16PL402 PETROLEUM ENGINEERING EQUIPMENT DESIGN

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P
45	-	20

WA/RA	SSH/HSH	CS	SA	S	BS
15	10	-	12	3	5

Course Description and Objectives:

This course deals with the fundamental concepts of equipment and machinery design. The objective of this course is to make students aware of different equipment and machineries used in petroleum industry. Study different forces and stresses to be considered in the design process and to understand drawing related national and international standards and practices followed.

Course Outcomes:

The student will be able to:

- understand drawing related national and international standards and practices
- analyze different forces and stresses considered in the design process
- know about equipments used in petroleum industry

SKILLS:

- ✓ Methodology for designing petroleum equipments
- ✓ Engineering drawing procedure for equipments
- ✓ Design of drill bits
- ✓ Design of surface facilities
- ✓ Design of stabilization and refinery equipments

ACTIVITIES:

- *Practical design problem based on real data.*
- *Report onissues associate with petroleum production and mitigation strategy.*

UNIT - 1 **L-9**

Casing program, casing and tubing design, principles of cementing, completion added skin, well perforating and hydraulic fracturing. Drill bit design, roller cone bits, pdc drill bits. Nomenclature and iadc codes for drill bits. Bottom hole assembly, electrical submersible pumps, sucker rod pumping units design

UNIT - 2 **L-9**

Design of surface facilities- design of production and processing equipment, including deparation problems, treating, and transmission systems

UNIT - 3 **L-9**

Practical design problems based on real field data using knowledge from the areas of geology, reservoir engineering, production, drilling and well completions with all of the associated short-comings and uncertainties and use of commercial software

UNIT - 4 **L-9**

Oil desalting, horizontal and spherical electrical dehydrators, natural gas dehydration, Horton sphere, natural gas sweetening. Crude and condensate stabilization: design of stabilizer. Oil and gas treatment: Treating equipment

UNIT - 5 **L-9**

Refinery equipment design: atmospheric distillation column, design and construction of on/ off-shore pipelines, field problems in pipeline, hydrates, scaling, wax and their mitigation.

LABORATORY EXPERIMENTS

List of Experiments : Total hours : 20

1. Design and simulation of the two-phase oil- water separator.
2. Design and simulation of three-phase gas-oil-water separator.
3. Design and calculate the field Performance of Heat Exchanger.
4. Drawing and design of onshore/offshore pipeline.
5. Design and simulation of single stage flash vaporization unit.
6. Design and simulation of three stage flash vaporization unit.
7. Drawing and design of well equipments.
8. Study of multiphase flow regimes with their characteristics.
9. Drawing and design of rotary system in drilling.
10. Drawing and design of wellhead and well control system.

TEXT BOOKS:

1. Arnold K. and Stewart M., "Surface Production Operations", Vol. I and II, Gulf Publishing Company, 1986

2. Mian, M.A., "Petroleum Engineering Hand Book for Practicing Engineers" Vol. I and II, Pennwell Publications, 1992.

3. Dale Beggs, 2003, Production Optimization using Nodal Analysis. OGCI Publications. 418 pp.

REFERENCE BOOKS:

1. Economides M J and Martin Tony, 2007, Modern Fracturing: Enhancing Natural Gas Production, ET Publishing, USA. 536 pp.

2. Economides M J and K G Nolte, 1989 Reservoir Stimulation. Second Edition, Prentice Hall, 408 pp.

3. Warner H R (Editor), 2007, Emerging and Peripheral Technologies, Vol. VI, Petroleum Engineering Handbook, SPE, 629 pp