Roll No.													

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

TEST 1

Winter Semester: 2021 - 22

Course Code: PET 2003

Course Name: Fundamentals of Oil and Gas Well Drilling Technology

Program & Sem: B.tech and IV Sem

Date: 26th April 2022

Time: 11:30 AM to 12:30 PM

Max Marks: 30

Weightage: 15%

Instructions:

(i) Question Paper has THREE Parts, i.e. Part A, Part B, and Part C.
(ii) All the questions should be answered. Part A consists of both fill in the blanks and MCQs.
(iii) Extra-time will not be given in any circumstances.
(iv) Read all the questions properly and answer accordingly.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries ONE mark. (10Qx1M=10M)

Q1. Length of a drill pipe is approximately _____.
(C.O. No. 1 Knowledge)

Q2. _____ is used to provide protection against well bore collapse.
(C.O. No. 1 Knowledge)

Q3. _____ shapes can not be used for kelly design.
(C.O. No. 1 Knowledge)

Q4. BOP refers to_____.
(C.O. No. 1 Knowledge)

Q5. A ___ is a hole on the rig floor in which kelly is placed where the hoisting operation are in progress.
(C.O. No. 1 Knowledge)

Q6. _____ can be a part of rotary system.
A.Choke line B.Kill line
C.Drilling spool D.Rotary table
(C.O. No. 1 Knowledge)

Q7. A ____ is a hole on the rig floor in which joints of drill pipe are suspended for the drill string connection.

(C.O. No. 1 Knowledge)

Q8. Triplex Pumps are _____ acting in nature.

Q9. ____ is a large diameter, high pressure flexible line used to connect standpipe to the swivel.
(C.O. No. 1 Knowledge)

Q10. ____ is the purpose of using anchor on rig.

A.To circulate the drilling fluid B.To reduce load on fast line
C.To increase load on fast line D. To support the swivel
(C.O. No. 1 Knowledge)

Part B [Thought Provoking Questions]

Answer both the Questions. Each question carries TWO marks. (2Q x 4M = 8M)

Q11. Dead line refers to the stationary section of drilling line while the fastline is moving section of drilling line. Which line will have more load, if the friction is present between the pulley and the drilling line and why?Justify your answer with proper explanation.
(C.O. No. 1 Comprehension)

Q12. Duplex Pumps are double acting pumps while Triplex Pumps are single acting pumps.Triplex Pumps are more lighter and compact than duplex pumps.Concerning the above statements which pumps are commonly employed for the circulation of mud. Justify your answer with proper statements.
(C.O. No. 1 Comprehension)

Part C [Problem Solving Questions]

Answer all the Questions. Each question carries FOUR marks. (3Q x 4M = 12M)

Q13. A diesel engine gives an output torque of 1740 ft-lbf at an engine speed of 1200 RPM. Density of diesel is 7.2 lbm/gal and heating value of diesel is 19000 BTU/lbm. If the fuel consumption rate was 31.5 gal/hour, determine the parameter that can be computed from the product of load and velocity. (1BTU = 778 lb-ft)
(C.O. No. 1 Application)

Q14. Consider a duplex pump having 6.5” liners, 2.5” rods, 18” strokes, and a volumetric efficiency of 90 percent. If the pump is operating at 140 cycles/min, compute the characteristic which is important for designing of pump from the above mentioned data . (1 gallon = 231 cubic inches)
(C.O. No. 1 Application)

Q15. Consider a triplex pump having 6” liners and 11’’ strokes operating at 120 cycles/minute and a discharge pressure of 3,000 psig. Determine the significant attribute evaluated if both flow rate and pressure are taken together into account. Flow rate is 484.7 gal/min.
(C.O. No. 1 Application)

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GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

TEST 2

Winter Semester: 2021 - 22

Course Code: PET 2003

Course Name: Fundamentals of Oil and Gas Well Drilling Technology

Program & Sem: B.tech and IV Sem

Date1st June 2022

Time: 11:30 AM to 12:30 PM

Max Marks: 30

Weightage: 15%

Instructions:

(v) Question Paper has THREE Parts, i.e. Part A, Part B, and Part C.

(vi) All the Questions should be answered. Part A consists of both fill in the blanks and multiple choice questions.

(vii) Extra-time will not be given in any circumstances.

(viii) Read all the questions properly and answer accordingly.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries ONE mark. (8Qx1M=8M)

1. Drill pipe is classified to account for the degree of wear. Which class of drill pipe represents uniform wear and a minimum wall thickness of 80% of the new drill pipe?

A. New B. Premium

C. Class 2 D. Class 3

(C.O. No. 2 Knowledge)

2. _____ drill collar types are used to reduce the risk of differential sticking.

(C.O. No. 2 Knowledge)

3. The type of drill collars that are used to reduce deviation in crooked hole is _____.

(C.O. No. 2 Knowledge)

4. _____ is the additional tension to be applied when pulling the struck drill string without breaking the tensile limit of the drill string.

(C.O. No. 2 Knowledge)

5. _____ casing is used to protect the near surface formations and to support subsequent casing strings.

(C.O. No. 3 Knowledge)

6. Ron stated that “A heavy walled drill pipe can be used to provide smooth transition of weight between drill pipe and drill collar”. This statement was contradicted by Smith who stated that “A drill pipe can be used to provide smooth transition of weight between heavy walled drill pipe and drill collar”. Which one of them is logically correct? (C.O. No. 2 Knowledge)

A. Ron
B. Smith
C. Both of them are right
D. Both of them are wrong

7. Which component failure is the main cause of fishing jobs in drilling industry?
(C.O. No. 2 Knowledge)

8. The tools that are placed above the drill bit and along the bottom hole assembly (BHA) to control hole deviation and prevent differential sticking are commonly called as _____.
(C.O. No. 2 Knowledge)

Part B [Thought Provoking Questions]

Answer both the Questions. Each question carries FOUR marks. (2Q x 4M = 8M)

9. Weight on the Bit, or WOB, is the amount of downward force exerted on the drill bit provided by thick-walled tubular pieces in the drilling assembly that are known as drill collars. The downward force of gravity on these steel tubes provide force for the drill bit in order to effectively break the rock. Weight on bit should be less than buoyant weight of drill collar. Describe the above statement along with consequences that can happen when WOB is kept higher than the drill collar weight .
(C.O. No. 2 Comprehension)

10. The tension load is evaluated using the maximum load concept. Buoyancy is included in the design to represent the realistic drilling condition. Discuss the factors which are vital in the consideration of tension design of the drill string.
(C.O. No. 2 Comprehension)

Part C [Problem Solving Questions]

Solve both the Questions. Each question carries SEVEN marks. (2Q x 7M = 14M)

11. Drill String consists of the following equipment:
5'' DP (S-135), 4-1/2" IF connection, adjusted weight of 23.5 ppf = 8000 ft
5" HWDP (S-135), 4-1/2" IF connection, adjusted weight of 58 ppf = 900 ft
Mud Motor and MWD Weight = 20 klb
Length of mud motor and MWD = 90 ft
Mud Weight is 9.2 ppg
Tensile strength of 5"DP S-135 (premium class) = 436 klb
Tensile strength of 5" HWDP S-135(premium class) = 1100 klb
90% of tensile strength is allowed to pull.
Calculate the additional tension to be applied when pulling the struck drill string without breaking the tensile limit of drill string.

(C.O. No. 2 Application)

12. The deviated well has an inclination of 30 degree in tangent section and planned mud weight is 11 ppg. Safety factor for this case is 15%. Determine the parameter that provides WOB for drilling mud to keep drill pipe from buckling , if WOB desired is 50 klb.

(C.O. No. 2 Application)

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PRESIDENCY UNIVERSITY
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SCHOOL OF ENGINEERING

END TERM EXAMINATION

Winter Semester: 2021 - 22
Course Code: PET 2003
Course Name: Fundamentals of Oil and Gas Well Drilling Technology
Program & Sem: B.Tech and IV Sem

Date: 29th June 2022
Time: 9:30 AM to 12:30 PM
Max Marks: 100
Weightage:50%

Instructions:
(ix) Read the all questions carefully and answer accordingly.
(x) No extra time will be given.
(xi) Questions has 3 parts : Part A , Part B and Part C.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries FIVE marks. (4Qx 5M= 20M)

1. Select the correct option among the following:

A) ____ is the purpose of using anchor on rig.

i)To circulate the drilling fluid
ii)To increase load on fast line
iii)To reduce load on fast line
iv) To support the swivel

(C.O.No.1) [Knowledge]

B) Buoyant weight of casing refers to the weight of casing in _____.

i) Air
ii)Drilling Mud
iii) Water
iv) None of the above

(C.O.No.3) [Knowledge]

C) Casings are classified based on the _____ .

i) Composition
ii) Depth
iii) Thickness
iv) Area

(C.O.No.3)

[Knowledge]

D) Thickness of drill collar is ____ as compared thickness of drill pipe.

i) Less
ii) Same
iii) More
iv) None of the above

(C.O.No.2)

[Knowledge]

E) Bit optimization can be done by maximizing _____ .

i) Hydraulic Horsepower
ii) Impact Force
iii)Both (i) and (iii)
iv) None of the above

(C.O.No.4)

[Knowledge]

2. Match the following:

(P) Roller Cone bits	(I) Long and widely spaced teeth
(Q) PDC Bits	(II) Journal (Pin) Angle
(R) Soft Formation	(III) Short and Wider Teeth
(S) Hard Formation	(IV) Excessive pressure loss and extra pumping capacity
(T) Jet Bit	(V) 1400 degree C and 6 x10^5 psi

(C.O.No.4)

[Knowledge]

3. Fill in the blanks:

1) BOP is required to prevent high pressure conditions. BOP refers to_____ .

(C.O.No.1)

[Knowledge]

2) Intermediate casing is set in the transition zone below or above overpressured zone. The common size of the intermediate casing is _____.

(C.O.No.3) [Knowledge]

3) The factor used to compensate the loss of drill string weight due to immersion in drilling fluid is _____.

(C.O.No.2) [Knowledge]

4) A drilling engineer stated that he will use D-55 drill pipe for drilling a particular well. The no 55 specify _____. (C.O.No.2)

[Knowledge]

5) The hydrostatic pressure of drilling mud should be ____ than pore pressure and __ than formation fracture pressure.

(C.O.No.1) [Knowledge]

4. Define the following terms with reference to Drilling Engineering:

1) Duplex Pumps (C.O.No.1)

[Knowledge]

2) Triplex Pumps (C.O.No.1)

[Knowledge]

3) Margin of Overpull (C.O.No.2)

[Knowledge]

4) Buoyancy Factor (C.O.No.3) [Knowledge]

5) Washouts (C.O.No.2) [Knowledge]

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries FIVE marks. (6Qx5M=30M)

5. Collapse design criteria is required to determine the maximum differential pressure that the tubular has to sustain, with force vector acting radially inward.Collapse pressure is maximum at bottom of well bore while minimum at the surface, during general drilling condition. Explain the above statement with an appropriate reason and along with the help of a schematic figure of the wellbore.
(C.O.No.2) [Comprehension]

6. Kelly uses a swivel system without motor while the top drive uses swivel with motor. Due to this reason ,which system is more effective. Considering the above statement which system works effectively on offshore. Justify your answer by giving proper explanation. (C.O.No.1) [Comprehension]

7. The tension load is evaluated using the maximum load concept. Buoyancy is included in the design to represent the realistic drilling condition. Discuss the factors which are vital in the consideration of tension design of the drill string? (C.O.No.2) [Comprehension]

8. A rotary system consists of kelly, swivel, rotary table. The swivel helps to to allow the kelly and drill pipe to rotate while allowing the travelling block to be stationary. During drilling the swivel is allowed to rotate or not? Justify your answer. (C.O.No.1) [Comprehension]

9.Roller-cone bit design goals expect the bit to achieve a low cost per foot drilled. The design criteria also requires the bit to have a long downhole life that minimizes requirements for tripping.It should ensure that the three legs must be equally loaded during drilling. Explain the factors that are considered when designing and manufacturing a three-cone bit.
(C.O.No.4) [Comprehension]

10.Casing design involves the determination of factors which influence the failure of casing and the selection of the most suitable casing grades and weights for a specific operation, both safely and economically. Before designing casing, the essential data must be obtained from various sources including: geologists, petrophysicists, reservoir engineers etc. Describe the forces that are taken into consideration while designing the casing.
(C.O.No.3) [Comprehension]

Part C [Problem Solving Questions]

Answer all the Questions. Each question carries TEN marks.
(5Qx10M=50M)

11.A drill string is composed of 7000 ft of 5in (4.276 in) , 19.5 lbm/ft drill pipe and 500 ft of 8in OD by 2.75 ID drill collars when drilling a 9.875 in borehole. Assuming that the borehole remains in gauge, compute the number of pump cycles required to circulate mud from the surface to the bit and from the bottom of the hole to the surface if pump factor is 0.1781 bbl/ cycle.

(C.O.No. 2) [Application]

12.A recommended bit program is being prepared for a new well using bit performance records from nearby wells. Drilling performance records for three bits are shown for a thick limestone formation at 9,000 ft. Determine which bit gives the lowest drilling cost if the operating cost of the rig is $400/hr, the trip time is 7 hours, and the connection time is 1 minute per connection. Assume that each of the bits were operated at near the minimum cost per foot attainable for that bit.

Bit	Bit Cost($)	Rotating Time (hours)	Connection Time(hours)	Mean Penetration Rate (ft/hr)
A	800	14.8	0.1	13.8
B	4,900	57.7	0.4	12.6
C	4,500	95.8	0.5	10.2

(C.O.No. 4)
[Application]

13. Calculate the tensile forces for the following casing string in running conditions and static conditions.
20 "casing, ID = 18.71 inch
Wn = 133 lb/ft
CSD = 2800 ft (Total Depth = 5000 ft)
Mud weight =10 ppg
Test Pressure =2500 psi
Dogleg = 0.75 deg/100 ft (C.O.No. 3)
[Application]

14. Consider a duplex pump having 6.5” liners, 2.5” rods, 18” strokes, and a volumetric efficiency of 90 percent. If the pump is operating at 140 cycles/min, compute the characteristic that is important for designing of pump from the above mentioned data . (1 gallon = 231 cubic inches)

(C.O.No. 1) [Application]

15. Consider a triplex pump having 6” liners and 11’’ strokes operating at 120 cycles/minute and a discharge pressure of 3,000 psig. Determine the significant attribute evaluated if both flow rate and pressure are taken together into account. Flow rate is 484.7 gal/min. (C.O.No. 1) [Application]