Name:

Enrolment No:

UPES

End Semester Examination, December 2023

Course: Production Engineering and Well Completion **Semester: V**

Program: B.Tech (Applied Petroleum Engineering- Upstream) **Time : 03 hrs.**

Course Code: PEAU 3037 **Max. Marks: 100**

Instructions: Attempt all the questions in a serial order. Use illustrations/diagrams wherever necessary.

SECTION A
(5Qx4M=20Marks)

S. No.	Question Statement	Marks	CO
Q1	Illustrate through a diagrammatic approach the open hole gravel pack and cased hole gravel pack completion strategy.	**4**	**CO2**
Q2.	Illustrate the different techniques of perforating the well with appropriate diagrams only. Explanation is not needed.	**4**	**CO1**
Q3.	Which type types of valves present in a Christmas tree should be used for taking production and for stopping a well for performing workover operations. When do we install the Christmas tree, and will it stay on wellhead as a preventive measure in the case of kick or blowout?	**4**	**CO2**
Q4	Briefly discuss the summary of completion process or state all the steps of completing a well starting from setting casing to setting tubing.	**4**	**CO3**
Q5	State the purpose of workover operations and its applications. At which stage of well life they are applied?	**4**	**CO4**
	SECTION B **(4Qx10M= 40 Marks)**		
Q6	Explain the different steps of matrix acidization with their reactions for the following type of reservoirs (a) Sandstone Reservoirs (b) Carbonate Reservoirs	**5 + 5**	**CO2**
Q7	Explain the different steps of hydraulic fracturing process. Illustrate the plot of breakdown pressure with time with proper explanation.	**10**	**CO2**
Q8	Provide your analysis about the different sand control screens types with diagrams.	**10**	**CO3**
Q9	**Attempt any one out of the two questions given below.** **9A.** Demonstrate using a diagrammatic approach the proppant profile development during hydraulic fracture treatment. **OR** **9B.** Interpret the impact of skin on well productivity. Can it impact the well inflow pressure profile, elaborate with a simple diagram?	**10**	**CO3**

	SECTION-C **(2Qx20M=40 Marks)**		
10	**Attempt any one of the two below given questions** **10A.** Demonstrate in detail about the perforation operations the following techniques with proper illustrations 1. Underbalanced Perforation 2. Overbalanced Perforation 3. Through Tubing Perforation 4. Tubing Conveyed Perforation 5. Wireline Conveyed Casing Gun **OR** **10B.** A sandstone with a porosity of 0.3 containing 15 vol. % calcite (CaCo3) is to be acidized with HF/HCl mixture. A preflush of 25 w.% HCl is to be injected ahead of the mixture to dissolve the carbonate mineral and establish a low pH environment. If the HCl pre-flush is to remove all the carbonates in a region within 2 ft beyond 0.428 ft radius wellbore before the HF/HCl stage enters the formation, what minimum pre-flush volume is required in terms of gallon per foot of payzone? Write all the reactions involved in this acidization process.	**5*4 =20**	**CO3**
11	**11A**. Analyze the given figures describing the Perforation in a well (Fig. 1) and perforations in different formations (Fig. 2 and 3). Based on the analysis elaborate the findings from the schematics of bullet and jet perforations. Provide point wise answers.	**15 + 5 =20**	**CO4**

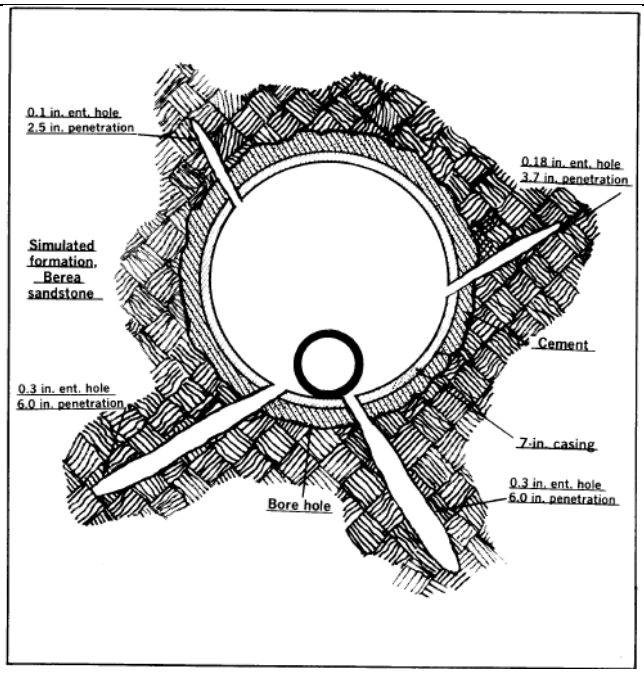


Figure 1: Schematic of perforated casing

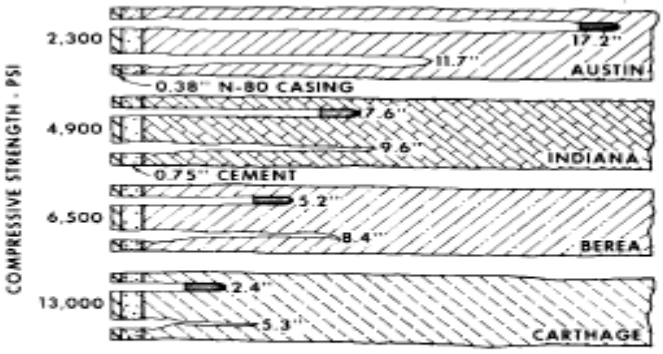
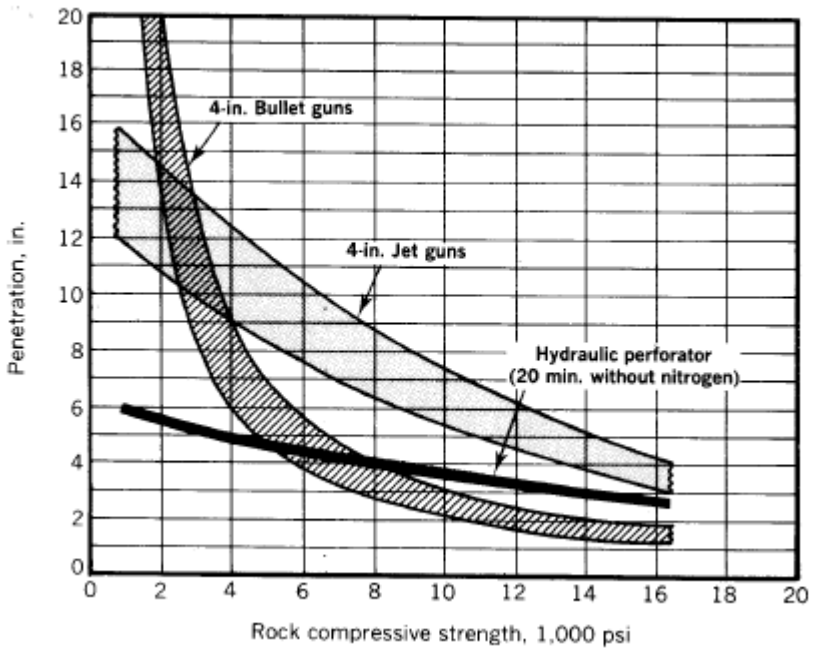


FIG. *7-5—Effect of formation compressive strength on penetrating efficiency of bullet and jet perforators.[6] Permission to publish by API Production Department.*

Figure 2: Penetration depth of bullet and jet perforation techniques into different types of formations



Fugure 3: Performance of different perforation techniques in formation of different compressive strengths

11B. Elaborate any Coiled Tubing Operation using any particular example.

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