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## UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2017

**Program: B.Tech Applied Petroleum Engineering- upstream**  
**Subject (Course): Offshore Drilling & Production Operations**  
**Course Code : PTEG411**  
**No. of page/s: 4**

**Semester – VII**  
**Max. Marks : 100**  
**Duration : 3 Hrs**

**Instructions:** Use of books, handouts, calculators is allowed but Cellphone, Internet, is NOT ALLOWED.

### Section-A

**Answer all questions** (Select the correct answer(s) or write short answers)

**[10X2=20]**

1. In an offshore well producing Dry Gas the obvious choice of Subsea X-Tree would be
  - a. Partial Drilling Horizontal Tree
  - b. Eccentric Dual bore Vertical Tree
  - c. Full Drilling Horizontal Tree
  - d. Concentric Monobore Vertical Tree
2. Out of the various operational issues faced offshore which ones affect Gas Production most
  - a. Corrosion
  - b. Hydrates
  - c. Wax
  - d. Asphaltenes
  - e. Scale
  - f. Sand erosion
3. Why is it extremely important NOT to have large volumes of Free Gas in Riser?
4. What are the differences between Cementing Operation Onshore versus Offshore?
5. What is the reason behind development of Shallow Water Flows?
6. Differences between Catenary and Taut Leg Mooring system are
7. Structural Casing hangs from the
  - a. Permanent Guide base
  - b. Low Pressure Subsea Well head
  - c. High Pressure Subsea Well head
  - d. Guideless Re-entry Adaptor

8. What is the main advantage of Dual Activity Derrick ? (as in KG1 and KG2 Drill-ships)
9. Spars are typically used in \_\_\_\_\_ region
10. What is the Difference between Sparker Seismic Source and Air Gun Seismic Source

**Section – B**

**Answer all questions**

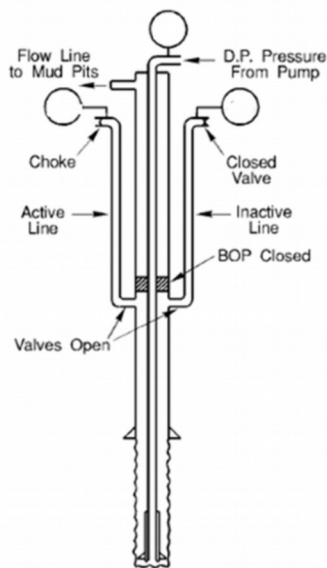
**[5X8=40]**

11. Write the Advantages and Disadvantages of various types of Drill String Motion Compensators in a tabular form and explain with Diagram, how Active Drill String Motion Compensation is done on an offshore Floater Rig

Drill String Motion Compensator	Advantages	Disadvantages
Passive		
Active		

12. During a well control operation, CLFP data obtained prior to Kick using OMW of 10 ppg is as per below table.

Pump Rate	Circulating thru Riser	Circulating thru Choke
1 bpm	105 psi	225 psi
2 bpm	115 psi	245 psi
3 bpm	125 psi	265 psi



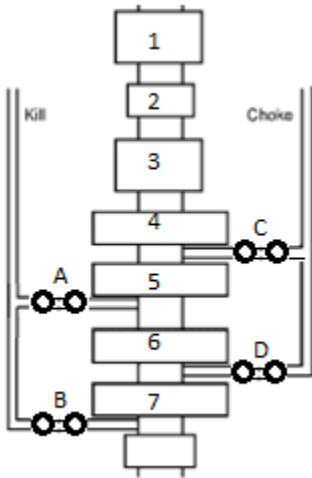
The influx has been removed, the OMW has been replaced by Balance Mud weight of 11 ppg

The final Drill Pipe Circulating pressure is 400 psi for 11 ppg mud @ 2 bpm.

If the inactive line Pressure is showing 350 psi then what is the pressure on the active line?

Show all calculations

13. During a routine operation, the Driller decides to pump down Mud using the **Upper Kill** line and return thru **Lower Choke** line (There is Drill Pipe in well but not shown in the diagram)



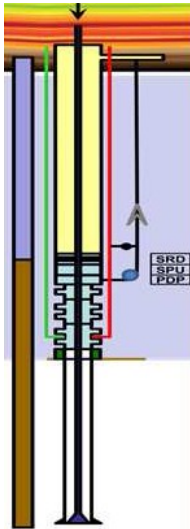
Valves are marked A, B, C, D .

Which Valves need to be Open, Which Valves need to be Closed.

Rams/Annulars are numbered from 1 to 7.

Which Rams need to be Closed, which Rams need to be Open and explain Why?

14. In a Dual gradient Drilling method, using Seabed Pumping (as in Chevron Maxlift system)



Total Depth of a vertical offshore well to TD is 5000 ft measured from mean sea level. Water Depth is 3000 ft.

The BOP Stack, LMRP are connected to the Well Head, and the Mud Lift Pump (PDP), Solids processing Unit (SPU) and Subsea Rotating Device (SRD) are connected above the LMRP.

The total height from the wellhead to top of SRD is 135 ft.

Mud weight is 15 ppg, Seawater is 8.5 ppg

What is the Bottom Hole Pressure? Show all calculations

15. In a Subsea well head with Vertical X-Tree, the Tubing Hanger is hung on the Well Head. Why does the Tubing Hanger need to be aligned correctly?

Section – C

**Answer all questions**

**[2X20=40]**

16. While running Casing in an offshore well, the Casing is stuck two Casing joints above the intended landing depth near T.D. Explain with diagram of each step, the sequence of operations that are involved in bringing the situation under control. Label all the equipment in the diagrams

17. Deepwater Drilling and Production challenges:

a. After the Deepwater Horizon accident at Macando in GOM in 2010, several steps were taken by government and industry to make Deepwater safer. Both oil companies and service companies were made more accountable for their actions, rules stricter and penalties were made more severe

b. There are technical engineering challenges that need to be overcome before the industry can explore any deeper

c. The current Oil Industry scenario with Oil prices low and Shale Oil & Gas somehow surviving even \$50 per bbl oil price has put Deepwater on hold

d. Environmental challenges forcing many countries to look at Renewables more seriously and fossil fuels are not getting the same attention as past

Given all the 4 factors, please comment on what YOU think will be the fate of Deepwater Drilling and Production in future. Please provide facts to support your reasoning and cover each of the 4 factors

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