Name: Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

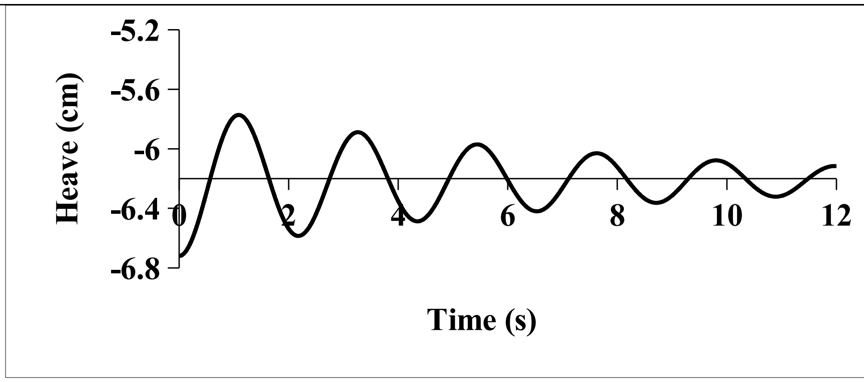
Course: Offshore operations (PEAU 7003) Semester: I
Programme: M.Tech - Petroleum Engineering
Time: 03 hrs. Max. Marks: 100
Instructions: Open book exam, printed ppts are allowed, hand written notes is allowed, photocopies of hand written notes are not allowed, everyone should bring calculators, calculators should not be borrowed, everyone should bring wave tables.

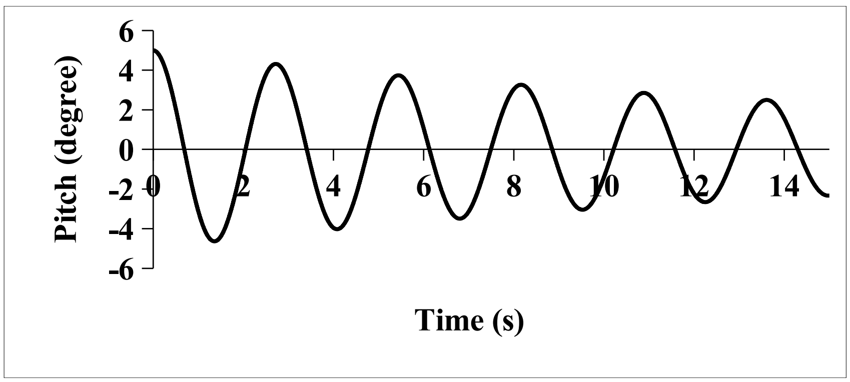
SECTION A

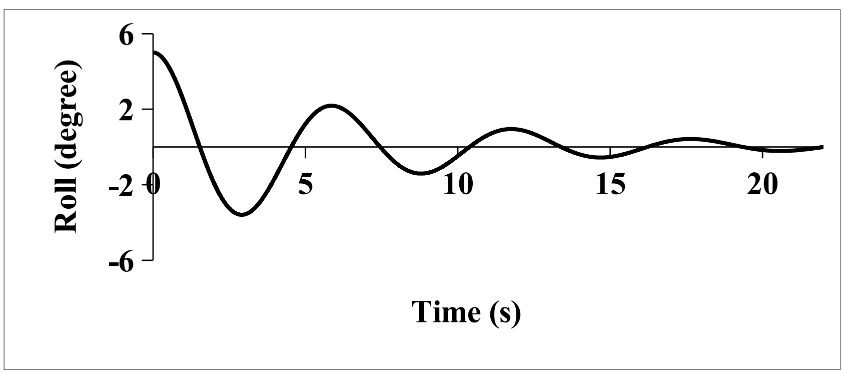
S. No.		Marks	CO
Q 1	A wave of 8 seconds enters from deep water to a water depth of 100 m. Find its wave length, celerity in deep water and at 100 m water depth.	4	CO1
Q 2	A solitary wave has wave height of 12 m, find its energy at 200 m water depth	4	CO2
Q 3	Explain about the stability parameters of semi-submersible oil platform	4	CO3
Q 4	A spiral stranded steel wire has diameter of 10 cm, find its submerged weight and stiffness.	4	CO4
Q 5	Define shallow water flow?	4	CO4

SECTION B

Q 6	A wave has a height of 2 m and period of 8 secs, plot the variation of orbital velocity and acceleration in the vertical and horizontal directions of a particle at a position 4 m below SWL and 20 m above the seabed.	10	CO1
Q 7	What is neutral, positive and negative stability of offshore structures, explain with diagrams. Find meta centric height in x and y directions for a wooden pontoon whose specific gravity is 0.7 floats in water and its dimensions are 2 m x 1 m x 0.8 m.	3+7	CO2
Q 8	The experimental tests conducted on model semi-submersible platform in wave basin. The logarithmic decay curves for heave, pitch and roll are given below. The weight of the model is 25 kg, Calculate its damping and natural time period in heave pitch and roll degrees of freedom for the following graphs.	10	CO3

<table>
<tr><td></td><td>




</td><td></td><td></td></tr>
<tr><td rowspan="3">Q 9</td><td>Explain different types of SCR’s and their configurations with suitable diagrams.</td><td rowspan="3">10</td><td rowspan="3">CO4</td></tr>
<tr><td>OR</td></tr>
<tr><td>Explain the different types of components used on TTRs and design considerations</td></tr>
</table>

<table>
<tr><td colspan="4">SECTION-C</td></tr>
<tr><td rowspan="3">Q 10</td><td>A drilling riser is installed in water depth of 2000m, its base is located 5 m above the seabed and its hanged at the platform deck which is above 10 m from water level. The weight plus added mass/length of the riser is 800kg/m, the riser is tensioned at the top with 160000 kg. Find its first natural frequency, the bandwidth of reduced velocities where it under goes vibration, mass ratio, reduced damping at damping ratio 0.05 and find the velocity at which it under goes resonance.</td><td rowspan="3">20</td><td>CO3</td></tr>
<tr><td>OR</td><td rowspan="2">CO1
and
CO2</td></tr>
<tr><td>A drilling riser of diameter 1.2 is installed at water depth of 100 m is subjected to regular wave of amplitude 1.0 m with wave period of 12 sec. The drag and inertia coefficients are 0.6 and 2.0 respectively. The wind driven current at surface is 2 m/s. Calculate the) horizontal wave force at 25 m from sea water level at x = 0 and t = 2.5 sec.</td></tr>
<tr><td>Q 11</td><td>Explain about the about the solutions to the SWF problem with suitable diagrams</td><td>20</td><td>CO4</td></tr>
</table>

Name: Enrolment No	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

Course: Offshore operations — Semester: I

Programme: M.Tech - Petroleum Engineering

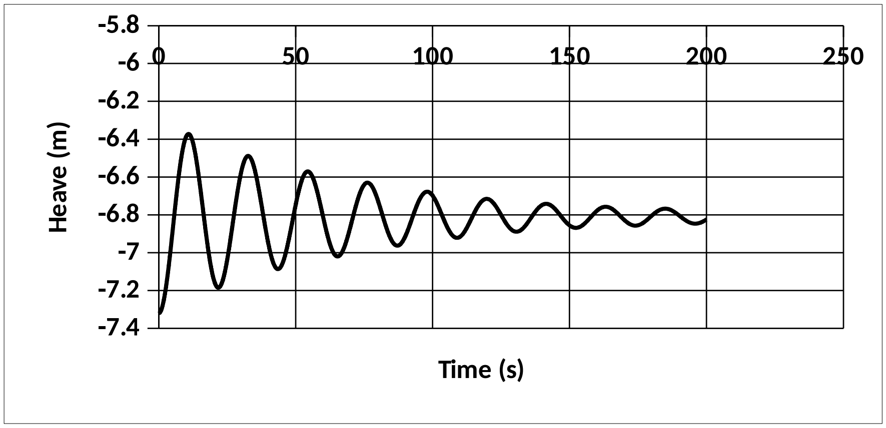
Time: 03 hrs. — Max. Marks: 100

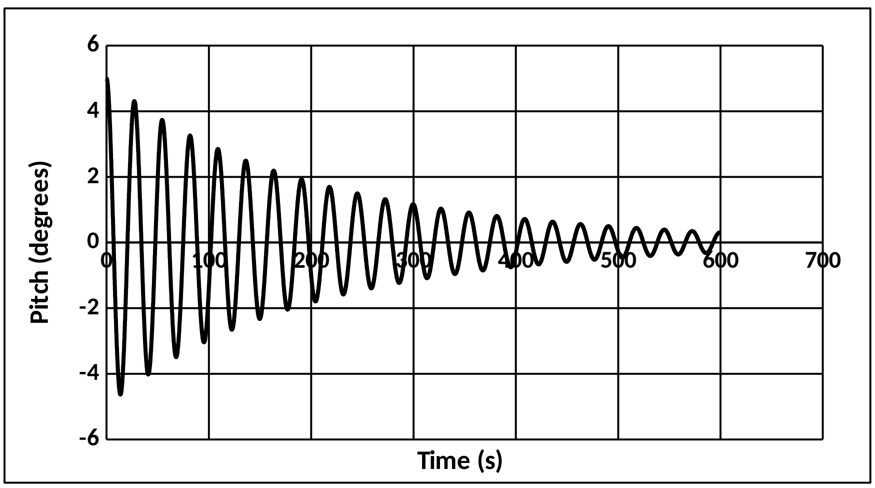
Instructions: **Open book exam**, printed ppts are allowed, hand written notes is allowed, photocopies of hand written notes are not allowed, everyone should bring calculators, calculators should not be borrowed, everyone should bring wave tables.

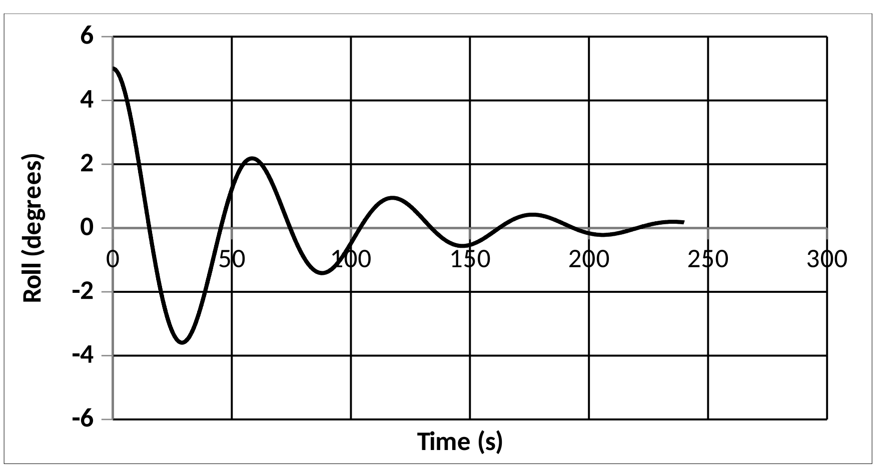
S. No.		Marks	CO
Q 1	A wave of 11 seconds enters from deep water to a water depth of 100 m, find its wave length and celerity in deep water and at 100m water depth.	4	CO1
Q 2	A solitary wave has wave height of 12 m, find its energy and wave celerity at 100 m water depth	4	CO2
Q 3	What are the components of the mooring system?	4	CO3
Q 4	Explain about guidelines and why are they used?	4	CO4
Q 5	Explain about kick detection in offshore operations.	4	CO3 and CO4
	SECTION B		
Q 6	A wave has a height of 1.5 m and period of 9 secs, plot the variation of orbital velocity and acceleration in the vertical and horizontal directions of a particle at a position 6 m below SWL and 18 m above the seabed.	10	CO1
Q 7	Define what is significant wave height, From a Wave Height Statistics point of view, for the data given in the Table, Calculate $H_{1/3}$, $H_{1/10}$	2+8	CO2

wave height intervals (m)	wave height average (m)	number of waves n	frequency quotient $f(x)$	cumulative frequency quotient $F(x)$
0.25-0.75	0.5	15	0.100	0.100
0.75-1.25	1.0	30	0.200	0.300
1.25-1.75	1.5	55	0.367	0.667
1.75-2.25	2.0	21	0.140	0.807
2.25-2.75	2.5	14	0.093	0.900
2.75-3.25	3.0	9	0.060	0.960
3.25-3.75	3.5	5	0.033	0.993
3.75-4.25	4.0	1	0.007	1.000
total		150	1.000	

Q 8	Logarithmic decay curves for heave, pitch and roll from a software are given below for semi-submersible platform. The weight of the platform is 25000 tons; Calculate its damping and natural time periods in heave pitch and roll degrees of freedom for the following graphs.	10	CO3







Q 9	Explain about steps involved in flow check, shut in, and hang off procedure in offshore operations OR Explain about the shallow fracture gradients and shallow gas kicks: causes and prevention in deep water operations	8	CO4
SECTION-C			
Q 10	A drilling riser of diameter 1.0 is installed at water depth of 100 m is subjected to regular wave of amplitude 1.2 m with wave period of 10sec. The marine growth on the drilling riser is 100 mm, The drag and inertia coefficients are 0.6 and 2.0 respectively. The wind driven current at surface is 2.5 m/s. Calculate the horizontal wave force at 20 m below sea water level at x = 0 and t = 2.0 sec. OR A model of drilling riser is installed in a current flume of water depth 1 m, it mass plus added mass with out considering inner fluid is 0.354 kg/m. The riser filled with drilling fluid of specific gravity 1.5. The riser outer diameter is 1.4 cm and inside diameter is 1 cm, the length of the riser is 1.2 m and riser is tensioned with 5 kg mass. Find its first natural frequency, the bandwidth of reduced velocities where it under goes vibration, mass ratio, reduced damping at damping ratio 0.05. Find the velocity at which it under goes resonance.	20	CO1 and CO2 CO3
Q 11	Explain about the functions of a drilling riser and operations considered in floating well control.	20	CO4