

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2018

Course: Introduction to Petroleum Operations (PTEG 201)

Programme: B.Tech APE UP

Time: 03 hrs.

Instructions: Scientific calculator usage is allowed

Semester: III

No. of Pages: 1

Max. Marks: 100

SECTION A 4\*5=20

SNo		Marks	CO
Q 1	Classify crude oils based on their chemical composition	5	CO-1
Q 2	List the types of drill rigs used in on-shore and off-shore operations.	5	CO-2
Q 3	Define wettability and mention its significance in oil production	5	CO-3
Q 4	Define skin factor	5	CO-4

SECTION B 4\*10=40

Q 5	Classify rocks. Elaborate on sedimentary rocks	10	CO-1
Q 6	Illustrate with a sketch various components of drill string	10	CO-2
Q 7	i. Define permeability and mention its significance ii. Derive an expression for permeability of a concentric spherical porous media with outer and inner diameters maintained at pressure of $P_o$ and $P_i$ respectively, if an incompressible liquid of viscosity $\mu$ flows linearly through it with a flow rate $Q$ STB/day  OR i. List various factors affecting the permeability of a porous system ii. Derive an expression for permeability of a concentric cylindrical porous media with outer and inner diameters maintained at $P_o$ and $P_i$ respectively, if a gas of viscosity $\mu$ flows linearly through it with an average flow rate $Q$ bbl/day	3+7	CO-3
Q 8	Analyze various methods used to activate wells for production of reservoir fluids.	10	CO-4

SECTION-C 2\*20=40

Q 9	i. Elaborate on multi-component phase diagram and classify various reservoirs ii. A sandstone sample of 2.54 cm diameter and 1.954 cm length weighing 20.8 gm (bone dried), when crushed, dried and weighed by Melcher-Nutting's method weighed 20gm. However, the same core weighed 23 gm after saturating with water of 1.05 specific gravity. Calculate the effective and total porosity of the sand stone sample, if its grain density is 2.67 gm/cc	20	CO-3
Q 10	Elaborate with diagrams various types of separators used to process reservoir fluids  OR Classify various artificial lift techniques to improve the oil recoveries. Demonstrate with a neat diagram the working of sucker rod pump	5+15	CO-4

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**SECTION A 4\*5=20**

SNo		Marks	CO
Q 1	List various exploration methods available for investigating hydrocarbon reserves	5	CO-1
Q 2	Mention the importance of the following: i. draw works; ii. rat hole; iii. kelly; iv. rotary table and v. monkey board	5	CO-2
Q 3	Define formation volume factor and gas oil ratio	5	CO-3
Q 4	Classify various artificial lift methods used to improve oil recoveries	5	CO-4

**SECTION B 4\*10=40**

Q 5	With a neat sketch analyze on the components and types of folds	10	CO-1
Q 6	Elaborate on the importance of well planning in effective hydrocarbon exploitation	10	CO-2
Q 7	i. Derive an expression for permeability of a concentric cylindrical and spherical porous media of outer and inner diameters of $D_o$ and $D_i$ respectively maintained at $P_o$ and $P_i$ respectively, if a gas of viscosity $\mu$ flows linearly through it with an average flow rate $Q$ bbl/day ii. A sandstone sample of 2.54 cm diameter and 1.954 cm length weighing 20.8 gm (bone dried), when crushed, dried and weighed by Melcher-Nutting's method weighed 20gm. Calculate the total porosity of the sand stone sample or i. A reservoir extending over an area of 200 acres has a payzone of 30ft with 22.7% porosity and 30% water saturation. Calculate the original oil in place in STB, if the formation volume factor of the reservoir fluid is 1.2 RB/STB ii. Calculate the steady state flowrate (STB/day) through a reservoir with the following data: Porosity = 0.19; effective permeability = 8.2 md; pay zone thickness = 53 ft; reservoir pressure = 5651 psia; flowing bottom hole pressure = 4151 psia; fluid formation volume factor = 1.1; fluid viscosity = 1.7 cp; reservoir area = 640 acres; wellbore radius = 0.328 ft	5+5	CO-3
Q 8	Elaborate various stages of production of reservoir fluids	10	CO-4

**SECTION-C 2\*20=40**

Q 9	i. Estimate the porosity of a system packed cubically with spheres of radius $r$ . ii. Elaborate multi-component phase diagram and classify various reservoirs	8+12	CO-3
Q 10	Demonstrate the working principles of various types of Enhanced Oil Recovery (EOR) methods OR Elaborate with neat diagram on the working of various types of separators used to process reservoir fluids	5+15	CO-4