

17BPE321 - Well Test Analysis

Teaching Scheme					Theory			Practical		Total
L	T	P	C	Hrs/Week	MS	ES	IA	LW	LE/Viva	
3	1	0	4	4	25	50	25	-	-	100

Unit I **Hours: 10**
 Introduction of Well Test Analysis: Importance and types of pressure tests, Pressure recorder: Measurement instruments used for bottom hole studies- Calibration of pressure recorders, Indicator diagram. Diffusivity equation, linearization and solution under semi steady state, steady state and applications. Constant Terminal Rate Solution, Line source solution.

Unit II **Hours: 10**
Oil Well Testing
 Pressure Transient Tests: Horner's Plot, Pressure Build-up Test / Draw-down tests, RLT (Reservoir Limit Test), Determination of average reservoir pressure. Skin factor and average reservoir permeability, Drill Stem Testing: Equipment, DST Chart observation, analysis & interpretation, Wire line formation tests, Modular Dynamic Test.

Unit III **Hours: 10**
Gas Well Testing
 Russel: good rich solution of diffusivity equation. Real gas pseudo pressure function and its use in diffusivity equation. Non-Darcy's effect and evolution. Gas Well testing: Multi rate test of gas well, pressure build-up and draw down in gas reservoir. Flow after flow (Multi-rate Test), isochronal & Modified isochronal tests. Skin factor and average reservoir permeability. Determination of average reservoir pressure

Unit IV **Hours: 9**
 Advanced Pressure Transient Analysis: Interference and pulse tests, Pressure Fall Off test in Injection wells. PBU / PDD in Horizontal wells. Principle of Superposition, Deconvolution of Pressure Data. Type Curves analysis, interpretation & their uses.

Total Hours :39

Text Books and References :

1. Well Test Analysis by John Lee,
2. Modern Well Test Analysis by R.C. Erlougher,
3. Fundamental of Reservoir Engineering by L.P. Dek,
4. Applied Reservoir Engineering by Craft and Hawkins
5. Well Testing Analysis by Mathews and Russell,
6. Gas Well Testing Handbook, Amanat U. Chaudhry

17BPE322 - Surface Production Operations

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	25	50	25	--	--	100

Unit I **Hours: 12**

Separation and Treatment of crude oil

Classification of separators, Components of separator, Types of separator, Liquid level control and relative advantages / disadvantages of different types of separators, Dehydration & Desalting of Oil, De-emulsification, Effluent Treatment, and Design of Separator.

Unit II **Hours: 09**

Storage and metering of Oil and Gas

Storage tank for Oil, storage of LPG, Underground storage, Measurement-metering of Oil and Gas

Unit III **Hours: 09**

Transportation

Gathering, Collector and Trunk pipeline system, Scale & Paraffin Deposition and their Mitigation, Flow improver (Pour point depression and Drag reducer, heat treatment), pigging in pipe lines.

Unit IV **Hours: 09**

Oil Processing in Offshore

Mooring System, Offshore Installations – Fixed Platform substructures, Comparison of Onshore and Offshore Oil Processing System.

Total Hours: 39

Texts and References:

1. Arnold Ken and Stewart Maurice, Surface Production Operations Vol-I and II.
2. Chillangarian G V, Surface Operations in Petroleum Production.
3. Huges J R and Swindles, Storage and Handling of Petroleum Liquids.
4. Alex Marks, Petroleum Storage Principles.
5. Handbook of Offshore Engineering, vol.2, S K Chakrabarti.

17BPE323 - 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	25	50	25	--	--	100

Unit I **Hours: 10**

Reservoir Modeling

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 **Hours: 10**

Reservoir Simulation

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 **Hours: 9**

Data Preparation

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 **Hours: 10**

History Matching

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: 39

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.

17BPE324 - Drilling Engineering - II

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	25	50	25	--	--	100

Unit I **Hours : 10**

Directional Drilling

Directional Drilling Technology, Objectives of Directional Drilling. Tools for deflection & orientation. Directional well profiles and well path – deflection & corrections Motor Types: PD motors and Turbo-drills; their description, power calculations and applications. Directional drilling problems & their remedies. Auto and Verti-track systems: Rotary steerable motors and geo-steering tools.

Unit II **Hours : 10**

Horizontal Well Drilling

Horizontal Well Drilling, Introduction of Horizontal well drilling: objectives & selection, drilling techniques and different well profiles, special mud requirements and their characteristics. Measurements While Drilling: objectives, MWD / LWD tools, Telemetry system and data interpretation Well Surveying: Objectives & methods. surveying analysis & calculations for well coordinates

Unit III **Hours : 10**

Offshore Drilling

Offshore oil and gas operations & ocean environment. Offshore fixed platforms, 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. Jack-up, drill ships and semi submersibles.

Unit IV **Hours: 09**

Well Control Principles& Procedures

The Anatomy of a KICK, Kicks - Definition, Kick Control (a) Dynamic kick control (b) Other Kick control methods- Driller & Engineer methods of kick control.

Total Hours: 39

Text and References:

1. Bourgoyne , Adam T. Jr., Martin E. Chenevert, Keith K. Millheim and F.S. Young Jr., Richardson, TX (1991) Applied Drilling Engineering, Society of Petroleum Engineers.
2. Joshi, S. D. (1991) Horizontal Well Technology, Penn Well Publishing.
3. Adam, N. J. (1980) Well control Problems and Solutions. Petroleum Publishing Company
4. Baker, R. (1998) A Premier of Offshore Operations Petroleum Extension Service, Division of Continuing Education, University of Texas at Austin in cooperation with International Association of Drilling Contractors, Houston, Texas.
5. Robinson, T (1992) The Offshore: An Introduction to the Technology, terminology and operations of offshore oil Exploration.

17BPE325 - Process Equipment Design

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	25	50	25	--	--	100

Unit I **Hours : 7**

Pump: Pump:- classification & types, Advantages & disadvantages, Basic principles – head, HP, Net Positive Suction Head (NPSH), Selection criteria, Centrifugal pump and multiple stage installations and their characteristics. Pumping stations (series & parallel installations).Types of seal systems etc. Reciprocating pumps

Process design of Heat exchangers: Shell & Tube heat exchangers, Functions of various parts of shell & Tube Heat exchanger, General design method of shell & tube heat exchanger, Criteria of selection among Fixed Tube sheet, U Tube & Floating Head heat exchanger. Tinker’s flow model, Air cooled heat exchangers and air heaters, plate heat exchangers, etc. TEMA classification.

Unit II **Hours : 7**

Process Design of Distillation Column: Introduction, Various types of Distillation columns, Criteria of selection, Distillation column design, Selection of key components for multicomponent distillation, Determination of operating pressure and temperature for distillation column, Advantages & disadvantages of vacuum distillation, Determination of nos. of theoretical stages for binary distillation by McCabe Thiele method. Determination of nos. of theoretical stages for multi-component distillation by Fenskey - Underwood-Gilliland’s method, Selection of trays, Calculations for tower diameter & pressure drop of sieve tray tower, Checking of conditions for weeping, down comer flooding, liquid entrainment, etc, tray efficiency, Jet Flooding & down comer Flooding, Different types of weirs & down comers of tray tower, their selection criteria.

Unit III **Hours : 7**

Various code and standards for pressure vessel; design considerations and factors influencing design of unfired pressure vessels; materials of construction, type and selection, unfired pressure vessels with internal pressure; unfired pressure vessels with external pressure; end closures -types, considerations for selection, design under internal pressure and external pressure; testing of pressure vessels, safety criterion for pressure vessel.

Unit IV **Hours : 5**

Non-pressure storage tanks -type and design; design of tall vertical vessels; vessels supports type – selection, Introduction to flanges and gaskets –design of non-standard flanges. Floating roof storage tanks, design of floating roof storage tank as per API650.

Total Hours: 39

Text and References:

1. Bourgoyne , Adam T. Jr., Martin E. Chenevert, Keith K. Millheim and F.S. Young Jr., Richardson, TX (1991) Applied Drilling Engineering, Society of Petroleum Engineers.
2. Joshi, S. D. (1991) Horizontal Well Technology, Penn Well Publishing.

3. Adam, N. J. (1980) Well control Problems and Solutions. Petroleum Publishing Company
4. Baker, R. (1998) A Premier of Offshore Operations Petroleum Extension Service, Division of Continuing Education, University of Texas at Austin in cooperation with International Association of Drilling Contractors, Houston, Texas.
5. Robinson, T (1992) The Offshore: An Introduction to the Technology, terminology and operations of offshore oil Exploration.

17BPE326 – Petroleum Engineering Practical - II

Teaching Scheme					Exam Scheme					Total Marks
L	T	P	C	Hrs/Week	Theory			Practical		
					MS	ES	IA	LW	LE/Viva	
0	0	2	1	2	--	--	--	50	50	100
<p>Week 1: Determine the acid value of the given oil sample.</p> <p>Week 2: Determine the Sulphur content of the given oil sample.</p> <p>Week 3: Draw a ternary phase diagram for solubility of water benzene isopropyl alcohol(IPA) solution.</p> <p>Week 4& 5: Determine the rheological properties of a given oil sample using Rheometer.</p> <p>Week 6: Determine the particle size of the given oil sample using Zetasizer Particle Size analyser.</p> <p>Week 7: Determine the Formation resistivity of the saturated rock sample.</p> <p>Week 8: Water Coning using Resistance Analogy</p> <p>Week 9: Understanding of Auto-Tensiometer</p> <p>Week 10: Understanding of Proppant Conductivity System at normal temperature conditions.</p> <p>Week 11: Understanding of Proppant Conductivity System at high temperature conditions</p> <p>Week 12: Understanding of Formation Damage System with temperature conditions.</p> <p>Week 13: Understanding of Formation Damage System without temperature conditions</p>										

17BPE327 - Petroleum Product Testing Practical

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	--	--	--	50	50	100
<ol style="list-style-type: none"> 1. Determination of Acid number of Fossils Oil Samples 2. Determination of percentage purity of refinery products by Auto Distillation Apparatus. 3. Determination of viscosity of a sample by Say Bolt Viscometer 4. Determination of Smoke point and find the Luminosity Number of given sample. 5. Determination of Calorific value of Coal, Lignite and Oil samples of different formation by Bomb Calorimeter. 6. Determination of Flash & fire point of Refinery Products by semi automatic Pensky& Martin apparatus. 7. Determination of Flash & fire point b of Refinery Products by Cleveland open cup apparatus. 8. Determination of Cloud point and Pour point of given samples. 9. Determination of Aniline Point of a given samples of Refinery products 10. Determination of Diesel Index of given samples 11. Determination of Cetane Number of given samples of Refinery Products. 12. Determine the moisture content of the given liquid fuel sample using dean and stark apparatus 13. Determine the saponification value of given oil sample 										

17BPE328 - Personality Development and Communication Skill

Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	2	1	--	--	--	--	50	50	100

UNIT I

Self Analysis : SWOT Analysis, Who am I, Attributes, Importance of Self Confidence, Self Esteem.
 Creativity : Out of box thinking, Lateral Thinking.
 Attitude : Factors influencing Attitude, Challenges and lessons from Attitude, Etiquette.
 Motivation : Factors of motivation, Self talk, Intrinsic & Extrinsic Motivators.

UNIT II

Leadership : Skills for a good Leader, Assessment of Leadership Skills
 Decision Making : Importance and necessity of Decision Making, Process and practical way of Decision Making, Weighing Positives & Negatives.

UNIT III

Interpersonal Skills :Gratitude Understanding the relationship between Leadership Networking & Team work. Assessing Interpersonal Skills Situation description of Interpersonal Skill. Team Work: Necessity of Team Work Personally, Socially and Educationally.

UNIT IV

Goal Setting : Wish List, SMART Goals, Blue print for success, Short Term, Long Term, Life Time Goals.
 Time Management : Value of time, Diagnosing Time Management, Weekly Planner To do list, Prioritizing work

Text Book :

SOFT SKILLS, 2015, Career Development Centre, Green Pearl Publications.

References :

1. Covey Steven, Seven Habits of Highly Effective Teens, New York, Fireside Publishers, 1998.
2. Carnegie Dale, How to win Friends and Influence People, New York: Simon & Schuster, 1998.
3. Thomas A Harris, I am ok, You are ok , New York-Harper and Row, 1972
4. Daniel Coleman, Emotional Intelligence, Bantam Book, 2006
5. Robin Sharma A monk who sold his Ferrari, 1997.

17BPE329 - Seismic Sequence Stratigraphy

Teaching Scheme					Exam Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	0	0	2	2	25	50	25	--	--	100

Unit I **Hours : 6**

Methods of sequence stratigraphic analysis

Facies analysis using outcrops, core and model analogues ;Well Logs; Seismic datas and age determination techniques, System Tracts;High stand system tract, Falling- stage system tract, Lowstand system tract, Transgressive system tract, Regressive systems tracts.

Unit II **Hours:6**

Sequence Models

Types of stratigraphic sequences, sequences in fluvial systems, sequences to coastal to shallow water Clastic systems, sequences in deep water Clastic systems

Unit III **Hours : 8**

Seismic attributes in understanding sequences

Horizon and Formation attributes (Time derived attributes, coherence, Post stack amplitude attribute, Frequency derived attributes, Spectral attributes), Visualization of Horizon attributes.

Unit IV **Hours:6**

Depth Conversion of Sequence attributes

Sources and computation of velocities, general consideration in depth conversion, depth conversion using single velocity function, depth conversion using mapped velocity function

Total Hours: 26

Text and References:

1. Text Book: Principles of Sequence Stratigraphy, By- O. Catuneanu
2. Text Book: Interpretation of Three- dimensional seismic Data- Sixth Edition, By Alistair R. Brown

17BPE330 - Pipeline Engineering

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	25	50	25	--	--	100

Unit I **Hours : 6**
 Modes and comparison among different modes of transportation of petroleum products, Advantages and limitations of pipelines modes, Introduction to pipeline project, Economics and cost structure of Pipeline project, Economic pipe diameter.

Unit II **Hours : 7**
 Introduction to outline for Design & construction of onshore-offshore pipelines, Pipeline codes and standards, Overview of O & G field Processes, Types of Onshore/ Offshore Pipelines, Factors affecting pipeline design(External, fluid properties, pipeline parameters and Fluid flow considerations. Loop- lines

Unit III **Hours : 7**
 Design of Liquid pipelines: Hydraulic Analysis, Relevant Pipeline Parameters, Types of fluids, Pressure Loss calculations, Maximum allowable operating Pressure, Pipeline sizing, Diameter sizing, Determination of wall Thickness, Station Spacing Pumping Power calculations, Design of Gas Pipelines: Factors affecting Gas Pipeline Design, Pressure Loss calculations, Gas pipeline Hydraulic Calculations, Gas Compression / Power requirement.

Unit IV **Hours : 6**
 Construction Of pipelines: Introduction, Onshore & Offshore pipeline Construction. Commissioning of pipeline. Pipeline Operations, Pigging, integrity assessment by Intelligent pigging and Instrumentation, Monitoring and Control Thru SCADA application, Corrosion and control/ Cathodic Protection.

Total Hours: 26

Texts and References:

1. AlkazrajiDuraïd, (2008) A quick guide to pipeline engineering WOODHEAD Publishing Limited
2. Vincent, Jecqes (2010) Fundamentals of Pipeline Engineering, Gulf Publishing
3. Antaki, G. A. (2003) Piping and Pipeline Engineering, Marcell Dekker.
4. Modeling of oil and products and gas pipeline transportation by Mikhail V Luric
5. Pipeline Engineering By Henry Liu

17BPE331 - Corrosion studies in Petroleum Industry

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	25	50	25	-	-	100

Unit I **Hours : 7**

Corrosion fundamentals, Corrosion in oil Industry, Cost of corrosion in the industry, Corrosivity of hydrocarbon fluids:-Water-oil emulsion and multiphase flow regime, Wettability of metal surface., Corrosivity of aqueous phase in hydrocarbon fluids; Sulfur and H₂S in hydrocarbon fluids; Influence of oil chemistry on the corrosivity of the aqueous phase. Pipeline corrosion; Kinetics of electrochemical surface reactions; Cathodic reduction reactions; Anodic dissolution reactions; Transport of species; Transport from the bulk solution to the steel surface; Transport through the porous surface scales. Corrosion products; Kinetics of corrosion products precipitation and corrosion products growth;

Unit II **Hours : 7**

Modes of internal corrosion attack: -Uniform corrosion; Localized corrosion ; Pitting corrosion; Erosion corrosion; Galvanic corrosion; Intergranular corrosion; Stress corrosion cracking; Hydrogen damage; Hydrogen embrittlement; Hydrogen-induced cracking; Formation of hydride. Pipeline flow corrosivity: Effect of water wetting; Effect of multiphase flow regime; Effect of multiphase velocity ; Effect of water phase characteristics; Significance of salinity; Significance of CO₂ pressure; Significance of H₂S; Significance of O₂; Significance of pH; Effect of temperature. Materials selection:-Significance of alloying composition; Significance of steel microstructure.

Unit III **Hours : 6**

Experimental setups, methods, and standards:- Multiphase flow loop; Autoclave; Horizontal rotating cylinder; High velocity rig; Glass cell; Goniometer/Tensiometer ; Moisture content measurements ; Slow strain rate test. Corrosivity and corrosion rate determination:- Weight loss measurements; Potentiodynamic polarization and polarization resistance; Electrochemical impedance spectroscopy; Potentiostatic polarization;

Unit IV **Hours : 6**

Pipeline Corrosion control; Environment control; Gas-phase contaminants and degasification; Water presence and dehydration/dewatering; Pipe cleaning; Pigging; Internal coating/liner; Chemical treatment and corrosion inhibitors:-Corrosion control by industrial inhibitors, Application methods; Influence of operating conditions; Solubility, partitioning, and compatibility. Biocides

Total Hours : 26

Texts and References:

1. Papavinasam, S (2013) Corrosion control in oil and gas industry, Elsevier.
2. Cicek, Volkan. "Corrosion in Petroleum Industry." Cathodic Protection: Industrial Solutions for Protecting Against Corrosion: 231-245.
3. Nathan, Charles Carb. "Corrosion inhibitors." C. C. Nathan, Editor, published 1973 by NACE, 260 (1973).

17BPE332 - Hydrocarbon Based Fertilizer Industries

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	25	50	25	--	--	100

Unit I **Hours: 6**

Introduction to Fertilizer Industry

Introduction to Fertilizer Industry: Definition, Types, Consumption and Uses. Role of Hydrocarbon in Fertilizer Industry. Reaction of Natural Gas in Making Fertilizer. Different type of Processes and Hydrocarbon involved in making fertilizer – Steam Reforming Process, Partial Oxidation Process, Total Recycle CO₂ Stripping Urea Process, Linde Process for manufacturing ammonia.

Unit II **Hours: 8**

Different Unit Operation Involved in Fertilizer Industry

Fluidized Catalytic Cracking Unit, Process Furnaces, Boilers, Incinerators, Fractionation, Towers and Columns, Ammonia Unit Secondary Reformer, Sulfur Recovery Unit.

Unit III **Hours: 7**

Key Fertilizers product and process involved in multinutrients fertilizers

Ammonia Plant, Urea Plant, Anhydrous Ammonia, Aqua Ammonia, Urea Ammonium Nitrate Solution, Ammonium Nitrate, Ammonium Sulfate, Calcium Nitrate, Ammoniated Phosphate, Phosphoric Acid Potassium Chlorite, Potassium Sulfate, Potassium Nitrate, Mono Potassium Sulfate

Unit IV **Hours: 6**

Natural Gas Demand, Natural Gas Pricing, Environmental Impact, New Fertilizer Practices, Technological and R&D issues related to Industry, India in Fertilizer Sector, Kind of Fertilizer Used in India and Natural Gas Supply for Fertilizer Industry.

Total Hours: 26

Texts and References:

1. Katja, India's Fertilizer Industry: Productivity and Energy Efficiency
2. Schumacher and JayantSathaye Hand book of fertilizer manufacturing process.
3. Report of the working group on fertilizer industry for the twelfth plan
4. Industry notes in key fertilizer product resources