Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
Online End Semester Examination, Dec. 2020

Course: Artificial Lift Technology **Semester: III**
Program: M. Tech. - Petroleum Engineering **Time: 03 hrs.**
Course Code: PEAU 8002 **Max. Marks: 100**

SECTION A

1. Each Question will carry 5 Marks
2. Instruction: All questions are compulsory. Assume if any data missing.

S. No.	**Question**	**CO**
Q 1	Construct IPR curve for given problem: Given data: $\overline{P}_r$= 2600 psi; P_{wf}= 1900 psi; q_o= 150 bpd Find: (q_o)max and q_o for P_{wf} = 1100 psi	**CO2**
Q 2	Illustrate the causes of sand production. Write the methods for control sand production.	**CO1**
Q 3	What are the well stimulation jobs applicable to enhanced oil production and why do we need to perform well stimulation jobs?	**CO1**
Q 4	Paraffin deposition is a serious problem in production of crude oil. Briefly write the most common methods of removing paraffin from the oil wells.	**CO1**
Q 5	The reaction rate is the important parameters in the acidizing techniques of fracturing, write the factors controlling acid reaction rate.	**CO4**
Q 6	Explain the working the working procedure of beam pumping system with the help of suitable diagram.	**CO3**

SECTION B

1. Each question will carry 10 marks
2. Instruction: All questions are compulsory. Assume if any data missing.

Q 7	The first and often most important step is the selection of a proper well situation where the benefits of fracturing can be maximized and the possible problems from creating undesired communication can be avoided. Write the design parameters for the successful fracturing job.	**CO4**
Q 8	Gravel packing play most important to control sand production in oil well. Write the practical aspects for the successful placement of gravel packing to control the sand production with the help of suitable diagram.	**CO1**

Q 9	With the help of suitable diagram, explain the working principle, types, procedure advantages and disadvantages of gas lift.	**CO3**
Q 10	Artificial lift is used for lifting the wellbore fluid to the surface. Illustrate the electrical submersible progressive cavity pumping system (ESPCP) and write its advantages and disadvantages.	**CO3**
Q 11	It is desired to estimate fracture length and width resulting from pumping 200,000 gal of frac fluid at a rate of 15 bpm. **Fluid properties:** Apparent viscosity: 175 cp Fluid loss coefficient: 0.002 ft/$\sqrt{\text{min}}$ Spurt loss coefficient: 0.015 gal/ft^2 **Rock Properties:** Poisson's ratio: 0.2 Shear modulus: 1.5×10^6 psi From log analysis it has been estimated that fracture height will be 200 ft. use Geertsma and de Klerk method. **OR** Explain the following acidizing techniques for carbonate formations. (i) Matrix acidizing (ii) Fracture acidizing	**CO4**
SECTION C **1. Each Question carries 20 Marks.** **2. Instruction: All questions are compulsory. Assume if any data missing.**		
Q 12	Predict the operating point to use an artificial lift in the gas well with the help of Nodal analysis graph. Data are given below: Gas specific gravity (γ_g) = 0.71, tubing inside diameter (D) = 2.259 in., tubing relative roughness (e/D) = 0.0006, Measured depth at tubing shoe (L) = 10000 ft., Inclination angle (θ) = 0 degrees, Wellhead pressure (p_{hf}) = 800 psia, Wellhead temperature (T_{hf}) = 150 °F, Bottom-hole Temperature (T_{wf}) = 200 °F, Reservoir Pressure = 2000 psia, C-constant in back pressure IPR model = 0.01 Mscf/d-psi^{2n}, n-exponent in back pressure IPR model = 0.8, Avg. temperature (T_{av}) = 635 °R, compressibility factor (Z_{av}) = 0.8626, skin factor (s) = 0.4861, moody friction factor (f_m) = 0.0174, absolute open flow (AOF) = 1912.705 Mscf/d. **OR** Derive an expression for determining future IPR with the help of Fetkovich's method with proper assumptions. Using Fetkovich's method, plot the IPR curve for a well in which P_i is 3000 psia and $J_o^i = 4 \times 10^{-4}$ stb/day-psia^2. Predict the IPRs of the well at well shut in static pressures of 2500 psia, 2000 psia, 1500 psia, 1000 psia and 500 psia.	**CO2**