

Name:
Enrolment No:



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

Course: Enhanced Oil Recovery Techniques
Program: M. Tech. (Petroleum Engineering)
Course Code: PEAU 7009
Instructions: assume any missing data.

Semester: 2 , Ac. year 2019-20
Time 03 hrs.
Max. Marks: 100
Number of Pages: ?

14-Jul-20, Tuesday 10:00AM
Tuesday
10:00 AM

SECTION A (60 MARKS)

THIS COMPRISES 60 SHORT QUESTIONS AND EACH QUESTION WILL BE OF 1 (ONE) MARK. THIS SECTION COMPRISES TWO PARTS, EACH PART WILL HAVE 30 (THIRTY) QUESTIONS. ALL QUESTIONS ARE COMPULSORY AND ONLY CORRECT ANSWER WILL BE AWARDED 1(ONE) MARK EACH.

QUESTION NO.	STATEMENT OF QUESTION	Marks	CO
1 PART-ONE	<p>SELECT THE CORRECT OPTION IN THE FOLLOWING MCQs:</p> <p>Q-1 How do you choose “the right EOR technique” for a given reservoir? a) Based on available technologies. b) Based on technical criteria. c) Based on investment capabilities. d) Based on economic criteria.</p> <p>Q-2 Where is the most opportunity for growth in of EOR technology? a) Reservoirs with high order of proved reserves. b) Reservoirs with high order of probable reserves. c) Reservoirs with high order of possible reserve. d) Every type of reservoir.</p> <p>Q-3 What is the expected key achievement of EOR techniques: a) Technological variations. b) Resource enhancement. c) Financial gain. d) Social expectations.</p> <p>Q-4 What are the investment trends into EOR? a) Growth oriented: growing market trends in upstream sector b) Negative: resulting from terrorism world over c) Uncertain : long gestation period d) Apprehensive Global economic trends.</p>	1(ONE) Mark Each	CO1

- Q-5 What are Perception and uptake changes of EOR :
- Knowledge base
 - Speculative
 - Catalytic
 - Curious**
- Q-6 The EOR - target reservoir is defined as a hydrocarbon reservoir hydrocarbon reservoir, which produces:
- Oil or Gas and Water**
 - Produces Gas
 - Both of above
 - None of above
- Q-7 In EOR technique voidage-compensation may be characterized as:
- Instantaneous
 - Cumulative**
 - Both of above
 - None of above
- Q-8 An EOR is a process that results in extending :
- Life Cycle/Span of an oil reservoir
 - Recovery Factor of the oil reservoir
 - Both of above**
 - None of above
- Q-9 The values of M can be $>$, $=$ or $<$ 1 these stages are respectively said to be:
- Matching, preferred, not desired
 - Preferred, matching, not desired
 - Not desired, matching preferred**
 - All above
- Q-10 Sweep efficiency is affected by :
- Wettability of displacing fluid
 - Viscosity of displacing fluid**
 - Ion exchange capacity of porous media
 - All above
- Q-11 Displacement Efficiency is described the intra- molecular forces- that play a vital role in the recovery process and depends on:
- Geometry of porous media,
 - Fluid-Fluid properties
 - Applied Pressure gradients
 - All above**
- Q-12 Efficiency due to conformance depends on :
- Fluid viscosity
 - Reservoir Heterogeneity**
 - Pressure anomaly
 - All above
- Q-13 Reservoir Heterogeneity is estimated from:
- Semi log plot of porosity curve of core sample
 - Weight average of porosity analysis of core samples.
 - Log-probability scale graph of permeability samples.**
 - None of above.

- Q-14 A Complete heterogeneity is ensured when numerical value of V is:
permeability variance factor (V) is :
- a) 0
 - b) 0.5
 - c) 1.0
 - d) None of above
- Q-15 An effective EOR has the conceptual approach to:
- a) To increase the viscosity of oil
 - b) To increase the capillary forces
 - c) To minimize the effect of gravity forces
 - d) All above
- Q-16 Select the EOR technique in the following:
- a) Water shut off
 - b) Huff and puff
 - c) In- fill drilling
 - d) None of above
- Q-17 Which of the following Gas injection yield highest EOR output:
- a) Natural Gas
 - b) Nitrogen
 - c) Carbon di Oxide
 - d) None of above
- Q-18 Thermal injection, accounts for :
- a) 30 percent of EOR
 - b) 40 percent of EOR
 - c) 50 percent of EOR
 - d) Above 50 percent of EOR
- Q-19 Effectiveness of water-floods accounts for :
- a) 05-15 Percent of EOR
 - b) 15-25 Percent of EOR
 - c) 25-35 Percent of EOR
 - d) None of above
- Q-20 Plasma pulse technology(PPT) a high energy reservoir flipping technique using:
- a) Heat Energy
 - b) Wave Energy
 - c) Both of above
 - d) None of above
- Q-21 Miscible flooding allows favorable changes related to: reservoir
- a) Pressure maintenance
 - b) Improves oil displacement
 - c) Both of above
 - d) None of above
- Q-22 Thermal injection methods are used to heat the crude oil in the to:
- a) reduce the Oil viscosity
 - b) vaporize the part of the oil
 - c) reduce the Oil viscosity and vaporize the part of the oil
 - d) None of above

- Q-23 Cyclic Steam Injection improves:**
- Improve the sweep efficiency only
 - Improves only the displacement efficiency.
 - Both of above
 - None of above**
- Q-24 Solar EOR is defined as modified steam flooding where :**
- In-situ conversion of water is into steam by the array of solar rays
 - The water from external source is converted into steam at the surface and injected into the reservoir,**
 - Conversion of injected water into steam.
 - All above.
- Q-25 Applicability of chemical methods is usually limited by:**
- Cost of the chemicals
 - Adsorption
 - Reaction with the rock & oil within the formation.
 - All above.**
- Q-26 Reduction of capillary pressure is analysed in terms of :**
- Bond Number,
 - Capillary Forces
 - Gravitational Force
 - All above**
- Q-27 Surfactants when used in conjunction with polymers results in improvement of :**
- Megascopic Efficiency
 - Macroscopic Efficiency
 - Microscopic Efficiency**
 - All above
- Q-28 Surfactants usually requires co-surfactants, their process activity is described as:**
- Catalyser
 - Stabiliser**
 - Both of above
 - None of above
- Q-29 EOR by using Caustic Flooding is basically attributed to:**
- Reversing the Oil Wettability
 - Emulsification of the oil.
 - Both of above**
 - None of above
- Q-30 MEOR is the result of microbial activity, attributed to:**
- Partially digesting long hydrocarbon molecules
 - Generating bio-surfactants
 - Emitting carbon dioxide
 - All above**

QUESTION NO.	QUESTION	MARKS	CO
<p style="text-align: center;">1</p> <p>PART-TWO</p>	<p>INDICATE TRUE OR FALSE IN THE FOLLOWING STATEMENTS:</p> <p>Q-1 At irreducible water saturation point water, flow rate is Zero. (T/F)</p> <p>Q-2 For a good EOR technique, the critical oil must be high. (T/F)</p> <p>Q-3 In an EOR process, if Mobility of oil decreases, and then the sweeping efficiency will also decrease. (T/F)</p> <p>Q-4 In the event of Perfect Piston Movement of a displacing fluid in an oil reservoir, the post break through recovery of oil will be high. (T/F)</p> <p>Q-5 A front is defined as the boundary of the zone into which, injected fluid has not been able to penetrate. (T/F)</p> <p>Q-6 If the reservoir is characterized with a contact angle (Θ) $>90^\circ$, the System will be oil wet. (T/F)</p> <p>Q-7 Oil-wet formation increases the probability of a continuous path to a producing well, and results in a lower SOR. (T/F)</p> <p>Q-8 If in a reservoir undergoing an EOR application, ‘ Voidage replacement calculations’ are conducted on the entire reservoir, it is defined as Cumulative. (T/F)</p> <p>Q-9 Drive indices for oil reservoirs indicate the absolute magnitude of the various energy sources acting in the reservoir. (T/F)</p> <p>Q-10 There is increase in crude oil viscosity with the decrease in free gas saturation. (T/F)</p> <p>Q-11 The residual oil saturation in an EOR is a fraction of oil reserves. (T/F)</p> <p>Q-12 There is increase in crude oil viscosity with the decrease in free gas saturation. (T/F)</p> <p>Q-13 Infill drilling acts as an EOR technique. (T/F)</p> <p>Q-14 For successful EOR, mobile oil saturation must be larger than residual oil saturation. (T/F)</p> <p>Q-15 Strong water-drive oil reservoirs are good candidates for water flooding. (T/F)</p>	<p style="text-align: center;">1(One) Mark Each</p>	<p style="text-align: center;">CO-2</p>

- | | | |
|---|--|--|
| <p>Q-16 Reservoirs with solution gas drive are the best candidate for EOR applicability. (T/F)</p> <p>Q-17 The use of a brine source for water flood operation <u>not a good choice</u> from technical point of view. (T/F)</p> <p>Q-18 Injection Wells , specifically for water flooding are preferably completed in multiple zones (T/F)</p> <p>Q-19 Sub surface formation water is not suitable especially for the formations having swelling type of clays. (T/F)</p> <p>Q-20 The Dump Floods may also be economical.(T/F)</p> <p>Q-21 Where pilot water flooding is projected with uncertainty in displacement mechanism, it is essential to undertake the water quality test program in chemistry laboratory. (T/F)</p> <p>Q-22 The depth limit of steam flooding is 5000ft. (T/F)</p> <p>Q-23 Capillary number represents viscous forces. (T/F)</p> <p>Q-24 Nitrogen gas injection is only immiscible form of EOR. (T/F)</p> <p>Q-25 Reynold number represents the viscous force. (T/F)</p> <p>Q-26 If the API gravity of the crude ranges between 25°-35°,caustic flood may be considered as applicable technique. (T/F)</p> <p>Q-27 Waxy crude are the best recovered by CO₂ Flooding. (T/F)</p> <p>Q-28 Microbes do not consume large amount energy. (T/F)</p> <p>Q-20 Using lower salinity in the WAG process allows for greater oil removal. (T/F)</p> <p>Q-30 Plasma is generated by heating or subjecting a neutral gas to a strong electric field. (T/F)</p> | | |
|---|--|--|

Assignment No.	<p style="text-align: center;">SECTION B (40 MARKS) THIS SECTION CONTAINS (FOUR) ASSIGNMENTS. ALL ASSIGNMENTS ARE COMPULSORY. MAXIMUM MARKS OF EACH ASSIGNMENT IS 10 (TEN) Time limit for submission of assignments -“WITHIN <u>24 (TWENTY FOUR) HOURS.</u>”</p>	Marks	CO
1	<p>Describe the application scenario of Polymer EOR Technique with special reference to following :</p> <p>(i) Laboratory Screening (ii) Injectivity and Inject-ability.</p>		
2	<p>Indicate the Essential Requirements and characteristics of Fire Front for efficient In-situ Combustion Technique.</p>		
3	<p>Project the scope of Exotic EOR Techniques with special reference to Electrical EOR <u>OR</u> Plasma Plus EOR Technique.</p>		
4	<p>“Presently the oil industry is facing two major challenges. These are : OIL FIELD ECONOMIC FLIPPING AND COVID -19 EPIDEMIC. Both these challenges are socio economic in nature. Their impact is also uncertain and may not be quantified exactly, but there is need to realize these challenges for the futuristic of each individual issue so as to achieve a growth-oriented sustainability in Oil Industry. In above context it is enjoined to project and understand various aspects of these challenges together with their quantum effect leading to a tangible solution and benefit world over.”</p> <p>Considering above text, kindly express your views about futuristic of Oil Industry in Indian scenario. With special reference to trends of Demand - Supply, application of EOR and Technological Innovations</p> <p style="text-align: center;">PLEASE LIMIT YOUR VIEWS WITHIN 250 WORDS.</p>	10 Marks each	CO3

For Dr Vamsi please.

1. Section A comprises TWO PARTS RELATED TO ONLINE EXAM. Y
2. Both of these kindly be converted into required format and may please be loaded accordingly.
3. The **Reddish Brown** colour indicates correct answer in both the sections.
4. Reasonably good time may please be for doing both the sections (may be about one to one and a half hour)
5. Section B comprised 4 (FOUR) assignments of 10 marks each.
6. It may please be loaded in black board for the Enhanced Oil Recovery Technique MT-PE-II
7. The required ID and Password for Black Board is:
drsknanda@ddn.upes.ac.in password: sknanda@0461

- 8. Students may please be instructed to submit their completed assignments within 24 (Four) hours.**
- 9. In case any student have any problem he/she is free to contact me on following mobile:9760372420**

Thanks
Dr. S. K. Nanda