

Subject Code: 1ET4060501	Subject Title: Elements of Petroleum Production Engineering
Pre-Requisite	--

COURSE OBJECTIVE

The objective of the course is to familiarize the students with field processing of crude oil and gas, develop PI and IPR of wells, diagnose & solve well problems, design sand control, learn well servicing and stimulation techniques and finally learn about the digital oil fields.

COURSE OUTCOMES

Upon successful completion of this course, students will have the ability to :

- Design basic field processing systems of crude oil and natural gas.
- Design tests for calculating PI and IPR of wells
- Diagnose and solve production problems and to design simple gravel pack operations
- Have the basic knowledge of well servicing, digital oil fields

TEACHING AND EVALUATION SCHEME:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)			
Lecture	Tutorial	Practical	Credit	Theory		Practical	
				University Assessment	Continuous Assessment	University Assessment	Continuous assessment
3	-	2	4	60	40	20	30

COURSE DETAILS

Unit	Topics and Sub-topics	Teaching Hours	Weightage %
Unit-1	Introduction to Field Processing of Oil & Gas: Flash and stage separation of oil & gas, oil & gas, Demulsification, dehydration, stabilization and desalting of crude oil. Dehydration and desalting of gas. Special problems in oil and gas separation. Removal of suspended solid & water from oil & gas. Scrubbers and wash tank. Safety features in oil and gas separation system.	8	20
Unit-2	Production Testing: PI & IPR of artificial lift wells, production testing - back pressure test, flow after flow test & isochronal test, surface layout, test design & analysis of test data. Production characteristics of Horizontal and multilateral wells.	8	20
Unit-3	Well Production Problems, Diagnosis and mitigation: Scale formation, paraffin deposition, formation damage, water production, gas production, sand deposition, corrosion problem etc. Oil, Gas and Watering Treatment in Production	8	20

Unit-4	Sand Control: Sand control techniques, Formation Sand Size analysis, optimum gravel - sand ratio, gravel pack thickness, gravel selection, gravel packing fluid & gravel pack techniques.	4	10
Unit-5	Well Servicing & Work over: Work over system, work over rigs and selection, rig less work over including Endless/ Coiled tubing unit, minor & major work over jobs-diagnosis & remedial measures water shut off and gas shut off- Chemical treatment and conformance control. Wire-line operations, Work over & completion fluids - types & selection, Formation damage, Work over planning & economics.	8	15
Unit-6	Enhanced Oil Recovery Processes	4	10
Unit-7	Introduction to Digital oil field, Satellite oil fields	2	5
Total		42	

SUGGESTED LIST OF EXERCISES/PRACTICALS

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills (outcomes in psychomotor and affective domain) so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

Sr. No.	Name of Experiment	Contact Hrs
01	Determine surface tension of the supplied oil sample.	02
02	Determine smoke point, flash point and fire point of the supplied oil sample.	02
03	Determine aniline point, diesel index and cetane number of the supplied oil sample.	02
04	Determine cloud and pour point of the supplied oil sample.	02
05	Determine viscosity index of the supplied oil sample	02
06	Determine kinematic viscosity of the supplied oil sample	02
07	Determine water content of the supplied oil sample.	02
08	Determine initial and final boiling point, evaporation loss and condensate recovered of the supplied oil sample	02
09	Determine Reid vapor pressure of the supplied oil sample.	02

Text Books:

1. Petroleum Production Handbook : Bardly
2. Petroleum Production Handbook, Vol. 1 : T. C. Frick
3. Production Operations Vol. 1 and 2 : Allen Roberts
4. Principle of Oil well Production : T. F. W. Nind

Reference Books:

1. Production Optimization using Nodal Analysis : H. Dale Beggs
2. Petroleum Production Systems : Economides et al.
3. Production and Transport of Oil & Gas : Szilas