


Name:	
Enrolment No:	

**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**End Semester Examination, April 2018**

**Course: LNG & NGL Conversion and Handling (PTEG 464)**  
**Program: B.Tech. APE Gas**  
**Time: 03 hrs.**

**Semester: VIII**  
**Max. Marks: 100**

**Instructions: Assume suitable data, if necessary.**

**SECTION A**

S. No.	Answer all questions. [5X4=20 marks]	Marks	CO
Q.1	Define LNG. Also give its composition.	4	CO1
Q.2	What are the major components of LNG liquefaction plant?	4	CO1
Q.3	Give the significance of LNG storage facilities along with their cost percentage.	4	CO2
Q.4	Explain why LNG transportation is a specialized job.	4	CO2
Q.5	What is the role of tug boats in LNG ship movement?	4	CO3

**SECTION B**

S. No.	Q.6 to 8 are compulsory. Answer any one out of Q.9 and 10. [4X10=40 marks]	Marks	CO
Q.6	Describe the operation of LNG receiving terminal with respect to traffic control and cargo transfer.	10	CO3
Q.7	Explain LNG pricing conceptualization with respect to pricing formula, straight line approach and ceiling and floor approach. Figures are necessary.	10	CO3
Q.8	Give the salient features of LNG SPA (sales purchase agreement) signed between any two countries.	10	CO3
Q.9	Describe with flow diagram, power plant with LNG cold energy utilization.	10	CO4
Q.10	Open rack vaporizer is being used for regasification of LNG entering at $-161.5^{\circ}\text{C}$ to RLNG leaving at $0^{\circ}\text{C}$ . Sea water is being used as heating medium entering at $25^{\circ}\text{C}$ and leaving at $5^{\circ}\text{C}$ . Overall heat transfer coefficient based on outer tube surface is $50000\text{ W/m}^2\text{C}$ . Calculate surface area and total number of tubes required for following tube lengths: i) $L=4\text{m}$ , ii) $L=8\text{m}$ . <b>Data:</b> Tube OD = 20 mm Type of flow = countercurrent LMTD correction factor = 1 Flow rate of sea water = $24000\text{ m}^3/\text{hr}$ Density of sea water = $1.03\text{ g/ml}$ Specific heat of sea water = $3850\text{ J/kg K}$	10	CO4

**SECTION-C**

<b>S. No.</b>	<b>Q.11 is compulsory. Answer any one out of Q.12 and 13. [2X20=40 marks]</b>	<b>Marks</b>	<b>CO</b>
<b>Q.11</b>	Describe with flow diagram, simplified cascade liquefaction process for LNG production. Also give its major advantages and areas of concern.	<b>20</b>	<b>CO1</b>
<b>Q.12</b>	Describe with flow diagram, mechanical refrigeration process for NGL recovery from natural gas.	<b>20</b>	<b>CO5</b>
<b>Q.13</b>	Describe with flow diagram, solid bed adsorption process for removal of heavy hydrocarbons from natural gas.	<b>20</b>	<b>CO5</b>