Name: Enrolment No:	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2020

Programme Name: B.Tech APE Upstream **Semester : III**

Course Name : Mechanics of Drilling Engineering **Time : 03 hrs**

Course Code : PEAU 2006 **Max. Marks: 100**

Instructions :

- All questions are compulsory. However, internal choice has been provided. You have to attempt only one of the alternatives.
- Write the answers on an A4 sheet with your name and roll number mentioned on each page. Pl scan properly so as the answers are visible.
- Submit well within time limit.

SECTION A

(5 x 6 marks = 30 marks)

S. No.	Questions of three mark each. Chose the correct answer/answers.	Marks	CO
1	i. The shape of the Kelly can be a) Square b) Hexagonal c) Cylindrical d) None of the above ii. Kelly receives the rotary motion from a) Kelly bushing b) Master bushing c) Rotary table d) Hook	**5**	**CO1**
2	iii. For a hole size of 12 ¼ inch the size of Drill Collar used is a) 13 inches b) 14inches c) 8 inches d) None of the above iv. The drill pipe having uniform wear and min. wall thickness 80% is called **a)** New **b)** Premium **c)** Class 2 **d)** Class 3	**5**	**CO2**

3	i. The specific gravity of air and water is a) 1,1 b) 1,0 c) 0,1 d) 0,0 ii. To maintain the drilling line, which one of the following actions should be done frequently? a. Perform a specified cut and slip program b. Change all the drilling line c. Inspect all the drilling line after each well drilled d. All of the above	**5**	**CO1**
4	Enumerate the components of mud circulation system.	**5**	**CO2**
5	i. The height of the derrick must be such as to permit the horizontal movement of the travelling block. (True/False) ii. The rotary tool that is hung from the hook of the traveling block to suspend the drill string and permit it to rotate freely. (True/False) iii. According to the IADC classification of bit the first code or digit defines the series classification relating to the cutting structure. (True/False) iv. Kelly is made from high grade chrome molybdenum having Brinell hardness from 285 to 341. (True/False) v. Spiral d/c is used where differential sticking is prominent. (True/False)	**5**	**CO1**
6	i. The crown block bears the load applied at the _____ and its function is to reduce the wire rope tension required to pull the tubular material used to drill the well. ii. If the pin and box connection are not tight enough then the drilling mud being circulated from it can leak through that causing wear and tear in the d/p. This phenomena is called _____.	**5**	**CO1**
SECTION B **(50 marks)**			
Q 2	A production casing was planned to be set at 18,000 ft with a drilling mud of 11.2 ppg at the annulus. When inside casing was filled with 13.0 ppg mud, burst safety factor was calculated to be 4.12. Determine the burst rating of the casing. OR Explain the design factors considered while designing a Roller cone Drill Bit. Also discuss the IADC classification of Drill bit.	**10**	**CO3**
Q 3	Explain the main causes for torque and drag during drilling an oil well. Under which circumstances a wellbore is known to be in poor hole condition.	**10**	**CO3**
Q 4	A single-acting triplex pump has been used in a drilling rig to provide a total pump rate of 650 gals/min at pressure of 1300 psi and pump speed of 100 strokes/ min. If the liner diameter is 6 inches, determine the liner length and the pump output power. Assume a displacement efficiency of 93%. Or	**10**	**CO4**

	A drill string consists of 600 ft of 8* in x 2U in drill collars and the rest is a 5 in, 19.5lbm/ft Grade X95 drillpipe. weight of drill collar= 161Ibm/ft If the required MOP is 100000 lb and mud weight is 75 pcf(10 ppg), calculate the maximum depth of hole that can be drilled when (a) using new drillpipe and (b) using Class 2 drillpipe having a yield strength *(PI)* of 394 600 lb.		
Q5	Listout the various BHA components required in drilling a conventional oil well. Briefly explain the key functions of drill string.	**10**	**CO2**
Q6	Write short notes on following **:** a. Collapse Pressure in Drill Pipes b. Burst Pressure in Drill Pipes c. Dog Leg Severity d. Mechanics of Drilling	**10**	**CO3**
SECTION-C (20 marks)			
Q7	After Macondo , deepwater horizon accident in Gulf of Mexico, there has been a rethink of Deepwater Exploration. In your opinion what are the 3 biggest Risks or challenges and how they can be addressed in future. Give sufficient details to support your answer. **OR** Why the wells are telescopic? What are the five type of casings used to complete a well. Clearly mention their specific function. Write down the steps used to design a casing.	**20** **4+5+5 +6=20**	**CO4**