

Name:  
 Enrolment No:

**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**End Semester Examination, May 2020**

<b>Course:</b>	<b>Enhanced Oil Recovery</b>	<b>Semester :</b>	<b>VIII</b>
<b>Program:</b>	<b>B. Tech. APE UPSTREAM</b>	<b>Time :</b>	<b>03 hrs.</b>
<b>Course Code :</b>	<b>PTEG: 427</b>	<b>Max. Marks:</b>	<b>100</b>
<b>Nos. of page(s) :</b>	<b>5</b>		

**Instructions: All Questions are Mandatory.**  
**Section- A MCQ, T/F and Fill in the Blanks.**  
**Section- B Answers required in few sentences without diagram. 4 questions are compulsory 1 question has internal choice**  
**Section- C 1 Question compulsory with internal choice. Descriptive without diagram.**

**SECTION A**

**Marks 5\*6 = 30**

<b>Sl. No.</b>	<b>Statement of question</b>	<b>Marks</b>	<b>CO</b>
Q 1	<p><u>Tick the correct answer. Each MCQ carries ONE marks.</u></p> <p>(a) The total production from a well or field primary production and improved oil recovery that is justified by economics is known as            Ans.:            (a) Improved oil recovery            (b) Ultimate oil recovery            (c) Primary recovery            (d) None of them</p> <p>(b) Trapped oil saturation can be minimize by            Ans.            (a) Increase Capillary number            (b) Decrease Capillary number            (c) Increase Viscosity of oil            (d) None of the above</p> <p>(c) Reservoir volumes of oil contacted by displacing agent, divided by reservoir volumes of oil initially in place is called:            Ans.            (a) Displacement efficiency            (b) Volumetric Sweep efficiency            (c) Vertical Sweep efficiency            (d) None of Them</p>	5	CO1

	<p>(d) Which of the following process refers to the recovery of oil through the injection of fluids and energy not normally present in the reservoir?  Ans.  (a) Enhanced Oil Recovery  (b) Primary Recovery  (c) Artificial Lift  (d) Work Over</p> <p>(e) Which of the following is the basis for the classification of reservoir -aquifers systems?  Ans.:  (a) Degree of pressure maintenance  (b) Flow regimes &amp; outer boundary conditions  (c) Flow geometries  (d) All of the above</p>		
Q 2	<p><u>Tick the correct answer. Each MCQ carries ONE marks.</u></p> <p>(a) The mobility ratio is defined by  Ans.:  (a) The ratio of mobility of displacing fluid and mobility of displaced fluid  (b) The ratio of Viscosity of displacing fluid and mobility of displacing fluid  (c) The ratio of density of displacing fluid and mobility of displaced fluid  (d) All of them</p> <p>(b) The parameters which influences fluid characteristics are  Ans.:  (a) Viscous Fingering  (b) Mobility &amp; Mobility ratio  (c) Permeability, Pore volume &amp; Hydrocarbon pore volume  (d) All of them</p> <p>(c) Gravity drainage is particularly important in  Ans.  (a) Solution gas drive  (b) Gas cap drive oil reservoirs  (c) a &amp; b  (d) None of the above</p> <p>(d) Material Balance is a powerful tool that helps determine the  Ans.:  (a) Reserves  (b) Recovery Factor  (c) Drive Mechanism  (d) All of them</p>	5	CO2

	<p>(e) What is the name for reserves that are calculated based on tests that the oil can be produced with 50%e certainty?</p> <p>Ans.:</p> <p>(a) Proven</p> <p>(b) Probable</p> <p>(c) Possible</p> <p>(d) None of the above</p>		
Q 3	<p><u>Tick the correct answer. Each True/False carries ONE marks.</u></p> <p>(a) Analogy method is most useful when running the economics on the current field; which is supposed to be a development field. (True/False)</p> <p>(b) In gas-cap drive reservoirs, oil in gas-invaded region drains down to rejoin oil column, reducing residual oil saturation (and thus improving recovery efficiency). (True/False)</p> <p>(c) Oil displacement efficiency is the function of microscopic and macroscopic displacement efficiency. (True/False)</p> <p>(d) A special case of the hyperbolic decline is known as “<i>harmonic decline</i>”. , (True/False)</p> <p>(e) WAG injection is also called tapering. (True/False)</p>	5	CO1
Q 4	<p><u>Tick the correct answer. Each True/False carries ONE marks.</u></p> <p>(a) Chemical EOR are designed to bring changes in Physico-chemical properties of rock and fluid. (True/False)</p> <p>(b) Low viscosity oil reservoirs with low acid No. are candidates where Chemical EOR processes have applied. (True/False)</p> <p>(c) Decreasing the viscosity of water by polymer reduces the mobility of water and thus mobility ratio. . (True/False)</p> <p>(d) If polymer flooding is applied in the initial stages when <math>k_o</math> is high as well as mobile <math>S_o</math> is high and <math>k_w</math> low benefit will be more. (True/False)</p> <p>(e) Polymer assisted chemical EOR is mainly IFT reduction, wettability change and solubilization. (True/False)</p>	5	CO2

<p>Q 5</p>	<p><u>Fill the correct answer. Each Fill in the Blanks carries ONE marks.</u></p> <p>(a) Well spacing in gas reservoirs is _____ as Mobility of gas high.</p> <p>(b) Direct Line Drive pattern is applicable when the formation is _____ and _____.</p> <p>(c) The wells are arranged in a _____ pattern which has alternating injectors and producers.</p> <p>(d) Well spacing depends mainly on wider spacing for _____.</p> <p>(e) The injection wells lie in between the production well positions in above and below rows is called _____ Pattern.</p>	<p>5</p>	<p>CO3</p>
<p>Q 6</p>	<p><u>Fill the correct answer. Each Fill in the Blanks carries ONE marks.</u></p> <p>(a) Steam Assisted Gravity Drainage is less efficient as depth _____.</p> <p>(b) The combustion front is moving in the same direction as the injected air is called _____.</p> <p>(c) Efficiency of oxygen utilization in In-Situ combustion depends on _____.</p> <p>(d) CO2 recovers crude oil by lowering the _____ between the oil and the CO2/oil phase in the near-miscible regions.</p> <p>(e) Nitrogen and flue gas flooding recover oil by vaporizing the _____ of the crude oil and generating miscibility if the pressure is high enough.</p>	<p>5</p>	<p>CO3</p>
<p><b>SECTION B</b></p>		<p><b>Marks 10*5 = 50</b></p>	
<p>Q 1</p>	<p>(a) Define water quality. Write down the major problems caused by water during oil operations. Write down recommended parameters for injection water. <b>(5 Marks)</b></p> <p>(b) Explain coning and channeling. Write down the types of coning. Describe the reasons and remedies of excessive water in field. <b>(5 Marks)</b></p>	<p>10</p>	<p>CO2</p>

Q 2	<p>(a) Define different techniques of Thermal recovery process. Explain limitation of Steam Flood process. <b>(5 Marks)</b></p> <p>(b) Explain the limitations and problems in CO<sub>2</sub> Flooding? Write down the most suitable Flooding Method for deep reservoirs. <b>(5 Marks)</b></p>	10	CO3
Q 3	<p>(a) Define Chemical processes for EOR. Describe selection criteria for EOR Surfactant. <b>(5 Marks)</b></p> <p>(b) Define Miscible Flooding with LPG and Enriched gas, <b>(5 Marks)</b></p>	10	CO3
Q 4	<p>(a) Define the need and Major Applications area of MEOR Method. Explain Microbial products Write down the two Indian patents of MEOR. <b>(5 Marks)</b></p> <p>(b) Explain applications of Enzyme EOR &amp; Nanotechnology in EOR. <b>(5 Marks)</b></p>	10	CO4
Q 5	<p>(a) Explain different types of simulators and its applications in Different EOR Methods. <b>(5 Marks)</b></p> <p>(b) Describe the input and output files in Black Oil IMEX Simulator of CMG. Write down the two names of Commercial Simulator for Thermal Recovery methods. <b>(5 Marks)</b></p> <p style="text-align: center;"><b>OR</b></p> <p>Explain different deliverables for Geo-cellular modeling in Petrel. Write down the names of modeling software for Static modeling. Set the depth below sea level of the tops of each cell in the box to 5,000 feet using the <b>BOX, TOPS</b> and <b>ENDBOX</b> keywords in Eclipse. <b>(10 Marks)</b></p>	10	CO6
<b>SECTION C</b>		<b>Marks 20*1 = 20</b>	
Q 1	<p>(a) Explain the problem associated with In situ Combustion Process. Describe Fire Flooding Method with case study of successful implementation in any Indian Oil Field. <b>(10 Marks)</b></p> <p>(b) Explain the applications of ASP flooding method. Describe ASP Flooding Mechanism with successful case study of Indian Oil Field. <b>(10 Marks)</b></p> <p style="text-align: center;"><b>OR</b></p> <p>Define favourable characteristic of polymer flooding. Explain Synthetic and Biopolymer and its disadvantages. How to fail and successful polymer Flooding? Write down any case study of Indian Oil Field where polymer Flooding successfully implemented. <b>(20 Marks)</b></p>	20	CO5