Name: **Enrolment No:**	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2018

Course: Product Lifecycle Management **Semester:** III

Program: MBA_Core (Operations & Project Mgt. Specialization)_Elective CC: LSCM 8016

Time: 03 Hrs. **Max. Marks:** 100

Instructions: Answer all parts of a question in one place. Attend all sections.

SECTION A

S. No.		**Marks**	**CO**
Q 1	Answer all questions of this section.	20	1-8
(i)	CAD/CAM stands for _____. [Fill in the blank.]	1	1
(ii)	PDM stands for: _____ _____	1	5
(iii)	What is *Collaborative Product Commerce*? [Write in one sentence]	2	1
(iv)	Design thinking has openness to all possible set of creative ideas to try with various iterations as a process of innovation. [True / False]	1	8
(v)	PLM overlaps with CRM and SCM applications. [True / False]	1	5
(vi)	ERP overlaps with CRM and SCM applications. [True / False]	1	5
(vii)	_____ is a discipline that uses the designer's sensibility and methods to match people's needs. [Fill in the blank.]	1	1
(viii)	Systems Design entails many components and subassemblies and involves several engineering disciplines. [True / False]	1	1
(ix)	Vault is the computerized data storage area of a PDM system. [True / False]	1	6
(x)	Do interoperable tools have access to use the original data? [Yes / No]	1	5
(xi)	Variant is same as version. [True / False]	1	6
(xii)	_____ is the purposive application of creativity throughout the process of innovation. [Fill in the blank.]	1	1
(xiii)	CMM is used for assessment of PLM readiness of an organization. What CMM stands for?	1	7
(xiv)	Design Information Management (DIM) depends on the degree of computerization/ digitization. [True / False]	1	6
(xv)	Which of the following is a type of innovation? a) Innovation for people	1	2

	b) Innovation for business c) Innovation for technology d) All of these.		
(xvi)	PLM readiness assessment depends on the assessment of _____ and _____. [Fill in the blanks.]	2	8
(xvii)	PLM integrates the business system with _____. [Fill in the blank by the right option.] a) people data b) product data c) process data d) All of these	1	8
(xviii)	Scope of PLM lies in the journey from idea to realization and extends beyond that. [True / False]	1	4
SECTION B			
Q 2	Answer <u>any four</u> questions in short.	20	
(i)	Write a short note on *Compliance Management*.	5	5
(ii)	Draw the PLM model with information at core.	5	6
(iii)	Explain how PLM integrates – people, product data, process, and business system.	5	2
(iv)	What are the benefits of PLM?	5	1
(v)	What is the scope of PLM in the modern business environment?	5	8
SECTION-C			
Q 3	Answers with description and/or analysis, <u>any three</u> questions	30	
(i)	What kind of business challenges PLM can resolve?	10	4
(ii)	Explain how PLM Strategy is implemented in an organization.	10	4
(iii)	Explain the concept of ‘design thinking’.	10	1
(iv)	Compare ERP and PLM in terms of their function, competition and collaboration.	10	5
(v)	What are the drivers of PLM? Explain in detailed.	10	3
SECTION-D			
Q 4	Answer the case questions with a thorough reading and analysis.	30	

CASE: ANDRITZ HYDRO [Source: https://www.plm.automation.siemens.com/pub/case-studies]

ANDRITZ HYDRO uses Teamcenter to facilitate worldwide collaboration

Sustainable power generation

One-fifth of global power is generated from renewable energy sources. Approximately 85 percent of that power is generated from hydroelectric sources, which makes hydroelectric the most important source of renewable energy. It is estimated that only about one-third of the world's potential hydroelectric power is currently used. Although numerous hydroelectric power plants are currently under construction or in the planning phase, there is still substantial potential for the future. At the same time, additional investment is required for modernization, rehabilitation and capacity improvements to existing power plants.

The ANDRITZ GROUP is a leading global supplier of plants, equipment and services for hydropower stations, the pulp and paper industry, the metalworking and steel industries, and solid/liquid separation in the municipal and industrial sectors. In addition, ANDRITZ offers technologies for certain other sectors, including automation, the production of animal feed and biomass pellets and pumps. Established in 1852, the ANDRITZ GROUP has a long tradition in manufacturing machinery and industrial plant equipment. In the hydropower sector, its business arm ANDRITZ HYDRO draws on more than 160 years of experience.

When ANDRITZ HYDRO decided it needed a product lifecycle management (PLM) solution to unify its various business areas as part of its corporate strategy, it selected Teamcenter® software from Siemens PLM Software.

"Teamcenter plays a strategic role in our success in the market as it ideally supports ANDRITZ HYDRO engineers in designing hydroelectric power plants, from water to wire, collaboratively across the globe," says Ulrich Lanz, head of application engineering services.

Building a heterogeneous engineering giant

ANDRITZ HYDRO promotes hydroelectric power as the most economical form of renewable energy. In close cooperation with customers, ANDRITZ HYDRO incorporates mature, environmentally friendly concepts. Maintaining the environment, people and technology in harmony is part of the company's corporate credo. ANDRITZ HYDRO has more than 30,000 turbines, which account for more than 400,000 megawatts (MW) of power installed globally, covering the complete range up to more than 800 MW. The company is also a leading supplier in the service and rehabilitation sector and a premier provider of compact hydro systems. Headquartered in Vienna, Austria, ANDRITZ HYDRO has about 7,800 staff working at more than 50 locations in 20 countries.

1-8

"The ANDRITZ GROUP has shown solid growth based on internal expansion and acquisitions, so ANDRITZ HYDRO is the legal successor of many pioneers and leading companies in the hydropower sector," says Lanz. "As acquisitions are typically complementary rather than more of the same, the IT (information technology) infrastructure and data management methods used in the acquired companies are as diverse as their respective business cultures."

This is even more the case for the group itself, as the activities of its divisions rarely overlap. All the same, in 2005, ANDRITZ GROUP began implementing a large-scale, unified software solution for the entire group that would not only offer engineering data management, but would also include data and processes outside engineering, thus providing a basis for PLM.

Adopting a PLM strategy

"Engineers who design paper mills and power plants use different methods when handling engineering data and documentation," says Lanz, who was hired in part due to his experience with the software used to handle acceptance issues. "PLM is not a piece of software as much as it is a corporate strategy, and a strategy such as PLM can't simply be decreed regardless of the specifics of a trade," adds Lanz.

Five years later, however, representatives from all business areas and the group information and business services department came together to review this strategy. No less than nine different engineering data management (EDM) solutions were evaluated. In the course of this process, the business areas' needs were analyzed.

"As a result, ANDRITZ GROUP decided to go with several smaller, best-fit EDM systems instead of one large PLM solution, considering the size of each business unit," says Lanz. "We recognized that implementing a unified global solution would have made the situation more complex, while at the same time causing a drop in performance."

The 10 PLM directives of ANDRITZ HYDRO

Based on ANDRITZ HYDRO's experience, using PLM, its engineers developed a set of 10 directives:

1. Establish the business drivers.
2. Determine the right collaboration level.
3. Set project development limits.
4. Get appropriate suppliers onboard.
5. Involve all applicable locations during the definition phase.
6. Define small standard packages.

7. Adhere to best practices.
8. Focus on added value/quality.
9. Continuously communicate.
10. Keep costs low and under control.

10 offices collaborate, select Teamcenter

Lanz notes that the more flexible approach chosen helps ensure that the computer-aided design (CAD) software used in the business areas is accompanied by the most suitable EDM system. While in other business units, bill of materials (BOM) handling and a thorough enterprise resource planning (ERP) integration are pivotal, design engineers at ANDRITZ HYDRO expected best-in-class support for the handling of model and drawing data created in NX™ software and other CAD systems. The company planned to implement item and BOM management later as required, and only if and when the base is stable.

In August 2010, ANDRITZ HYDRO, the biggest business area within the group in terms of revenues and employees, decided in favor of Teamcenter, a comprehensive PLM software suite. “We had learned our lessons from mistakes made in the past, so we took care to involve 10 project development offices with a total of several hundred engineers collaborating across locations,” says Lanz. “This proved essential as each location has its specifics in terms of IT infrastructure that need to be taken into account.”

These specifics range from different network and computer operating systems, regional settings and security technology, to a variety of database and application servers. Also, the degree of harmonization of an organization often looks better on paper than it is in reality. In some locations, for example, the drawing header, although basically standardized throughout the corporation, had developed distinctive dialects.

Implementing a successful global rollout

In early 2011, work began on a global implementation of Teamcenter across ANDRITZ HYDRO sites. Following the motto “width over height,” the rollout was to be comprehensive logistically, but with minimal application functionality. Only the basic features of the standard Teamcenter package were used. Company-specific, in-house modification programming was kept to a minimum. This was done to provide a common base for work as quickly as possible, while not overstraining users or support staff. The network was expanded across 10 global development locations over an 18-month period.

“Not even a thousand lines of code have been invested in Teamcenter itself,” says Lanz. “The most significant modification was an add-on module for NX for a guided attribute entry on the basis of a globally unified ANDRITZ naming catalog. The catalog is maintained in all languages using the ERP system and the associated interface to Teamcenter.”

	Similarly, an interface for material information exchange from the ERP system was implemented. This enabled ANDRITZ GROUP to create an organization-wide standard for EDM. This relieves the vast majority of design engineers from tedious search and documentation tasks and provides a common foundation on which they can base decisions required to create successful hydroelectric power plants. An important part of the global rollout was establishing a database and file server structure. “In this area, Teamcenter enables us to operate a distributed database structure, which has proven to be a significant benefit,” says Lanz. “We plan to install one database server each for Europe, North America, China and India. File servers are forseen in all regions.” The worldwide implementation of Teamcenter has been fully operational since the beginning of 2013. About 50 to 100 people are using the system at all times, and the number grows daily. The number of projects carried out collaboratively across multiple locations is also growing rapidly. Lanz notes that’s because ANDRITZ HYDRO design engineers find Teamcenter especially effective in helping to increase the quality of the company’s solutions and services and particularly impressive in terms of improving overall operations efficiency. **Case Question:** Explain how ANDRITZ HYDRO benefits from the set of 10 directives in adopting PLM practices.		