

COURSE STRUCTURE FOR M.TECH. SEMESTER II (Petroleum Engineering)

w.e.f. 2015-2016

Sr. No	Course Code	Course Name	Teaching Scheme					Exam Scheme					Total Marks
			L	T	P	C	Hrs/wk	Theory			Practical		
								MS	ES	IA	LW	LE/Viva	
1	MPE108T	Advanced Instrumentation and Control	2	1	0	3	3	30	60	10	--	--	100
2	MPE109T	Petroleum Production Engineering	3	0	0	3	3	30	60	10	--	--	100
3	MPE110T	Artificial Lift Techniques	3	1	0	4	4	30	60	10	--	--	100
4	MPE111T	Advance Formation Evaluation	3	1	0	4	4	30	60	10	--	--	100
5	MPE112T	Well Test Analysis	3	0	0	3	3	30	60	10	--	--	100
6	MPE113E	Elective-2 (FOET)	2	1	0	3	3	30	60	10	--	--	100
7	MPE114P	Petroleum Engineering Lab 2	0	0	2	1	2	--	--	--	25	25	50
Total			16	4	2	21	22						650

MS = Mid Semester, ES = End Semester;

IA = Internal assessment (like quiz, assignments etc)

LW = Laboratory work; LE = Laboratory Exam

Elective: - 2 (FOET Level)

Elective

1. Enhanced Oil Recovery
2. Formation Damage
3. Reservoir Modeling & Stimulation

MPE 108T: Advanced Instrumentation and Control

Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	1	0	3	3	30	60	10	--	--	100

Unit- 1 Basics of feedback control, State-space analysis, System modeling and Identification,

Unit-2 Linearization Techniques, Process Simulator Design using MATLAB, Various computer control strategies such as Cascade control, Feed forward control, Ratio Control, Adaptive Control, Pole-placement control etc.,

Unit-3 Distributed Control System (DCS) framework and SCADA, Typical Data acquisition systems,

Unit-4 Smart sensing technology such as soft sensor design, Conventional PID controllers in digital framework, Model Predictive Control

Texts and References:

- 1) Dale E. Seborg, Thomas F. Edgar, Duncan A. Mellichamp, "Process Dynamics and Control", Second Edition, John Wiley & Sons Inc., 2004
- 2) Kannan Moudglya, "Digital Control", John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, England, 2007.
- 3) Lennart Ljung, "System Identification: Theory for the user." Second Edition, Prentice Hall Inc. 1999.
- 4) Astrom K., Wittenmark B., "Computer Controlled System – Theory and Design", Prentice Hall of India: New Delhi, India, 1994
- 5) Sanjay Gupta, Joseph John, "Virtual Instrumentation Using LABVIEW", Tata McGraw-Hill Publishing Company Limited, New Delhi, 2005.
- 6) G.F. Franklin J.D Powell, 'Digital Control of Dynamic Systems", Addison Wesley Longman, Menlo Park, CA, Third Edition, 2002

MPE-109T Petroleum Production Engineering

Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	30	60	10	--	--	100

Unit - 1: Petroleum Production Engineering Fundamentals:**Hours: 10**

Introduction- Role of Production Engineer, Petroleum Production System, Oil & Gas Field Development ,Well Completion/Types of well completions,

Unit – 2: Well testing and Inflow Performance:**Hours: 15**

Production Testing & analysis, Well Performance- Inflow Performance Relationship (IPR), Construction of IPR curve using Test Point, IPR for Two phase reservoir using Vogel's equation, concept of Productivity Index, Future IPR, Various flow regimes in wellbore.

Unit – 3: Surface Production Operations(Overview):**Hours: 8**

Well head fitting & piping, Process flow diagram (PFD) for oil gas, Process control, separation of oil, gas,& water , types of separator, Separation mechanism. De- emulsifications & Desalination of crude . Indirect bath heater and Heater- treater. Produced water treatment. Storage of oil and gas, Liquefied Petroleum Gases (LPG& LNG), Transportation of oil& gas and metering systems.

Unit – 4: Production Enhancement:**Hours: 7**

Introduction, Well Analysis and Remedial Measures, Low Productivity – Stimulation, Excessive Production of unwanted fluid, Water Control, Sand Control, Production Optimization, Best practices for installation and maintenance, Economic analysis

Total Hours: 40**Texts and References:**

1. Dr. GuoBoyun, Computer Aided Petroleum Production Engineering
2. H Dale Begg,Production Optimization , OGCI Publication,tulsa.
3. Kermit Brown, Technology of artificial lift method –. Vol2a ,2b.Penwell publishing company, Tulsa.

MPE 110T: Artificial Lift Techniques

Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	1	0	4	4	30	60	10	--	--	100

UNIT -1 Introduction to Artificial lift: (8 Hrs)

Need for an artificial lift system. Basic principles and descriptions on artificial lift methods- Gas lift-continuous and intermittent, chamber lift, plunger lift/sucker rod pumping, hydraulic pumping,- Piston and Jack type, electrical submersible pumping,

UNIT-2: Principle, applications, design, monitoring and optimization of Rod Pumping System: (12 Hrs)

- Sucker Rod Pumps.
- Progressive Cavity Pumps.

UNIT-3: Principle, applications, design, monitoring and optimization of: (14 Hrs)

- Gas Lift Systems.
- Hydraulic Lift (Piston and Jet)
- Electric submersible pumping system (ESP)

UNIT-4: Optimization/Selection of lift system: (6 Hrs)

- Nodal System Analysis and its application to artificial lift optimization.
- Artificial lift selection criteria.

Total Hours 40

Texts and References:

1. Brown, Karmit (1984) The technology of artificial lift methods, Vol 1, 2, 3 and 4a & b, PPC Books publication.
2. Takacs, G (2005) Gas Lift Manual, Penn Well publication
3. Craft, B. C.; Holden, W. R and Graves, E. D (1962) Well design : drilling and production, Prentice-Hall.

MPE 111T: Advance Formation Evaluation

Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	1	0	4	4	30	60	10	--	--	100

Unit-1 Introducing to Logging, Electrical logs: Normal LOG, Inversion profile, Top & bottom gradient logs, Lateral log, Induction log, Micro normal & micro inverse log, SP log: Liquid junction & kinetic potential, Cation exchange, Caliper log, Geochemical log, Concept of porosity, Bulk density measurement.

Unit-2 Neutron porosity measurement, Response of neutral log in shale, coal, Gas bearing formation, Presentation of logs, Bore hole sonic log.

Unit-3 Basic interpretation of well log: Formation resistivity factor, Archie's equation, Determination of Archie's constant & cementation factor from well logs, Formation of water resistivity, Geological interpretation of logs, identification of shale, Coal, Limestone gas bearing, Oil bearing & water bearing zones on logs, Estimation of shale/coal volume fraction. Evaluation of lean Reservoir, Evaluation of Shaly sands, commonly used equation of shaly reservoir.

Unit-4 Cased hole logging operations: CBL – VDL, USIT, CCL-GR & controlled perforation, Production of logging: Temperature, Flow meter Density measurements, Introduction to High Tech logs: Dipmeter/FMI log, CMR log, LWD, etc., Advanced PLT measurement, SFT/MDT

Texts and References:

- 1) Formation Evaluation by Lynch E.J
- 2) Zaki Bassioni: "Theory, Measurement, and Interpretation of Well Logs" SPE Textbook Series Vol. 4, 1994.
- 3) "Log Interpretation Charts" Schlumberger, 2000 Edition
- 4) Serra, O and Serra, L: Well Logging: Vol. 1, Vol. 2 & Vol. 3

MPE 112T Well Test Analysis

Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	30	60	10	--	--	100

Unit-1: Pressure transients in reservoir. Line source solution. Principle of superposition. Transient test analysis. Pressures build up and draw-down analysis.

Unit-2: Multiple rate testing. Production testing, Injection well testing. Reservoir Limit tests. Drilling-stem test. Gas Well testing. Test equipments. Well preparation for testing. Multiple Rate testing. Pulse testing.

Unit-3: Effect of reservoir heterogeneities & Well bore conditions, Fractured reservoir applications.

Unit:4 Applications of horizontal wells. ERD & multi-laterals. MDT, Type Curves and their uses.

Texts and References:

1. Well Testing – John Lee
2. Modern Well Test Analysis - R. N. Horne
3. Pressure Build up and Flow Tests in Wells – C.S. Mathews & D.G. Russell
4. Modern Well Test Analysis – R.C. Earlougher, Jr.

MPE 113E: Elective

Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	1	0	2	3	30	60	10	--	--	100

MPE113P: Petroleum Engineering Lab 2										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	2	1	2				25	25	50

Lecture Hours: 2 per week

Experiments and Practical exposure on Advanced instrumentation and Control, Petrophysics and Logging