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**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

TEST - 1

Even Semester: 2018-19

Course Code: PET 224

Course Name: Fundamentals of Reservoir Engineering

Programme & Sem: B.Tech (PET) & IV Sem

Date: 06 March 2019

Time: 1 Hour

Max Marks: 40

Weightage: 20%

Instructions:

- (i) Read the question properly and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and Non-programmable calculators are permitted.

Part A

Answer **all** the Questions. **Each** question carries **two** marks. (5Qx2M=10)

1. Define OFVF. Which Saturation is required to move Oil out of the pore space?
2. What is the significance of (-) ve sign in Darcy's Law? Why 'He' is used in permeability measurement?
3. What is the color of Low shrinkage oil? What is the Temperature condition for "Near Critical Crude Oil reservoir?"
4. Write the name of a formation which has high Porosity but less Permeable. Name any **Log** used to measure Porosity of a formation.
5. Define Gas reservoir. Mention one significance about the P-T diagram of Black oil reservoir.

Part B

Answer **all** the Questions. **Each** question carries **four** marks. (3Qx4M=12)

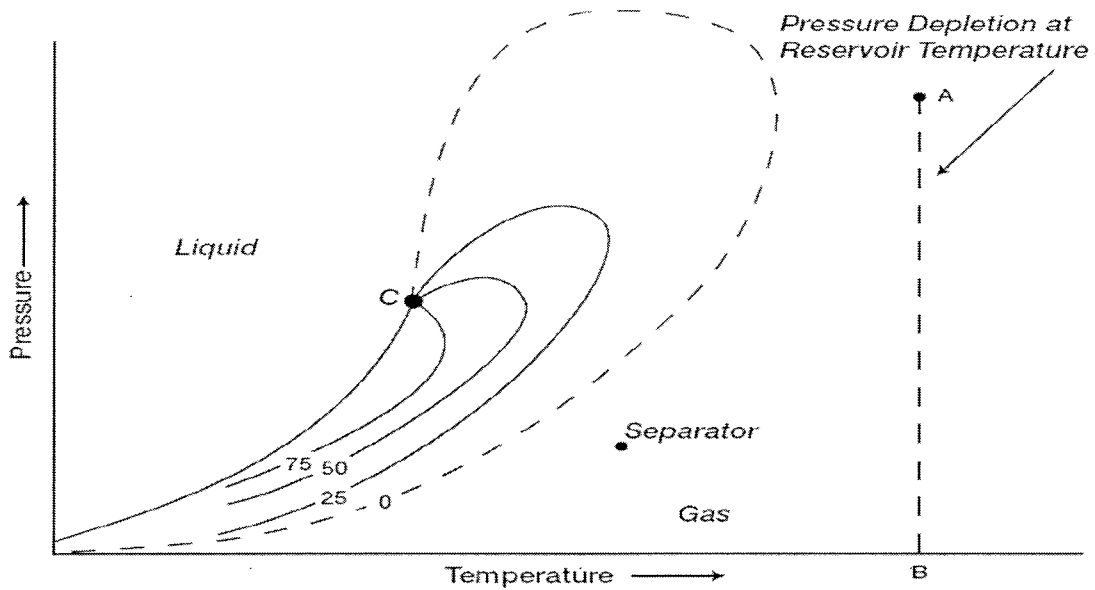
6. Do the dimensional analysis of Darcy's law.
7. Differentiate Absolute and Effective and Relative permeability.
8. What are the assumptions of Darcy's Law?

Part C

Answer **all** the Questions. **Each** question carries **six** marks.

(3Qx6M=18)

9. Explain Liquid Drop out curve with a suitable diagram
10. What is wettability? How it influence Oil production from the reservoir? Permeability of a core sample, measure with 'He' is found to be 100mD. The sample is saturated with Oil and Water. If relative permeability of water is 0.40 and total porosity is 20% then determine its effective permeability.
11. Identify the reservoir and write the characteristics of the reservoir and its Hydrocarbon mixture.





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**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

TEST - 2

Even Semester: 2018-19

Course Code: PET 224

Course Name: Fundamentals of Reservoir Engineering

Program & Sem: B.Tech & IV Sem

Date: 16 April 2019

Time: 1 Hour

Max Marks: 40

Weightage: 20%

Instructions:

- (i) Read the question properly and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and Non-programmable calculators are permitted.

Part A

Answer **all** the Questions. **Each** Question carries **six** marks. (3Qx6M=18)

1. Write two difference between Radial and Linear flow. How perforation will influence reservoir fluid flow? Define compressibility. Which are the reason leading to reservoir rock compressibility?
2. Discuss Klinkenberg's correction.
3. What is displacement pressure? Draw a graph between Capillary pressures Versus Water saturation and explain.

Part B

Answer the Question. The Question carries **ten** marks. (1Qx10M=10)

4. Show with a suitable diagram that " $K_{WETTING}$ " decrease with the increment of " $S_{NON WETTING PHASE}$."

Part C

Answer the Question. The Question carries **twelve** marks. (1Qx12M=12)

5. Prove for linear flow

$$\frac{\delta^2 P}{\delta x^2} = \left(\frac{\phi \mu c}{k} \right) \frac{\delta P}{\delta t}$$



**PRESIDENCY UNIVERSITY
BENGALURU
SCHOOL OF ENGINEERING**

END TERM FINAL EXAMINATION

Even Semester: 2018-19	Date: 24 May 2019
Course Code: PET 224	Time: 3 Hours
Course Name: Fundamentals of Reservoir Engineering	Max Marks: 80
Program & Sem: B. Tech & IV Sem	Weightage: 40%

8. Solve the following:
- Prove that Capillary pressure is inversely proportional to the radius of capillary.
 - An incompressible fluid flows in a linear porous media with the following parameters

L=2000 ft.	h= 20 ft	Width= 300 ft
K= 100mD	Porosity= 15%	Viscosity =2cP
P ₁ =2000 PSi	P ₂ = 1990 PSi	

Determine **flow rate, apparent fluid velocity and Actual fluid velocity** in FPS system.
 - Write the names of any two methods used to determine porosity of a core sample at PVT Testing Laboratory.
 - A clean dry core sample of weight 20 gm is saturated with water. New weight of the core sample is 22.5 gm. Then the saturated sample was immersed in water weight is measured which came is 12.6. What is the bulk volume of the sample?
 - From the above question, the core sample is crushed and then it is filled inside the Pycnometer. The following information are available

Dry weight of the crushed core sample (Prior to saturation) = 16 gm	
Pycnometer filled with Water weight	=65 gm
Pycnometer+ Water+ Crushed Sample weight	= 75 gm

Determine **Density and Porosity** of the original core sample.

Instructions:

- Read the question properly and answer accordingly.
- Question paper consists of 3 parts.
- Scientific and Non-programmable calculators are permitted.
- In **Part A**, for MCQ more than one answer may be correct. Student has to answer all correct answer.
- In **Part B**, Student has to answer any three question
- In Part C, Question 8 is mandatory and **either question 6 or question 7** student has to attempt.

Part A

Answer **all** the Questions. **Each** question carries **two** marks. (10Qx2M=20M)

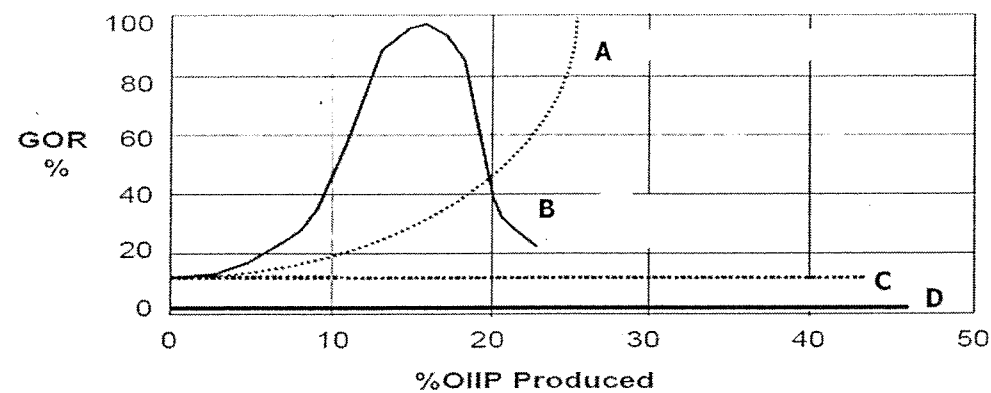
- Do as directed
 - For an Oil reservoir, reservoir temperature is,

i. Less than critical temperature	iii. Equals to critical temperature
ii. More than critical temperature	iv. Not dependent on temperature
 - Which of the following is/are TRUE

i. $S_{WC} < S_W < 1 - S_{OR}$	iii. $S_W < S_{WC} < 1 - S_{OR}$
ii. $< S_W < 1 - S_{OR} < S_{WC}$	iv. $S_{WC} < 1 - S_{OR} < S_W$
 - Capillary pressure is a measure of the tendency of the rock to
 - Suck in the wetting phase and to repel the non-wetting phase
 - Suck in the non-wetting phase and to repel the wetting phase
 - Suck in wetting phase and non –wetting phase
 - Repel wetting phase and non-wetting phase
 - Which of the following is/are NOT TRUE about volatile crude oil
 - $B_o < 2$ bbl/STB
 - API is 45 to 55 degree
 - R_p is < 200 scf/STB
 - Quality line a widely space near BPL

E. Match the following based on the below diagram

- | | |
|---|------------------------------|
| A | i. Water Drive Mechanism |
| B | ii. Rock and Fluid Expansion |
| C | iii. Gas Cap Drive |
| D | iv. Solution Gas Drive |



F. Which of the following factors/factors influence the gas formation volume factor

- | | |
|-----------|---------------|
| i. K & S | iii. P & T |
| ii. K & P | iv. S & μ |

G. For a reservoir having 2000 STB of crude oil is producing only 200 STB. The Recovery factor for this reservoir is _____ % and Ultimate recovery is _____

H. Which of the following flow satisfy the below mention equation,

$$\left(\frac{\partial p}{\partial t}\right) = f(i, t)$$

Where i is position and t is time

- | | |
|--------------------|------------------------|
| i. Steady state | iii. Quasisteady state |
| ii. Unsteady state | iv. Linear flow |
- I. Which of the flowing/flowings cannot be implemented in a well/reservoir to stop the movement of OWC or GOC
- | | |
|---------------------|----------------------------|
| i. Water flooding | iii. Maintaining flow rate |
| ii. Injecting steam | iv. Secondary cementing |

J. **Assertion (A):** During core flooding Gas velocity is more than liquid velocity

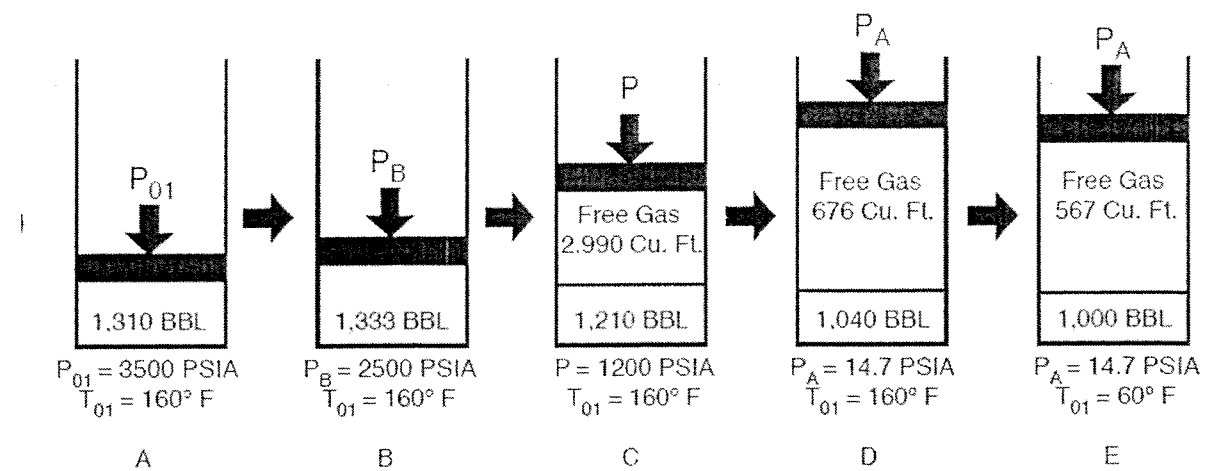
Reason (R): Diameter of capillary opening approaches the Mean free path of gas

- Both A and R are true. R is the correct explanation of A.
- Both A and R are true but R is not the correct explanation of A.
- A is true but R is false.
- A is false but R is true.
- Both A and R are false

Part B

Answer **any three** Questions. **Each** question carries **ten** marks. (3Qx10M=30M)

2. Based on the information available in below PVT cells, draw Solution gas oil ratio and Formation volume factor graph with respect to Pressure and justify your graph.



- Draw a neat diagram of the R_p graph for Solution Drive mechanism and explain each and every point. Consider from reservoir pressure above bubble point.
- Write ten differences between Conventional coring and Side wall coring.
- Which are the methods to be implemented to develop a depleted well?

Part C

Answer **any two** Questions. **Each** question carries **fifteen** marks. (2Qx15M=30M)

6. Given the following data for an oil field
- Volume of bulk oil zone = 112,000 acre-ft.
 - Volume of bulk gas zone = 19,600 acre-ft.
 - Initial reservoir pressure = 2710 Pisa
 - Initial oil FVF = 1.340 bbl/STB
 - Initial gas FVF = 0.006266 ft³/SCF [1bbl 5.61 cf]
 - Initial dissolved GOR = 562 SCF/STB
 - Oil produced during the interval = 20 MM STB
 - Reservoir pressure at the end of the interval = 2000 Pisa
 - Average produced GOR = 700 SCF/STB
 - Two-phase FVF at 2000 Pisa = 1.4954 bbl/STB
 - Volume of water encroached = 11.58 MM bbl
 - Volume of water produced = 1.05 MM STB
 - Water FVF = 1.028 bbl/STB
 - Gas FVF at 2000 Pisa = 0.008479 ft³/SCF [1bbl 5.61 cf]
- Determine OIIP for the following condition
- Reservoir without any primary gas cap
 - Reservoir with a plugging of those perforation through with water is entering into well
 - Reservoir with active water influx and water cut
 - Reservoir with Pressure above bubble point

OR

7. Prove that summation of different Drive Indices is unity.