



PARUL UNIVERSITY - FACULTY OF SCIENCES

DEPARTMENT OF PETROLEUM ENGINEERING

PROPOSED SYLLABUS FOR 2nd SEMESTER M.Sc. PROGRAMME

Elements of Reservoir Engineering

(SUBJECT CODE: 11215151)

Type of Course: Master of Science (Petroleum Technology)

Teaching and Examination Scheme:

Teaching Scheme (h/week)				Examination Scheme							
				Internal Marks			External Marks		Passing Marks (Theory + CE)	Passing Marks (Practical)	Total Marks
Lect	Lab	Tut	Credit	T	P	CE	T	P	Int. + Ext.	Int. + Ext.	
3	2	0	4	20	20	20	60	30	50	25	150

Lect -Lecture; **Tut**- Tutorial; **Lab**-Laboratory; **T**- Theory; **P**-Practical;

Content:

Sr. No.	Topic	Weight age in %	Teaching Hrs.
1.	Introduction of Reservoir Engineering :- Reservoir Rock properties Porosity and permeability determination, combination of permeability in parallel & series beds, porosity permeability relationship, fluid saturation determination and significance, effective and relative permeability, wettability, capillary pressure characteristics, measurements and uses. Coring and Core Analysis.	25	15
2.	Reservoir fluid properties Phase behavior of hydrocarbon system, ideal & non ideal system, equilibrium ratios, reservoir fluid sampling, PVT properties determination, different correlations and laboratory measurements.	25	15
3.	flow of fluids through porous media Darcy's law, single and multiphase flow, linear, radial & spherical flow, steady state & unsteady state flow considering compressible, slightly	25	15



Sr. No.	Topic	Weight age in %	Teaching Hrs.
	compressible and incompressible fluid, Diffusivity equation and its application for reservoir flow system.		
4.	Reservoir Drives and Reserve estimation: Rock an liquid expansion, Depletion drive mechanism, Gas cap drive, Water drive mechanism, Gravity drainage drive mechanism, Combination drive mechanism and recovery factors. resource & reserve concept, Different reserve estimation techniques: Volumetric, MBE, decline curve analysis;, latest SPE/ WPC/ IS classification,	25	15

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DEPARTMENT OF PETROLEUM ENGINEERING

PROPOSED SYLLABUS FOR 2nd SEMESTER M.Sc. PROGRAMME

Formation evaluation - 1

(SUBJECT CODE: 11215152)

Type of Course: Master of Science (Petroleum Technology)

Teaching and Examination Scheme:

Teaching Scheme (h/week)				Examination Scheme							
				Internal Marks			External Marks		Passing Marks (Theory + CE)	Passing Marks (Practical)	Total Marks
Lect	Lab	Tut	Credit	T	P	CE	T	P	Int. + Ext.	Int. + Ext.	
3	0	0	3	20	-	20	60	-	50	-	100

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Content:

Sr. No.	Topic	Weight age in %	Teaching Hrs.
1.	Introduction to formation evaluation	25	15



Sr. No.	Topic	Weight age in %	Teaching Hrs.
	basic concepts of logging, mud resistivity, function of mud type, function of temperature, downhole temperature filtrate invasion, measurement of Rmf and Rmc, resistivity profiles, diameter of the invaded Zone, surface logging systems		
2.	Mud logging and coring basic concepts: mud logging, hydrocarbon staining on the cuttings, lithology and texture of cutting samples, evaluation of geopressurized zone by mud logging, coring techniques and analysis; indirect methods: LWD/MWD & wireline logging, instruments/tools details.	25	15
3.	Lithology indication log open hole logging tool physics, measurement principles and data interpretation of the following including quantitative and qualitative analysis techniques: caliper log, electrical logs – SP and resistivity logs (conventional, induction and micro devices), radioactive logs – gamma Ray (natural and spectral)	25	15
4.	Porosity log neutron logs: principal, equipment, density and elemental capture spectroscopy logs, principal and mechanism of sonic log, principal and mechanism of Nuclear Magnetic resonance log	25	15

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DEPARTMENT OF PETROLEUM ENGINEERING

PROPOSED SYLLABUS FOR 2nd SEMESTER M.Sc. PROGRAMME

Advance well completion techniques

(SUBJECT CODE: 11215153)

Type of Course: Master of Science (Petroleum Technology)

Teaching and Examination Scheme:



Teaching Scheme (h/week)				Examination Scheme							
				Internal Marks			External Marks		Passing Marks (Theory + CE)		Passing Marks (Practical)
Lect	Lab	Tut	Credit	T	P	CE	T	P	Int. + Ext.	Int. + Ext.	
4	0	0	4	20	-	20	60	-	50	0	100

Content:

Sr. No.	Topic	Weight age in %	Teaching Hrs.
1.	Basics of Reservoir Completion and Sand Control Inflow Performance Relationship, Perforating, Hydraulic Fracturing, Acid Fracturing, Rock Strength, Sand control Prediction, Sand production mitigation, Sand control screens, Gravel Packing, Chemicals and consolidation.	25	15
2.	Life of Well Operations Types and methods of Intervening, Impact on Completion Design. Tubing well performance, Multiphase flow & tubing performance, Flow predictions, Temperature prediction and Control, Packer fluids, Production & Injection well sizing.	25	15
3.	Completion Equipments On-land and subsea Christmas trees; Subsurface safety Valves, Packers, Expansion devices and anchor latches, Landing nipples, locks and sleeves, Mandrels and gauges, Capillary lines and cable clamps, Loss control and reservoir isolation valves, Crossovers, Flow couplings.	25	15
4.	Well Completion Techniques Deep water Completions. HPHT Completions, Completions with down hole flow control, Multilateral Completions, Dual Completions, Multipurpose Completions, Underbalanced completions, Coiled tubing and insert completions, Completions for Heavy oil and steam injection, Completions for Coal Bed Methane.	25	15



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DEPARTMENT OF PETROLEUM ENGINEERING

PROPOSED SYLLABUS FOR 2nd SEMESTER M.Sc. PROGRAMME

Production operation-1

(SUBJECT CODE: 11215154)

Type of Course: Master of Science (Petroleum Technology)

Teaching and Examination Scheme:

Teaching Scheme (h/week)				Examination Scheme							
				Internal Marks			External Marks		Passing Marks (Theory + CE)	Passing Marks (Practical)	Total Marks
Lect	Lab	Tut	Credit	T	P	CE	T	P	Int. + Ext.	Int. + Ext.	
3	2	0	4	20	20	20	60	30	50	25	150

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Content:

Sr. No.	Topic	Weightage	Teaching hours
10.	<p>Well Equipment and Well Completion Design</p> <p>Well Head Equipment, Christmas tree, valves, hangers, flow control devices, packers, tubular and flow lines. Well completion Methods, Perforating Oil & Gas Wells - Conventional and Unconventional techniques viz. through tubing and tubing conveyed underbalanced perforating techniques, type size and orientation of perforation holes. Well activation, use of compressed air & liquid Nitrogen.</p>	25	15
11.	<p>Production System Analysis & Optimization</p> <p>Self flow wells - PI & IPR of self flowing and 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 - coning, IPR & skin factor. Multiphase flow in tubing and flow-lines. Sizing, selection and performance of Tubing, chokes and surface pipes. Production Optimization Nodal System analysis.</p>	25	15



12.	Well Production Problems and mitigation Scale formation, paraffin deposition, formation damage, water production, gas production, sand deposition etc. Sand control techniques, Formation Sand Size analysis, optimum gravel - sand ratio, gravel pack thickness, gravel selection, gravel packing fluid & gravel pack techniques.	25	15
13.	Well Servicing & Workover Workover system, workover rigs and selection, rig less workover including Endless/ Coiled tubing unit, minor & major workover jobs-diagnosis & remedial measures water shut off and gas shut off- Chemical treatment and conformance control. Wire-line operations, Workover & completion fluids - types & selection, Formation damage, Workover planning & economics, asphaltene wax.	25	15

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DEPARTMENT OF PETROLEUM ENGINEERING

PROPOSED SYLLABUS FOR 2nd SEMESTER M.Sc. PROGRAMME

PETROLEUM ENVIRONMENT, HEALTH AND SAFETY PRACTICES

(SUBJECT CODE: 11215155)

Type of Course: Master of Science (Petroleum Technology)

Teaching and Examination Scheme:

Teaching Scheme (h/week)				Examination Scheme							
				Internal Marks			External Marks		Passing Marks (Theory + CE)		Passing Marks (Practical)
Lect	Lab	Tut	Credit	T	P	CE	T	P	Int. + Ext.	Int. + Ext.	
4	0	0	4	20	0	20	60	0	50	0	100

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Content:

Sr. No.	Topic	Weight age in %	Teaching Hrs.
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Sr. No.	Topic	Weight age in %	Teaching Hrs.
1.	Introduction Introduction to Health, Safety and Environmental Management, HSE Terms and Definitions, Importance of HSE Management, HSE performance. HSE Regulations and regulatory agencies for Oil and Gas Industry	25	15
2.	Environmental issues and Management Introduction to Environmental issues and Management , Air pollution-Stack emissions, Flaring and fugitive release Water pollution and wastewater management, Produced water management	25	15
3.	Oil spill Management Introduction to oil spill management Waste management: Drilling waste, Rock cutting, oily sludge, etc.,	25	15
4.	Environmental Management Introduction to Environmental Management, monitoring and Impact Assessment. Occupational Health and Safety Management Risk assessment and management: (Qualitative and quantitative)	25	15

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DEPARTMENT OF PETROLEUM ENGINEERING

PROPOSED SYLLABUS FOR 2nd SEMESTER M.Sc. PROGRAMME

Oil and gas field development and planning

(SUBJECT CODE: 11215156)

Type of Course: Master of Science (Petroleum Technology)

Teaching and Examination Scheme:

Teaching Scheme (h/week)				Examination Scheme							
				Internal Marks			External Marks		Passing Marks (Theory + CE)	Passing Marks (Practical)	Total Marks
Lect	Lab	Tut	Credit	T	P	CE	T	P	Int. + Ext.	Int. + Ext.	
4	0	0	4	20	0	20	60	0	50	0	100

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Content:

Sr. No.	Topic	Weight age in %	Teaching Hrs.
1.	Brief overview on field development, Difference between oil and gas field development, The Field Life Cycle: Gaining Access, Exploration Phase, Appraisal Phase, Development Phase, Production Phase, Decommissioning. Petroleum Agreements & Bidding: Invitations to bid, Motivations and form of bid, Block Award, Fiscal System, Farm-in & Farm-out, Unitization and Equity determination. NELP & OALP, PSC.	25	15
2.	Reservoir Description: Data Gathering, Data Interpretation Field Appraisal: Importance of Appraisal, Identifying and quantifying sources of Uncertainty, Cost benefit calculations for Appraisal. Reservoir Dynamic Behavior: Fluid Flow studies, PVT data, Drive Mechanisms. Gas Reservoirs: Gas sales profiles; Influence of Contracts; movement of GWC during production, Pressure response, Fluid displacement in the Reservoir, Estimation of Reserves, Reservoir Simulation, Estimating the Recovery Factor, Estimating the Production Profile.	25	15
3.	Well Dynamic Behavior in Vertical and Horizontal Wells: Estimating the number of Development Wells, Fluid flow near the wellbore. Importance of Surface Facilities in Field Development	25	15
4.	Project & Contract Management: Phasing & Organization, Planning & Control, Cost Estimation & Budgets, Types of Contracts. Petroleum Economics: Basic principles of Development Economics, Project Cash flow, Revenue & expenditure items, CAPEX-OPEX, Sensitivity Analysis, Managing the Producing Field: Subsurface, surface facilities, Internal & External factors.	25	15