

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Winter 2022-23 Examination

Semester: 7**Subject Code: 203120401****Subject Name: Petroleum Engineering Design****Date: 03/10/2022****Time: 10:30 am to 01:00 pm****Total Marks: 60****Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions - (Fill in the blanks, one word answer, MCQ-not more than Five in case of MCQ) (All are compulsory) (Each of one mark) (15)

1. In SRP, during the downstroke, the traveling valve is and the standing valve is
(A) open, closed (B) closed, open (C) open, open (D) closed, closed
2. Which of the following AL method is best suited to lift highly viscous crude?
(A) Sucker Rod Pumps (B) Gas lift
(C) Progressive Cavity Pump (D) Electrical Submersible Pump
3. A sucker rod pump unit is designated by C-228D-200-74. Here, 'D' represents.
(A) Double Reduction Gear Box (B) Diameter of Sucker Rod
(C) Diameter of Plunger (D) Stroke Length
4. Which artificial lift technique is used for CBM, dewatering, and water source wells?
Sucker Rod Pumps (B) Gas lift
(C) Progressive Cavity Pump (D) Hydraulic Jet Pump
5. The primary function of the counter-balance system in rod pumped wells is:
(A) speed reduction of the prime mover to suitable pumping speeds
(B) store energy on the downstroke and release energy on the upstroke
(C) store energy on the upstroke and release energy on the downstroke
(D) supply the mechanical energy to transmit to the pump and lift fluids
6. In which artificial techniques, the pump has no moving parts?
7. Write down the name of the pump which is used in the Electric Submersible Pump (ESP)?
8. Which artificial lift technique is using high-pressure power fluid?
9. Write down the name of the subsurface component of the Electric Submersible Pump (ESP) (at least 3)
10. Define the Salvage value?
11. In which artificial technique, the pump has no moving parts?
12. What is the ideal case for the installation of a Continuous gas lift?
13. Define the term Capital Investment?
14. _____ used to provide stability of downhole SRP operation.
15. The rotary motion of the crank arm is converted to an oscillatory motion by means of the _____ through a pitman's arm.

Q.2 Answer the following questions. (Attempt any three) (15)

- A) Write down the factors that should be considered to determine the most desirable methods of treating crude oil.
- B) The pumping unit has an API designation of M-328-D-273-175. The plunger diameter is 2.65 inches with a pump speed of 22 SPM. The production rate of the well is 392 bbl/day and $B_o = 1.42$ bbl/STB. Calculate the volumetric efficiency of the pump in percentage.
- C) Derive the formula of the vertical terminal settling velocity of the droplet?
- C) The capital cost of a small portable pump is \$7,500, with a lifetime of 16 years. If money can be invested at 5% (annual interest rate), calculate the annual depreciation costs and the annual capital recovery and compare between the two values?

Q.3 A) Calculate the flow rate (in bbl/day) for PCP if the diameter of the rotor is 1.25 inches, the rotational speed is 28 RPM, the Eccentricity is 0.82 inches and the Pitch length of the stator is 2.34 feet. **(07)**

B) Explain all five basic elements of the Gas Lift Valve (GLV)? **(08)**

OR

B) Derive the formula of the terminal settling velocity of the droplet. **(08)**

Q.4 A) Calculate the Peak Polished Rod Load (PPRL) of the SRP unit: **(07)**

a) Conventional Unit b) Mark- II c) Air-balanced Unit

Pumping depth = 6250 ft, Desired fluid production = 172 BPD, Volumetric efficiency = 78%, Stroke length = 72 inch, Pumping speed = 18 spm, Pump diameter = 1.3-inch, Rod number = API No. 76(1.784lb/ft), Fluid specific gravity = 1.0

OR

A) Explain all the component of the Electric Submersible Pump (ESP)? **(07)**

B) Explain the procedure of the Valve Spacing in detail? **(08)**