Name:	
Enrolment No:	

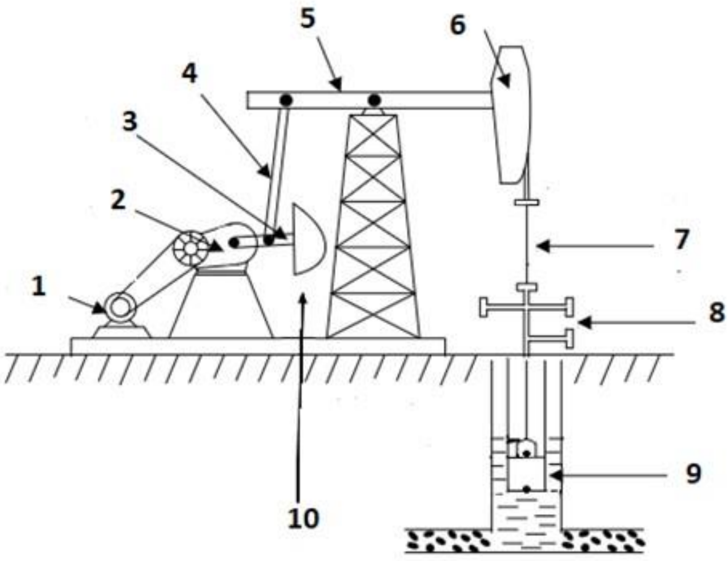
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, Dec 2021

Programme Name: B.Tech. (APEG) **Semester** : V
Course Name : Production Engineering **Time** : 3 Hrs.
Course Code : PEAU3008 **Max. Marks :** 100
Nos. of page(s) : 2

Instructions:
1. All questions are compulsory.
2. Attempt questions in order. All parts of the question must be attempted together.
3. Assume any missing data, if any

S. No.	Section - A (5x4 = 20)	Marks	CO
Q1	The density of the natural gas having specific gravity 0.7 at 2000 psia and 200^0F (Assume z = 0.9) in lbm/ft3 is	4	CO1
Q2	What is the law of corresponding states?	4	CO1
Q3	Write the assumptions of Poettmann and Carpeneter method used for constructing outflow performance curve	4	CO2
Q4	A well is capable of producing at a stabilized rate of 200 bpd at a bottom hole flowing pressure of 2200 psia. Determine specific productivity index if the average reservoir pressure and net pay are 2500 psia and 20 feet respectively	4	CO2
Q5	In a two-phase flow of air-water mixture, air and water are flowing with a superficial velocity of 0.6 feet/sec and 5.3 feet/sec in a 2-in. vertical pipe. The water density is 62.4 lbm/ft^3 and the surface tension is 74 dynes/cm. Find the liquid and gas velocity number	4	CO3
	Section – B (4x10 = 40)		
Q6	Construct IPR of a vertical well in an unsaturated oil reservoir using generalized Vogel's equation. The following data are given: Reservoir pressure (P_e) = 5500 psia, Bubble point pressure (P_b) = 3500 psia. The tested production rate from a well is 400 stb / day at a flowing bottom-hole pressure of 4000 psia	10	CO2
Q7	a) Find the critical pressure ratio in a choke, if the gas-specific heat ratio is 1.3 (Marks - 3) b) What is liquid holdup? (Marks - 2) c) Differentiate between bubble flow and slug flow in a vertical well (Marks - 5)	10	CO3
Q8	a) Explain nodal analysis approach for production optimization in oil and gas wells (Marks - 5)	10	CO6

	b) Briefly describe the different elements of smart wells (Marks - 5)		
Q9	a) What is perforation? Write the different types of perforating method used in petroleum industry? (Marks - 4) b) Classify the deliverability tests for oil wells and explain their significance (Marks - 6)	**10**	**CO1**
	Section – C (2x20 = 40)		
Q10	a) A schematic diagram of a sucker rod pumping unit is presented below; identify the different components highlighted by the numbers  b) Describe the requirements that must be followed while using the gravel packing sand-control method	**10+10**	**CO4 + CO5**
Q11	An unlimited amount of lift gas is available for the well having a pay zone around the mid-perforation depth of 6,200 ft. The formation oil has a gravity of 30 ^{0}API and GLR of 500 scf/stb. Water cut remains 0%. A 2.5-in. tubing (2.259-in.ID) can be set with a packer at 200 feet above the mid-perforation. If 1,100 psia is available to kick off the well and then a steady injection pressure of 900 psia is maintained for gas lift operation against a wellhead pressure of 150 psia. Assume a casing pressure margin of 50 psi and average reservoir pressure is 1985.3 psig. Calculate the following: a) Specific gravity (Marks 2) b) Static gradient (Marks 2) c) Hydrostatic pressure (Marks 2) d) Is the well flow naturally? Illustrate with reason (Marks 2) e) Static liquid level (Marks 2) f) Depth of first unloading valve (Marks 2) g) Is the first unloading valve submerged in static liquid level? Illustrate with reason (Marks 5) h) Design tubing pressure (Marks 3)	**20**	**CO4**