporting material such as equations and diagrams.

SECTION A
(5Qx4M=20Marks)
Answer all questions

S. No.		Marks	CO
Q 1	State the terms source rock, reservoir rock, faults and folds with suitable sketches.	**4**	**CO1**
Q 2	Illustrate the different phases of oil and gas field. List the temperatures at which oil and gas formation occurs.	**4**	**CO1**
Q 3	Define porosity, permeability, recovery factor, and productivity index with suitable equations.	**4**	**CO2**
Q 4	Enumerate the different oil & gas reserves estimation methods. List out the different types of reserves with flow diagram.	**4**	**CO2**
Q 5	Explain different types of EOR methods with flow diagrams.	**4**	**CO3**
	SECTION B **(4Qx10M= 40 Marks)**		
Q 6	(a) Illustrate different steps of the initial development plan. Explain development strategy for oil & gas fields. (b) Define well Spacing. Illustrate 5-spot pattern & inverted 5-spot pattern with suitable Figures.	**10 (5+5)**	**CO2**

<table>
<tr><td>Q 7</td><td>Explain principle of material balance equation (MBE) and calculate remaining reservoir oil, if cumulative oil production for example reservoir was 14.73×10^6 STB at the time when reservoir pressure was 900 psig.

Data Given:

$N = 90.46 \times 10^6$ [STB]

B_o at 900 psig = 1.104 [RB/STB]</td><td>10</td><td>CO3</td></tr>
<tr><td>Q 8</td><td>Discuss CAPEX, OPEX, NCF, probability and sensitivity analysis with suitable examples and equations.</td><td>10</td><td>CO4</td></tr>
<tr><td>Q 9</td><td>Discuss modern approaches of digitalization in oil and gas industry with suitable examples.
OR
Describe the future trends and technological advancement in oil field development.</td><td>10</td><td>CO5</td></tr>
<tr><td colspan="4">SECTION-C
(2Qx20M=40 Marks)</td></tr>
<tr><td>Q 10</td><td>(a) Discuss the HSE rules & regulations for the oil & gas industry. Discuss the sources of solid waste sludge. Explain the various steps in solid waste management.

(b) Describe advantages of DCA. Assuming exponential decline, predict the rate after 12 months and after 22.5 months if a well has declined from 100 BOPD to 96 BOPD during a one-month period. Also predict the amount of oil produced after one year.</td><td>20
(10+10)</td><td>CO4</td></tr>
<tr><td>Q 11</td><td>(a) Discuss risk analysis. Write down the variables and methods used in risk.

(b) Find the payback period for the cash flows given below:

<table><tr><th>Year</th><th>Cash flow ($)</th></tr><tr><td>0</td><td>-20,000</td></tr><tr><td>1</td><td>15,000</td></tr><tr><td>2</td><td>12,000</td></tr><tr><td>3</td><td>10,000</td></tr><tr><td>4</td><td>5,000</td></tr></table></td><td>20
(10+10)</td><td>CO5</td></tr>
</table>

OR

(a) Discuss Net Present Value (NPV). If any Person invested in three opportunities and invested as follows:

Rs.1000	Ist Year
Rs.1500	2nd Year
Rs.2000	3rd Year

Calculate NPV from above mentioned. To calculate NPV, we must calculate PV factor of every cash flow at a discount rate of 5% (say).

(b) **Given the following data for the sandstone oil field:**

Area = 26,700 acres
Net productive thickness = 49 ft
Porosity = 8%
Average Swi = 45%
Initial reservoir pressure, pi = 2980 psia
Abandonment pressure, pa = 300 psia
Bo at pi = 1.68 bbl/STB
Bo at pa = 1.15 bbl/STB
Sg at pa = 34%
Sor after water invasion = 20%

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
4. Oil reserve and Recovery Factor by volumetric depletion to abandonment pressure
5. Oil reserve and Recovery factor by full water drive