

**COURSE STRUCTURE OF M.TECH PETROLEUM ENGINEERING
FROM I TO IV SEMESTER TO BE EFFECTIVE FROM 2005-06 SESSION**

**COURSE STRUCTURE OF I SEMESTER M. TECH COMMON
(Effective from 2005 – 06 session)**

Sl. No.	Course No.	Name of the course	L	T	P	Credit Hrs.
1.	PEC51101	Well Test Analysis	3	1	0	7
2.	AMC51151	Advanced numerical Methods and Applied Statistics	4	0	0	8
3.		Optional – 1	3	1	0	7
4.		Optional – 2	3	1	0	7
5.		Optional – 3	3	1	0	7
6.		Optional – 4	3	1	0	7
7.	PEC51301	Environment Technology in the Oil Industry	3	0	0	6
8.	AMC51201	Advanced Numerical Methods and Applied Statistics Practicals	0	0	2	2
		Total	22	5	2	51

OPTIONAL PAPERS

SET – A: OPTIONAL PAPERS FOR NON-PE GRADUATES

	PEE51101	Oil & Gas well Drilling Engineering	3	1	0	7
	PEE51102	Petroleum Production Engineering	3	1	0	7
	PEE51103	Petroleum Reservoir Engineering	3	1	0	7
	GLF51151 GPF51151	Sec.A: Introduction to Petroleum Geology Sec.B: Introduction to Petroleum Geophysics	2 1	0 1	0	7

SET – B: OPTIONAL PAPERS FOR PE GRADUATES

	PEE51104	Horizontal Well Technology	3	1	0	7
	PEE51105	Transportation & Marketing of Petroleum & Petroleum Products	3	1	0	7
	PEE51106	Process Equipment Design	3	1	0	7
	PEE51107	Petrochemical Engg.	3	1	0	7

COURSE STRUCTURE OF II SEMESTER M. TECH COMMON
(Effective from 2005 – 06 session)

Sl. No.	Course No.	Name of the course	L	T	P	Credit Hrs.
1.	PEC52101	Workover & Stimulation	3	1	0	7
2.	PEC52102	Enhanced Oil Recovery Techniques	3	1	0	7
3.	PEC52103	Artificial Lift Techniques	3	1	0	7
4.	PEC52104	Advanced Petroleum Formation Evaluation	3	1	0	7
5.		Optional – 1	3	1	0	7
6.		Optional – 2	3	1	0	7
7.	PEC52201	Petroleum Engineering Practicals	0	0	2	2
8.	PEC52601	Excursion	0	0	0	4
		Total	18	6	2	48

OPTIONAL PAPERS (any two of the following)

1.	PEE52101	Offshore Oil & Gas Technology	3	1	0	7
2.	PEE52102	Advanced Natural Gas Engineering	3	1	0	7
6.	PEE52103	Deep Water Technology	3	1	0	7
7.	PEE52104	CBM & Gas Hydrates Technology	3	1	0	7
8.	PEE52105	Advanced Petroleum Reservoir Simulation	3	1	0	7
9.	PEE52106	Transport Phenomena	3	1	0	7
10.	PEE52107	Oil & Gas Processing Plant Design	3	1	0	7

COURSE STRUCTURE OF III SEMESTER M. TECH COMMON
(Effective from 2006 – 07 session)

Sl. No.	Course No.	Name of the course	L	T	P	Credit Hrs.
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1.	PEC53901	Industrial Training/ Minor Project	0	0	0	4
2.	PEC53401	Seminar and Viva on Industrial Training	0	0	0	2
3.	PEC53501	Comprehensive Viva Voce	0	0	0	4
4.	PEC53801	Dissertation (Interim)	0	0	0	15
5.	PEC53402	Seminar and Viva Voce on Dissertation	0	0	0	10
6.	PEC53001	Teaching assignment Evaluation/ Laboratory Development work etc.	0	0	0	5
		Total				40

**COURSE STRUCTURE OF IV SEMESTER M. TECH COMMON
(Effective from 2006 – 07 session)**

Sl. No.	Course No.	Name of the course	L	T	P	Credit Hrs.
1.	PEC54801	Dissertation	0	0	0	20
2.	PEC54401	Seminar on Dissertation	0	0	0	5
3.	PEC54501	Viva- Voce on Dissertation	0	0	0	10
4.	PEC54001	Evaluation of teaching assignment/ Laboratory Development work etc.	0	0	0	5
		Total				40

SYLLABUS/ COURSE CONTENT OF
I SEMESTER M.TECH PE

COURSE NO.	COURSE NAME	L	T	P
PEC51101	WELL TEST ANALYSIS	3	1	0

COURSE CONTENT :

Pressure transients in reservoir. Line source solution. Principle of superposition.
 Transient test analysis. Pressure build up and draw-down analysis.
 Multiple rate testing. Production testing, Injection well testing.
 Drilling-stem test. Test equipment, Well preparation for testing, Multiple well testing.
 Effect of reservoir heterogeneities & Well bore conditions. Fractured reservoir application.
 Applications of horizontal wells, ERD & multi-laterals.

COURSE NO.	COURSE NAME	L	T	P
AMC51151	ADVANCED NUMERICAL METHODS AND APPLIED STATISTICS	3	1	0

COURSE CONTENT :

Section A : Advanced Numerical Methods:

Review of solution of system of linear simultaneous equation. Solution of tridiagonal system, Ill conditioned system and iterative method to improve accuracy of an ill conditioned system. Evaluation of double and triple integrals by numerical method and its application, solution of non-linear simultaneous equations numerical solution of integral equations, Advanced method of interpolation, Spline interpolation, Numerical solution of simultaneous first order ordinary differential equations and higher order O.D.E. Initial and Boundary value problems, Numerical solution of partial differential equations: Laplace and Poisson equation, Heat conduction and wave equations, Writing computer programs of the above methods in F-77.

Section-B : Applied Statistics

Review of binomial, negative binomial, Poisson, normal and log normal distributions. Tests of significance for mean, variance, correlation and regression coefficients. χ^2 –test for goodness of fit, attributes and contingency table, F-test, test of proportions, tests of significance under large sample approximations.

Non-parametric tests : Wald-Wolfowitz run test, test of randomness, median test, sign test, Mann-Whitney Wilcoxon U-test.

Time series analysis, introduction to reliability and life testing experiments in engineering problems.

One way & two way analysis of variance, Completely Randomized Design (CRD), Randomized Block Design (RBD), Latin Square Design (LSD).

COURSE NO.	COURSE NAME	L	T	P
PEE51101	OIL & GAS WELL DRILLING ENGINEERING	3	1	0

COURSE CONTENT:

Well planning: Drilling planning approaches.
 Rotary Drilling Method: Rig parts, selection and general layout.
 Rig Building Operations: Rigging up & rigging down
 Drilling Operations & Practices: Hoisting, circulation, Rotation, power plants and Power transmission.
 Drilling Fluids: types, function & properties, Rotary drilling hydraulics, Mud pumps
 Cementing: Methods: Primary cementing, Stage cementing, cement plugging and squeeze cementing operations, cementing tools & techniques
 Wire Lines: Classification, service life evaluation, precautions in handling and storage.
 Drill Bits: Classification and design criteria of drag, rotary, roller, diamond and PDC bits.
 Drill String & Casing String: Parts, function and design.
 Coring: Different methods of core drilling.
 Drilling Problems, their control & Remedies: Pipe Sticking, Sloughing Shales, Lost Circulation, Blow Outs.
 Oil Well Fishing: Fish classification, tools and techniques.
 Fundamental of directional drilling: directional drilling profiles, deflection tools, correctional of deflected well path, down hole surveying, down hole motors, MWD.
 Drilling Economics.

COURSE NO.	COURSE NAME	L	T	P
PEE51102	PETROLEUM PRODUCTION ENGINEERING 3	3	1	0

COURSE CONTENT:

1. Well equipment : Well head assembly, Christmas tree, valves, hangers, flow control devices, packers, tubular and flow lines, safety & control systems.
2. Well completion : Systems, types and applications.
3. Well perforation & Well activation
4. Processing in oil fields : GGS/CTF - layout, sequential treatment, separation, storage and transportation of petroleum. Demulsification & desalting.
5. Introduction to well servicing and stimulation system - objectives and applications.
6. Inflow performance relations and its application.
7. Introduction to artificial lift methods.

COURSE NO.	COURSE NAME	L	T	P
PEE51103	PETROLEUM RESERVOIR ENGINEERING	3	1	0

COURSE CONTENT :

Characteristics of crude oil and natural gas, classification of crude and its physico-chemical properties.
 Introduction to oil & gas field development.
 Petrophysical properties of reservoir rocks: porosity, permeability, fluid saturation. Fluid flow through porous media.
 Reservoir fluid properties. Reservoir fluid sampling and PVT studies.
 Material Balance, Reservoir energies & drives - Water influx; Gas, condensate and oil reservoirs. Thermodynamics of fluid system – Phase behavior of single & multiphase systems, Decline curve analysis.
 Well performance: productivity index, IPR. Water and gas coning.
 Applications of horizontal wells, ERD & multi-laterals.

COURSE NO.	COURSE NAME	L	T	P
GLF51151	INTRODUCTION TO PETROLEUM GEOLOGY	2	0	0

COURSE CONTENT :

1. Branches of Geology, different types of source and reservoir rocks for hydrocarbon resources, their properties.
2. Formation, Migration and accumulation of hydrocarbons.
3. Hydrocarbon traps: structural, stratigraphic and combination traps.
4. Fundamentals of petrophysical properties of rocks.

COURSE NO.	COURSE NAME	L	T	P
GPF51151	INTRODUCTION TO PETROLEUM GEOPHYSICS	1	1	0

COURSE CONTENT :

1. **Basic concepts of magnetic survey :** The geomagnetic field. Magnetic anomalies. Magnetic surveying instruments. Ground magnetic surveys. Reduction of magnetic data. Diurnal correction and geomagnetic correction. Elevation and terrain corrections. Interpretation of magnetic anomaly.
2. **Basic theory of gravity method :** Units of gravity. Gravity measuring instruments. Gravity anomalies. Gravity surveying. Gravity data reduction Drift, latitude, Elevation, Tidal, Free-air and Eotvos correction. Free air & Bouguer anomalies. Rock densities. Gravity response of simple shapes. Interpretation of gravity anomalies.

3. **Basic aspects of seismic methods** : Seismic refraction surveys. Geometry of refracted path; planar interface. Two layer case with horizontal interface. Methodology of refraction profiling. Field surveys arrangements. Recording instruments & energy source. Corrections applied to refraction data.
4. **Geometry of reflected ray path** : Single horizontal reflector. Multiple horizontal reflector, Dipping reflector. Ray paths of multiple reflectors. Multi channel reflection profiling. The reflection seismograph and reflection seismogram (Seismic trace). Survey design. Positioning & Navigation, Air guns and water guns, Vibroseis energy source. Common depth point (CDP) profiling & stacking. Time corrections applied to seismic data. Data processing. Interpretation of reflection data.

COURSE NO.	COURSE NAME	L	T	P
PEE51104	HORIZONTAL WELL TECHNOLOGY	3	1	0

COURSE CONTENT :

Introduction & objectives of horizontal wells, ERD, Laterals etc. . Geological aspects, & development of oil & gas field using horizontal wells. Drilling & completion of horizontal wells. Reservoir engineering concepts of horizontal wells. Well logging methods in horizontal wells. Well test analysis of horizontal wells. Well performance & productivity of horizontal Wells. Water & Gas coning in horizontal wells. Application of horizontal wells in gas reservoirs & in recovery of heavy oils.

COURSE NO.	COURSE NAME	L	T	P
PEE51105	TRANSPORTATION & MARKETING OF PETROLEUM & PETROLEUM PRODUCTS	3	1	0

COURSE CONTENT :

1. Transportation of petroleum & petroleum products.
2. Basics of pipeline construction, operation and protection.
3. Pump and compressor stations. Instrumentation and control.
4. Metering and measurements of oil and gas.
5. Traffic management, Fire and safety rules.
6. Indian and Global supply scenario of petroleum and petroleum products. Product quality control. Bulk distribution and handling-domestic, commercial and industrial.
7. Storage of petroleum products in fixed installations. Standards and regulations.
8. Petroleum Economics
9. Role of International oil companies and OPEC pricing mechanism. Administered and market determined pricing mechanism in India. Spot and other market control mechanism.
10. Conservation of petroleum & its products.

COURSE NO.	COURSE NAME	L T P
PEE51106	PROCESS EQUIPMENT DESIGN	3 1 0

COURSE CONTENT :

1. Distillation :
Equilibrium (flash) calculations
Principles and design of continuous binary distillation
Design of multi-component distillation system
Tray-by-Tray calculation
2. Absorption :
NGL production by lean oil absorption
Glycol dehydration
Absorber operation, absorption & stripping
Tray-by-tray calculations
Column size calculation
3. Adsorptive Dehydration & Sweetening :
Basic system, nature of adsorption, process variables. Adsorber sizing calculation.
Regeneration cycle regeneration and cooling calculation. Hydrocarbon recovery,
liquid dehydration, gas & liquid sweetening.
4. Heat exchanger design:
Heat balance, tube and shell type exchanger, plate exchangers, special
exchangers, Indirect/direct fired heaters, chart, choice of heat exchangers.
5. Refrigeration systems :
Refrigerants types & characteristics. Ammonia adsorption compression
refrigeration, expansion turbine refrigeration value expansion refrigeration,
pressure drop across a valve, application of refrigeration.

COURSE NO.	COURSE NAME	L T P
PEE51107	PETROCHEMICAL ENGINEERING	3 1 0

COURSE CONTENT:

Introduction: Survey of petrochemical industry-Indian and global scenario; Raw Materials: Availability of different feed stocks; Production, purification and separation of feed stocks

Basic Processes for Petrochemicals: Steam reforming (process technology, reactions, catalysts & importance), production and utilization of synthesis gas, Chemicals from reforming products: oxo reactions (alcohol production route), Fischer-Tropsch synthesis (coal to H/C). Naphtha cracking and its products; Chemicals from C1, C2, C3, C4 and higher carbon compounds; Polymers – properties, production and utilization
Catalytic reforming of naphtha and isolation of aromatics (BTX); Chemicals from aromatics.

Productions of synthetic fibers, detergents, rubbers and plastics; Petroleum coke and carbon black

Elements of design of steam reformer, naphtha cracker, catalytic reformer.

Design aspects of Petrochemical Plants like PE, PP, PBR.

COURSE NO.	COURSE NAME	L T P
PEC51301	ENVIRONMENTAL TECHNOLOGY IN THE OIL INDUSTRY	3 0 0

COURSE CONTENT:

A: Introduction to Environmental Control in the Petroleum Industry.

B: Environmental Control Technology in Petroleum Drilling and Production

Methodology of oil field ECT design.

Control of drilling fluids volume and toxicity

Produced water cleaning – source separation technology

Integrity of petroleum wells: Contaminant technology

Subsurface reduction of produced water (In-situ drainage disposal technique)

Environmental aspect in offshore operations

Oil field pit closure technology

Tanker design from an environmental perspective

Environmental aspect in pipeline technology

Environmental Management technology in oil refineries

Long term environmental concerns for oil industry

Waste treatment and disposal methods.

C: Planning Environmental Protection.

Environmental Audits

Remediation of contaminated sites

Environmental Regulations.

COURSE NO.	COURSE NAME	L T P
AMC51201	ADVANCED NUMERICAL METHODS AND APPLIED STATISTICS PRACTICALS	0 0 2

COURSE CONTENT:

Advance Numerical Methods :

Solution of tridiagonal system, solution of simultaneous non-linear equations by iteration and Newton Raphson methods. Solution of simultaneous first order O.D.E. higher order O.D.E. by Range-Kutta and Miline's Solution of wave equations.

Applied Statistics :

Practical based on tests of significance for one & two populations case, practical based on non-parametric tests, practical based on time series, practical based on reliability & life-testing experiments, practical based on CRD, RBD & LSD.

SYLLABUS/ COURSE CONTENT OF
II SEMESTER M.TECH PE

COURSE NO.	COURSE NAME	L T P
PEC52101	WORKOVER AND STIMULATION	3 1 0

COURSE CONTENT :

Work-over operations. Work over fluids. Scraping, well circulation, Water and gas Shut-off, Squeeze cementing. Handling water and gas coning.

Production packers, Packers calculation, Well activation. Repair of wells, Paraffin and scale removal. Planning and evaluation of workover jobs. Corrosion, Bacteria & Scale control.

Well treatment; acidizing oil & gas wells. Hydro-perforation. Hydraulic fracturing. Stimulation designing, Proppants and their placement. Thermal stimulation techniques. Down-hole heaters. Horizontal well related development on the subject.

Sand-control, Screens, Gravel packs.

COURSE NO.	COURSE NAME	L T P
PEC52102	ENHANCED OIL RECOVERY TECHNIQUES	3 1 0

COURSE CONTENT :

Flow of immiscible fluids through porous media. Reservoir Geophysics and Fracture mapping, continuity equation, equation of motion, solution methods Water flooding, Fractional flow equation, Frontal advance theory. Concept of pattern flooding, recovery efficiency, permeability heterogeneity. Polymer flooding.

Flow of miscible fluids. Theory of Hydrodynamic dispersion: Parameters, governing equation and boundary conditions. Conditions of miscibility, Miscible displacement processes; Carbon dioxide flooding. Surfactant flooding. Mobilization of residual oil. Adsorption on solid and liquid interface, micelles and micro-emulsion, Micellar flooding, Microbial EOR.

Heat and mass transfer in porous media in thermal methods. Theory of models and analogs.

COURSE NO.	COURSE NAME	L T P
PETC52103	ARTIFICIAL LIFT TECHNIQUES	3 1 0

COURSE CONTENT :

Inflow performance, Multi-phase flows in pipes, Horizontal & vertical. Flowing well, Bean performance, Nodal analysis.

Bean pumping, Gas lift, Electrical submersible pumping, hydraulic pumping, Jet pumping, Plunger lift, Chamber lift etc.
 Well installation, maintenance and trouble shooting in artificial lift method.
 Selection procedure, planning, design; and analysis of artificial lift system.

COURSE NO.	COURSE NAME	L	T	P
PEE52103	ADVANCED PETROLEUM FORMATION VALUATION	3	1	0

COURSE CONTENT :

A Introduction to Formation Evaluation

Direct Methods: Coring & Core Analysis, mud logging .
 Wire-line Logging Devices: Electrical, Radioactive, Acoustic Logging devices.

B. Case Hole Log Analysis Monitoring.

Objectives of Case Hole Logging Environment
 CBL/VDL and Casing Inspection Logs.
 Perforating.

C. Production Logging & Reservoir Performance Monitoring

Flow Velocity Tools.
 Fluid Density Measurements.
 Pressure Measurements & Temperature Measurement Techniques

D Recent Development

FloView Measurements
 Modular Formation Dynamics Tester.
 Water Flow log services.
 Formation Subsidence Monitor Tool.
 Digital Entry Fluid Imaging Tools
 Ultrasonic Imaging Tools

E Interpretation Methods

Standard Log Interpretation Methods.
 MID Plot Method
 Crossplotting Methods.

COURSE NO.	COURSE NAME	L	T	P
PEE52101	OFFSHORE OIL & GAS TECHNOLOGY	3	1	0

COURSE CONTENT :

Wave forms and characteristics. Interaction with offshore structural elements.
 Environmental prediction and loading. Offshore structure. Fixed, mobile and floating.
 Fixed platform, Steel and concrete gravity structures. Interaction with floating vessels.

Mooring systems and design. Positioning and reentry system. Well completion- platform & subsea. Workover operations. Fluid gathering, processing, storage and dispatch.

COURSE NO.	COURSE NAME	L T P
PEE52102	ADVANCED NATURAL GAS ENGINEERING	3 1 0

COURSE CONTENT :

Natural gas industry in India and Abroad
 Natural gas reservoir, gas condensate reservoir
 Properties of Natural gas.
 Fundamentals of gas flow in conduits
 Gas flow measurement
 Gas flow in well-bores
 Pressure transient testing of gas wells
 Decline curve analysis for gas wells.
 Gas volumes and materials balance calculation.
 Natural gas processing, transportation & storage
 Utilization & conservation of natural gas

COURSE NO.	COURSE NAME	L T P
PEE52103	DEEP WATER TECHNOLOGY	3 1 0

COURSE CONTENT :

1. **Introduction :**
 Definition, Global Deepwater reserves & development activity. Technological advances.
2. **Dynamics of Offshore Structure :**
 Analysis of Waves and fluid induced forces on offshore structures, Current and wind forces, soil mechanics of seabed & structures.
3. **Deepwater Exploration & Drilling :**
 Seismic/Seabed Survey, constraints in Deepwater survey like geohazards, gas hydrate etc., Deepwater Drilling with emphasis on the additional inputs to normal offshore Drilling operation.
4. **Deepwater Production System :**
 Fixed Platforms, Compliant Towers, Subsea systems, Extended Reach Wells, Floating Production Systems like FPSOs, FPSSs, TLPs, Spar Platform and FSOs.
5. **Deepwater applications of Subsea Technology :**
 Subsea completion, X-mas tree, control systems, Manifolds, Templates, ROVs, Deepwater installation vessels with DP system and associated problems.
6. **Deepwater Pipelines & Umbilicals :**

Issues in Deepwater Pipeline Design, Rigid and Flexible flowlines, Pipe-in-pipe, Deepwater Risers and their configurations, Pipeline installation methods, Umbilicals – functions, configurations and installation, Flow assurance strategies.

7. Emerging Deepwater Technologies :

Autonomous Underwater Vehicles (AUVs) Seismic-while-drilling, Dual-activity-drilling, Innovative Floating Production Concepts, Subsea processing, subsea separation (VASPS, SUBSIS, Twister) and any new innovations.

COURSE NO.	COURSE NAME	L	T	P
PEE52104	CBM & GAS HYDRATES TECHNOLOGY	3	1	0

COURSE CONTENT:

A: COAL BED METHANE:

Introduction & present status of coal bed methane. Formation and properties of coal bed methane. Thermodynamics of coal bed methane. Drilling and completion and logging of coal bed methane wells. Hydro-fracturing of coal bed methane seam. Production installation and surface facilities. Well operation and production equipment. Treating and disposing produced water. Testing of coal bed methane wells.

B: NATURAL GAS HYDRATES:

Introduction & present status of gas hydrates. Formation and properties of gas hydrates. Thermodynamics of gas hydrates. Phase behavior of gas hydrates. Kinetics of gas hydrates. Drilling and completion of gas hydrate wells. Prevention & control of gas hydrates. Gas hydrates accumulation in porous medium. Gas extraction from gas hydrates. Uses and application of gas hydrates.

COURSE NO.	COURSE NAME	L	T	P
PEE52105	ADVANCED PETROLEUM RESERVOIR SIMULATION	3	1	0

COURSE CONTENT

An Overview of Reservoir Simulation, Rock and fluid properties

Model Equation formation: Reservoir flow equations: Single phase, two phase and multiphase systems with non-compressible & compressible fluid in different dimensions. Development of compositional flow model. Importance of Compositional Reservoir Simulation (Step-by-step reservoir simulation procedure, The difference between Compositional and Black-oil simulation)

Identifying the study objectives, Choice between the compositional and Black-oil approach.

Solution techniques: Numerical methods of solution with their merits and limitations

Preparation of input data, Data assessment and checking, Pseudo functions, Local grid refinement, History matching

Predicting reservoir performance & Development planning with a simulator

COURSE NO.	COURSE NAME	L T P
PEE52106	TRANSPORT PHENOMENA	3 1 0

COURSE CONTENT:

Vectors and tensors

Viscosity and mechanism of momentum transfer: Viscosities of gases and liquids, Velocity distribution in laminar flow

Equation of change for isothermal system: Continuity, Motion: Navier Stokes equation, Mechanical energy (mass, momentum and energy balance)

Dimensional analysis of equation of changes

Laminar viscous flow: Boundary layer flow, creeping flow, velocity distribution

Velocity distribution in turbulent flow: Interphase transport in isothermal systems

Mechanism of energy transport: Temperature distributions in solids and in laminar flow, Equation of change for non-isothermal systems, Temperature distribution in turbulent flow, Interphase transport in non-isothermal systems

Mechanism of mass transport: Equations of change for Multicomponent systems

COURSE NO.	COURSE NAME	L T P
PEE52107	OIL & GAS PROCESSING PLANT DESIGN	3 1 0

COURSE CONTENT :

1. Oil desalting: Operation, variables, Heater treater design.

2. Crude & Condensate Stabilization : LTX Stabilization.

3. Oil & Gas Treatment : Oil desalter, emulsion treatment theory and practice, Emulsifiers & Demulsifiers, Gravity Separation, coalescence, coalescing media, electrostatic coalescers.

4. Treating Equipment : pressure vessels - Vertical, horizontal, Electrostatic. Process heat duty, Sensible heat of natural gas, Water, Heat transfer from fire-tube. Heat exchangers-types, fluid placement, sizing, number of tubes.

5. Natural Gas Dehydration : (a) Glycol Process : operation, effect of variables, dew point depression, stage calculation.

NTU - graphical and analytical methods, Absorber sizing. Lean oil absorption. (b) Solid-bed process : design & operation, effect of process variables, Regeneration and cooling calculations. Hydrocarbon recovery. (c) Hydrate formation & inhibition.

6. Natural Gas Sweetening : Acid gases, Toxicity, Pipeline specification. Solid-bed Process : Design, operation & effect of variables. Adsorbent selection. Multistage Separation, Hengstebach's Flash calculation, stabilizer design. Amine and other absorptive process details.

COURSE NO.	COURSE NAME	L T P
PEC52201	PETROLEUM ENGINEERING PRACTICALS	3 1 0

COURSE CONTENT:

Practicals related to the design & selection of drilling fluids, Petro-physical properties of rocks, Well testing, formation evaluation and testing of Petroleum products.

M.TECH PE COURSE
HIGHLIGHTS OF SYLLABUS REVISION

S.NO.	Papers in Old syllabus	Change in New syllabus	Remarks
I SEM. M.TECH PE			
1	PET 2101 Production Engg	Split in to two optional papers on Oil & gas well drilling engg. & Petroleum Production Engg.	Syllabii of both papers are modified
2	PET 2102 Reservoir Engg	Continue as optional paper for non-PE graduates	Syllabus modified
3	PET 2103 Mechanical System Design	Paper is dropped and in-place, three new elective papers are included for PE graduates.	
4	PET 2104 Process Equipment Design	Continue as optional paper for PE graduates	Syllabus modified
5	PET 2105 Transport Phenomena	Continue in II sem. As elective paper.	Syllabus modified
6	MAT 2159 Engineering Mathematics	Two new compulsory papers on Advanced numerical Methods and Applied Statistics (Theory & Practicals) are included	New syllabus
7	PET 2106 Well Test Analysis	Continue as compulsory paper in I sem	Syllabus modified
8	PET 2107(s) Environmental Management in Petroleum Operations	A new sessional paper on Environment Technology in the Oil Industry is included	New syllabus
9	PET 2108(s) Seminar	Dropped	
10	PET 2109(s) Dissertation	Dropped	
11	PET 2110(s) Project on Working Model	Dropped	
12		Additional New Optional	New Syllabii

		papers for Non-PE graduates Sec.A: Introduction to Petroleum Geology Sec.B: Geophysical Exploration.	
13		Additional New optional papers for PE graduates i. Horizontal Well Technology ii. Transportation & Marketing of Petroleum & Petroleum Products iii. Petrochemical Engg.	New syllabi
II Sem M.Tech PE			
1	PET 2201	EOR Techniques	Continue as compulsory paper Syllabus modified
2	PET 2202	Work Over and Stimulation	Continue as compulsory paper Syllabus modified
3	PET 2203	Artificial Lift Techniques	Continue as compulsory paper Syllabus modified
4	PET 2204	Offshore Drilling and Production Technology	An paper on Offshore Oil & Gas Technology is included as elective New syllabus
5	PET 2205	Natural Gas Engineering	An elective paper on Advanced Natural Gas Engg. Is included as elective New syllabus
6	MAT 2257	Numerical Methods in Engineering	Paper is dropped as already one compulsory paper is included in I sem.
7	PET 2206(s)	Dissertation	Dropped
8	PET 2207(s)	Project on Working Model	Dropped
9	.		More elective papers in II Sem i. Deep Water Technology ii. CBM & Gas Hydrates Technology iii. Advanced Petroleum Reservoir Simulation iv. Oil & Gas Processing Plant Design All contain newly designed updated syllabus.
10			New Sessional paper on Excursion