

Code No: 126DB

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**B.Tech III Year II Semester Examinations, May - 2016****PETROLEUM PRODUCTION ENGINEERING AND DESIGN****(Petroleum Engineering)****Time: 3 hours****Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A (25 Marks)

- 1.a) Write in short about role of production engineer. [2]
- b) Explain the types of well completion with proper diagrams. [3]
- c) Define properties of Crude oil? [2]
- d) Define transient flow, its equation and parameters? [3]
- e) What are the separation systems in production engineering? [2]
- f) Explain the Ballooning effect of tubing. [3]
- g) What is the major role of artificial lift method? Give examples? [2]
- h) Where is Sucker rod pump applicable? [3]
- i) What is matrix acidization? [2]
- j) Define production optimization? [3]

PART - B (50 Marks)

- 2.a) Define and explain the properties of natural and real gas?
- b) Construct IPR of a vertical well in a saturated oil reservoir using Vogel's equation. The following data are given: [5+5]
Reservoir pressure = 4500 psia.
Bubble point pressure = 4500 psia.
Porosity = 0.2 permeability = 80 md
Fluid formation volume factor = 1.1
Fluid viscosity = 1.8 cp. total compressibility = 0.000013 psi⁻¹
Drainage area = 640 acres Wellbore radius = 0.328 ft.
Skin factor = 2.

OR

- 3.a) Derive the expression for radial flow for steady state for vertical well. (Make necessary assumptions)
- b) Write about the pressure drop in single phase liquid flow, define each and every parameter involved? [5+5]

- 4.a) Explain about decline Curves.
 b) An oil reservoir can produce under transient flow for the next 1 month. Predict oil production rate and cumulative oil production over the 1 month using the following data: [5+5]

Reservoir porosity (ϕ):	0.25
Effective horizontal permeability (k):	50 md
Pay zone thickness (h):	75 ft
Reservoir pressure (p_i):	5000 psia
Oil formation volume factor (B_o):	1.3 rb/stb
Total reservoir compressibility (c_t):	0.000012 psi⁻¹
Wellbore radius (r_w):	0.328 ft
Skin factor (S):	0
Well depth (H):	8,000 ft
Tubing inner diameter (d):	2.041
Oil gravity (API):	35 API
Oil viscosity (μ_o):	1.3 cp
Producing gas-liquid ratio:	400 scf/bbl
Gas specific gravity (γ_g):	0.7 air = 1
Flowing tubing head pressure (p_{hf}):	500 psia
Flowing tubing head temperature (T_{hf}):	120 °F
Flowing temperature at tubing shoe (T_{wf}):	160 °F
Water cut:	10%
Interfacial tension (σ):	30 dynes/cm
Specific gravity of water (γ_w):	1.05

OR

- 5.a) How nodal analysis is used for understanding well productivity?
 b) How GOR affect the VLP curve? [5+5]

- 6.a) Explain dehydration system in petroleum production engineering.
 b) Explain the transportation system in petroleum production engineering. [5+5]

OR

- 7.a) What do you mean by pumps used in production engineering, its types and working principle?
 b) How pipeline design is done and also explains its role in production engineering? [5+5]

8. Explain in detail about the gas lift operation and how it changes the productivity of well also tell the where we should apply gas lift technique? [10]

OR

- 9.a) Write in brief about ESP, Plunger lift and PCP used in artificial lift system.
 b) Explain the components and analysis technique PCP in system. [5+5]

- 10.a) How to identify excessive water production?
 b) A sandstone at a depth of 15,000 ft has a poisson's ratio of 0.25 and a poro-elastic constant of 0.72. The average density of the overburden formation is 170 lb/ft³. The pore pressure gradient in the sandstone is 0.38 psi/ft. assuming a tectonic stress of 3,000 psi and a tensile strength of sandstone of 1500 psi, predict the breakdown pressure for the sandstone? [5+5]

OR

- 11.a) How to identify excessive water skin related problem?
 b) Explain the PKN model for hydraulic fracking.
 c) How carbonate acidization is different from sandstone acidization? [3+3+4]