PE 413 Asset Management & Economics

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

Unit I **Hours: 5**

Definition of Petroleum Asset; Exploration Asset and Production Asset; Steps for the development of project

Unit II : Asset Economics **Hours: 7**

Economic feasibility of project using order of magnitude cost estimates, Asset cost estimation, and Product cost Estimation.
***Cash Flows*:** Time value of money, investment, costs, sales, profits, taxes, depreciation.
Profitability Analysis: Rate of return, payback period, Comparing investment alternatives and replacements, and application of compound interest calculations.

Unit III : Asset Management **Hours: 9**

Stages of a Project, Project Planning and Scheduling, Schematic Representation of Project Management, Pitfalls in Project Planning, Milestones and Milestone Planning, Project Organogram, Work Breakdown Structure (WBS), Hierarchical Plan, Project Network, Activity Floats, Programme Evaluation & Review Technique (PERT), Critical Path Method (CPM), Project Control, Decision Making, Project Reporting, Project Meetings, Project Failure and Success; Asset Resourcing; Asset Closure and Documentation; Joint Venture Organizations, Main Contributing Factors For Successful Projects, Management of Projects, Organization Management Functions, Project Management Team, Desirable Characteristics, Competencies of Project Manager, Duties of A Project Manager, Project Team

Unit IV : Project Execution **Hours: 7**

Project organization: Project structures, Cost monitoring, Time scheduling/monitoring of dates, P&IDs, Measurement and Control engineering, Layout and building design, Documentation, Erection, Commissioning

Total Hours: 28

Texts and References:

1. Ramaraju Thirumalai, *'Project Management in Emerging Environment of Globalization'*, Himalaya Publishing House.
2. Richard D Seba, 'Economics of Worldwide Petroleum Production', Pennwell Publication
3. Plant Design and Economics for Chemical Engineers, Max S. Peters, Klaus D. Timmerhaus, McGraw-Hill, Inc.

PE 414 Integrated Reservoir Management and Oil and Gas Field Development

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 I : Petroleum Resource Management **Hours: 8**

Concept of PRMS, History of PRMS, Deterministic Reserve and Probabilistic Resource, P90, P50 and P10 scenarios, equivalence of deterministic and probabilistic scenarios, Appraisal and Field Development plans, Field Optimization, Concept of Capex, Opex , NPV, IRR and EMV estimation.

Unit II : Field Development Studies **Hours: 12**

Conceptual field development studies, Deterministic and Probabilistic Resource estimation, Monte Carlo Simulation –P90, P50 and P10 Cases, Volumetric, Stochastic, Decline Curve analysis and Material Balance Calculations, Risking in Production Profile, Initial Field Development Plan Ingredients and considerations in Field development planning and implementation (Case Study), Differentiation in cases of oil, gas and condensate.

Unit III : Integrated Reservoir Management **Hours: 12**

Concept of Reservoir Management, Input to modeling, Concept of static and Dynamic Modeling, Structural modeling, Property modeling and Facies modeling, Simulation runs, History matching, Reservoir characterization, Mesh preparation, Gridding and Contouring, Cluster Analysis, Production Forecasting, Performance Analysis, Drive Mechanism- Solution gas drive, Gas-cap drive, Water drive, Gravity-drainage drive, Combination drive

Unit IV : Stimulation Processes for plateau maintenance **Hours: 10**

Technology providers in Hydrocarbon Industries, Development and Deployment Cycles, Matrix Acidization, Technology of Acid Pumping, Coiled Tubing Operation, Hydraulic Fracturing, Work over operation, Sand control and screening guides

Total Hours: 42

Texts and References:

1. Integrated Reservoir Asset Management, John R Franchi, Elsevier
2. Integrated Petroleum Reservoir Management, Abdus Satter, Ganesh Thakur, PennWell Books
3. www.spe.org/industry/docs/PRMS
4. Sand Control, Penberthy Jr, and Shaughnessy, SPE series on special topics Vol-1 , Henry L Doherty series.
5. Well completion and services , Dennis Perrin, Oil and Gas Field Development technique series, Technip Editions

PE 415 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 I **Hours: 8**

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, selection of suitable artificial lift methods

Unit II **Hours: 12**

Continuous gas lift system (Pressure operated valves)- Graphical and analytical methods, intermittent gas lift system; Single point injection, standard tubing installation (pressure operated valves)- Graphical and analytical methods.

Unit III **Hours: 10**

Rod Pumping system (SRP and PSP) design and related calculations, (Surface and subsurface design aspects)

Unit IV **Hours: 12**

Centrifugal electric submersible pumping system, Hydraulic pumping, piston and jet, related equipment and accessories, Monitoring of SRP and GL system.

Total Hours: 42

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.

PE 416 Workover and Stimulation

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 I : Work Over and Stimulation **Hours: 12**

Basic concept, various stimulation method, matrix acidization, Coiled Tubing, Hydraulic fracturing, Sand Control, productivity index, Jv and Jh, Jh/Jv, Mobilty Ratio

Unit II : Matrix Acidization **Hours: 10**

Formation Damage, Problems with formation damage, understanding formation damage, skin, effect on production, rock composition and mineralogy, clay types, effect on production, rock composition and mineralogy, clay types, extraneous solid entrainment, fracture proppant plugging, chemical damage, mechanism of matrix acidization, sandstone acidization, fluid selection, acid jobs, chemical reactions, surfactants, foam diversion

Unit III : Coiled Tubing **Hours: 10**

CT intervention, limitation, CTU component, Injector head, Guide Arch, stripper, BOP, CT downhole tool, operating procedure, activation by N2, CT downhole tool, CT software

Unit IV : Hydraulic Fracturing **Hours: 10**

Fracturing Fluid, Proppants, candidate selections and fracturing, Fracture design, insitu stress, frac geometry, frac treatment design, Sand Ingression, reasons for sand entry into wellbore, Control technique-mechanical and chemical techniques, Gravel Pack, N2 purging, acid fracturing, frac fluids and environment problems.

Total Hours: 42

Texts and References:

1. Allen, T. O and Roberts, A (1993) Production operations: Well completion, Workover and stimulation, Oil & Gas Consultants International, Inc
2. Economides, Michael J.; A. Daniel Hill, Christine Ehlig-Economides, Ding Zhu (2012) Petroleum Production system, Prentice Hall
3. Economides, Michael J (2000) Reservoir Stimulation, John Willey

PE 420 Reservoir Modelling and Simulation

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 I : Reservoir Modeling **Hours: 12**

Introduction to Modeling – Geological Modeling, Types of Model & designing of various models depending on reservoir complexities, rock properties, fluid properties etc., Concept of Black Model and Compositional Model

Unit II : Reservoir Simulation **Hours: 10**

Introduction, Historical Background, Application of Simulator, Different models, Flow Conditions: Single phase, two phase & multiphase equations for one two & three dimensional models
Special Concept: Explicit & implicit grid system, Finite difference & finite element method
Matrix solution, iterative method, stability criteria

Unit III : Data Preparation **Hours: 10**

Pesudo functions, Reservoir Model Solution Techniques: Implicit pressure and Explicit Saturation (IMPES); Implicit pressure & Implicit Saturation (IMPIS) , Preview of Numerical Solution Methods:
Direct & Iterative method

Unit IV : History Matching **Hours: 10**

Mechanics and Parameter match Special Concepts: Coning and Compositional Models Simulation
Optimization using Economic and Techno economic Evaluation Computation of Economic Indices viz. different variants based on technical and economic considerations Introduction to streamline simulation and comparison of conventional / streamline simulation

Total Hours: 42

Texts and References:

1. Crichlow, H. B. (1977) Modern Reservoir Engineering, A Simulation Approach, Prentice-Hall.
2. Franchi, J R. (2006) Principles of Applied reservoir Simulation, 3rd Edition. Gulf Professional Publication.
3. Aziz, K and Sattari, A (1979) Petroleum reservoir simulation, Applied Science Publishers
4. Peaceman, D. W. (1977) Fundamentals of numerical reservoir simulation, Elsevier Publication.

PE 417 Industrial Training and Viva -Voce							
Teaching Scheme					**Examination Scheme**		
L	**T**	**P**	**C**	**Hrs/Week**	**Report writing**	**V/V**	**Total**
0	**3**	**6**	**6**	**9**	**80**	**20**	**100**

Aim: To get exposure on day- to-day activities of various segments of hydrocarbon industries.

PE 418 Pre-project Dissertation and Seminar							
Teaching Scheme					**Examination Scheme**		
L	**T**	**P**	**C**	**Hrs/Week**	**Report writing**	**V/V**	**Total**
0	**0**	**6**	**3**	**6**	**80**	**20**	**100**

Aim: To address specific industry and research related problems.

Unit 1: Problem Identification

Unit 2: Literature survey and Methodology

Unit 3: Framing of Experimentation set up and Preliminary data collection

Unit 4: Future Deliverables & Expected Outcome

Text Books & **Recommended Software**:

1. Kothari, C. R. (2008) Research Methodology: Methods and techniques,
2. Murray, R (2002) How to write a thesis, McGrawal Hill Publication
3. Recent ENDNOTE Software for referencing
4. JABREF for Referencing.