

B.TECH
PETROLEUM ENGINEERING

| Subject Code | Name of Subject | Teaching Periods | | | Credit Points |
|--------------|--|------------------|---|----|---------------|
| | | L | T | P | |
| 03BPE101 | Mechanics of solids | 3 | 1 | 0 | 4 |
| 03BPE102 | Introduction to Geophysics | 3 | 1 | 0 | 4 |
| 03BPE103 | Mathematics III | 3 | 1 | 0 | 4 |
| 03BPE104 | Geology for petroleum engineers | 3 | 1 | 0 | 4 |
| 03BPE105 | Drilling fluids & cements | 3 | 1 | 0 | 4 |
| 03BPE106 | Drilling Technology | 3 | 1 | 0 | 4 |
| 03BPE201 | Petroleum engineering Lab 1 (Drilling fluids lab) | 0 | 0 | 2 | 1 |
| 03BPE202 | Geology for petroleum engineers Lab | 0 | 0 | 2 | 1 |
| 03BPE203 | Thermal Lab I | 0 | 0 | 2 | 1 |
| 03BPE204 | Geophysical Lab | 0 | 0 | 2 | 1 |
| 03BPE301 | Discipline & Co-Curricular Activities | 0 | 0 | 4 | 1 |
| Total | | 18 | 6 | 12 | 29 |

IV Semester Petroleum Technology

| Subject Code | Name of Subject | Teaching Period | | | Credit Points |
|--------------|--|-----------------|---|----|---------------|
| | | L | T | P | |
| 04BPE101 | Elements of production engineering | 4 | 0 | 0 | 4 |
| 004BPE102 | Elements of Reservoir engineering | 4 | 0 | 0 | 4 |
| 04BPE103 | Fluid Mechanics | 4 | 0 | 0 | 4 |
| 04BPE104 | Env. aspects in oils & allied industries | 3 | 1 | 0 | 4 |
| 04BPE105 | Numerical & Statistical methods | 4 | 0 | 0 | 4 |
| 04BPE106 | Surveying | 4 | 0 | 0 | 4 |
| 04BPE201 | Petroleum engineering Lab-II | 0 | 0 | 2 | 1 |
| 04BPE202 | Transducer & measurement Lab | 0 | 0 | 2 | 1 |
| 04BPE203 | Surveying Lab I | 0 | 0 | 2 | 1 |
| 04BPE204 | Fluid Mechanics Lab | 0 | 0 | 2 | 1 |
| 04BPE301 | Discipline & Co-Curricular Activities | 0 | 0 | 4 | 1 |
| Total | | 23 | 1 | 12 | 29 |

V Semester Petroleum Technology

| Subject Code | Name of Subject | Teaching Period | | | Credit Points |
|--------------|--|-----------------|---|----|---------------|
| | | L | T | P | |
| 05BPE101 | Thermodynamics of petroleum reservoir fluids | 4 | 0 | 0 | 4 |
| 05BPE102 | Petroleum Production operation | 4 | 0 | 0 | 4 |
| 05BPE103 | Applied electrical engineering | 4 | 0 | 0 | 4 |
| 05BPE104 | Sedimentary & petroleum geology | 3 | 1 | 0 | 4 |
| 05BPE105 | Applied Petroleum Reservoir Management | 3 | 1 | 0 | 4 |
| 05BPE106 | Unit Operation & Process Engineering | 3 | 1 | 0 | 4 |
| 05BPE201 | CAD Lab | 0 | 0 | 2 | 1 |
| 05BPE202 | Sedimentary & petroleum geology Lab | 0 | 0 | 2 | 1 |
| 05BPE203 | Production Lab | 0 | 0 | 2 | 1 |
| 05BPE204 | Surveying Lab II | 0 | 0 | 2 | 1 |
| 05BPE301 | Discipline & Co- Curricular Activities | 0 | 0 | 4 | 1 |
| | Total | 21 | 3 | 12 | 29 |

VI Semester Petroleum Technology

| Subject Code | Name of Subject | Teaching Period | | | Credit points |
|--------------|--|-----------------|---|----|---------------|
| | | L | T | P | |
| 06BPE101 | Drilling sys. design & Directional Drilling | 3 | 1 | 0 | 4 |
| 06BPE102 | Petroleum formation Evaluation | 3 | 1 | 0 | 4 |
| 06BPE103 | Natural gas engineering | 3 | 1 | 0 | 4 |
| 06BPE104 | Heat & Mass Transfer | 3 | 1 | 0 | 4 |
| 06BPE105 | OOP & advanced Numerical methods | 3 | 1 | 0 | 4 |
| 06BPE106 | Petroleum Refining and Petrochemicals | 4 | 0 | 0 | 4 |
| 06BPE201 | Petroleum Engineering Lab – III (Process Engineering Lab) | 0 | 0 | 2 | 1 |
| 06BPE202 | OOP & Advanced Numerical Lab | 0 | 0 | 2 | 1 |
| 06BPE203 | Production Practice Lab | 0 | 0 | 2 | 1 |
| 06BPE204 | Thermal Lab- II | 0 | 0 | 2 | 1 |
| 06BPE301 | Discipline & Co- Curricular Activities | 0 | 0 | 4 | 1 |
| | Total | 19 | 5 | 12 | 29 |

VII Semester Petroleum Technology

| Subject code | Name of subject | Teaching Periods | | | Credit Points |
|--------------|--|------------------|---|----|---------------|
| | | L | T | P | |
| 07BPE101 | Petroleum Engineering design | 3 | 1 | 0 | 4 |
| 07BPE102 | Onshore & Offshore Drilling | 3 | 1 | 0 | 4 |
| 07BPE103 | Petroleum Instrumentation &Control | 3 | 1 | 0 | 4 |
| 07BPE104 | Petro. exploration Geophysical methods | 3 | 1 | 0 | 4 |
| 07BPE105 | Petro. exploration Geological methods | 3 | 1 | 0 | 4 |
| 07BPE106 | Coal Bed Methane & gas Hydrates | 3 | 1 | 0 | 4 |
| 07BPE201 | Minor project | 0 | 0 | 2 | 1 |
| 07BPE202 | Petroleum Instrumentation &Control | 0 | 0 | 2 | 1 |
| 07BPE203 | Seminar | 0 | 0 | 2 | 1 |
| 07BPE204 | Industrial Training | 0 | 0 | 2 | 1 |
| 07BPE301 | Discipline & Co- Curricular Activities | 0 | 0 | 4 | 1 |
| | Total | 18 | 6 | 12 | 29 |

VIII Semester Petroleum Technology

| Subject Code | Name of Subject | Teaching Period | | | Credit Points |
|--------------|--|-----------------|---|---|---------------|
| | | L | T | P | |
| 08BPE101 | Reservoir Modeling & Simulation | 3/4 | 0 | 0 | 3/4 |
| 08BPE102 | Surface operation for oil & gas production | 3/4 | 1 | 0 | 3/4 |
| 08BPE103 | Oil-gas well testing & Enhanced oil recovery | 3/4 | 1 | 0 | 3/4 |
| 08BPE104 | Pipeline Engineering | 3/4 | 0 | 0 | 3/4 |
| 08BPE201 | Major Project | 5/6 | 0 | 0 | 5/6 |
| 08BPE202 | Seminar | 3/4 | 0 | 0 | 3/4 |
| 08BPE203 | Simulation Laboratory | 0 | 0 | 2 | 1 |
| 08BPE301 | Discipline & Co- Curricular Activities | 0 | 0 | 4 | 1 |
| | Total | 26 | 2 | 6 | 30 |

III Semester Petroleum Technology

03BPE-101:

MECHANIC OF SOLIDS

Course/Paper: 03 BPE -101
BPE Semester-III

Unit – 1

Stress & strain: Tension, compression, shearing stress & strain; Poisson's ratio: Stress-strain relationship, Hooke's law; equations of static = w for 2D & 3D cases Elastic constants and their relations for an isotropic Hookean material, anisotropy & orthotropy, thermal stresses, composite bars; simple elastic, plastic & visco-elastic behavior of common materials in tension and compression test, stress-strain curves. Concept of factor of safety & permissible stress. Conditions for equilibrium. Concept of free body diagram; Introduction to mechanics of deformable bodies.

Unit – 2

Members subjected to flexural loads: Theory of simple bending, bending moment and shear force diagrams for different types of static loading and support conditions on beams. Bending stresses, Section modulus and transverse shear stress distribution in circular, hollow circular, I, Box, T, angle sections etc.

Unit – 3

Principal planes, stresses & strains: Members subjected to combined axial, bending & Torsional loads, maximum normal & shear stresses; Concept of equivalent bending & equivalent twisting moments: Mohr's circle of stress & strain. Theories of Elastic Failures: The necessity for a theory, different theories, significance and comparison, applications.

Unit – 4

Torsion: Torsional shear stress in solid, hollow and stepped circular shafts, angular deflection and power transmission capacity. Stability of equilibrium: Instability & elastic stability. Long & short columns, ideal strut, Euler's formula for crippling load for columns of different ends, concept of equivalent length, eccentric loading, Rankine formulae and other empirical relations.

Unit – 5

Transverse deflection of beams: Relation between deflection, bending moment, shear force and load, Transverse deflection of beams and shaft under static loading, area moment method, direct integration method: method of superposition and conjugate beam method. Variation approach to determine deflection and stresses in beam. Elastic strain energy: Strain energy due to axial, bending and Torsional loads; stresses due to suddenly applied loads; use of energy theorems to determine deflections of beams and twist of shafts. Castigliano's theorem. Maxwell's theorem of reciprocal deflections.

a) References

- b) Strength of Materials : B.C Poonamia and ramamurtham, Dhanpatrai Publishers Delhi
- c) Mechanics of solid : S.H.Crandell, N.C.Dahi and T.J. Lardner, Mc Graw Hill International Edition
- d) Strength of Materials: G.H. Ryder, ELBS Publications co ltd
- e) Elements of Strength of Material :J.P. Tinnoshnko and G.H.Young, Affiliated East west Press New Delhi
- f) Solid Mechanic : GMA Kazmi, Tata Mc-Graw Hill Publishing Ltd., New Delhi Mc Graw Hill Publishing co Ltd New Delhi

03 BPE -102:

INTRODUCTION TO GEOPHYSICS

Course/Paper: 03 BPE -102
BPE Semester-III

Introduction to Geophysics & Geophysical methods, Magnetic methods – Magnetism of rocks and minerals – instruments – Calibration of Magnetometer , Reduction of data, Preparation of Magnetic Anomaly maps- Airborne Magnetometer and Magnetometer for marine survey. Airborne survey – Advantages and limitations of airborne geophysical data.

Gravity methods – Gravitational field of the earth – Densities of rocks and minerals – Instruments – Reduction of Gravity data, Gravity Anomaly maps – Interpretation of gravity data and applications. Radioactivity methods – Radioactivity decay – Radioactivity of rocks and minerals – Instruments – Interpretation of gravity data and applications.

References:

1. M.B. Ramachandra Rao, "Outlines of Geophysical Prospecting"- EBD Educational Pvt Limited, 1993
2. D.S. Paranis Kluwer, "Principles of applied Geophysics" - Academic Publishers, 1996
3. F.J.Pettijohn, "Sedimentary rocks" 3rd Edition - CBS Publishers & Distributors, 1984

03 BPE -103:

MATHEMATICS - III

Course/Paper: 03 BPE -103 BPE Semester-III

UNIT 1 : LAPLACE TRANSFORM - Laplace transform with its simple properties, applications to the solution of ordinary and partial differential equations having constant co-efficient with special reference to the wave and diffusion equations.

UNIT 2: Classification of partial differential equation. Linear partial differential equation of higher order with constant coefficients, Charpit's method Monges Method

UNIT 3 : Bessel's functions of first & second kinds, simple recurrence relations, Orthogonal property of Bessel's transformation, Generating functions Legendre's function of first kind, simple recurrence relation orthogonal property,, Generating function.

UNIT 4 : COMPLEX VARIABLES - Analytic functions, Cauchy-Riemann equations, Elementary conformal mapping with simple applications, Line integral in complex domain, Cauchy's theorem. Cauchy's integral formula.

UNIT 5 : COMPLEX VARIABLES -Taylor's series Laurent's series poles, Residues, Evaluation of simple definite real integrals using the theorem of residues. Simple contour integration.

References

1. Engg Mathematics III Mangal Maheswari ,Dhanpat Rai & co Delhi
2. Engg Mathematics IV Mangal Maheswari ,Dhanpat Rai & co Delhi
3. Differential Calculus: M.D.Raisinghanian
4. Engg Mathematics III Dr okharoo & others ,Unique Books Ajmer

03 BPE -104:

GEOLOGY FOR PETROLEUM ENGINEERS

Course/Paper: 03 BPE -104 BPE Semester-III

COURSE CONTENT

UNIT 1: Introduction: Sub division &Importance of geology in petroleum engg., importance structure of the earth, Environment aspects of geology.

UNIT 2: Petrology: origin, classification, texture and structure of igneous, sedimentary and metamorphic rocks, engineering properties of rocks.

UNIT 3: Structural geology: causes and classifications of faults, folds, joints and unconformities.

UNIT 4: Engineering geology: Geological investigation for site selection of tunnels, deep wells, reservoirs and mines. Site improvement techniques.

UNIT 5: Economic geology: Introduction, variety of course, building stones, salt deposits, fuels and industrial minerals

References

- a) Geology : Parbin Singh, Katson Publishers
- b) Engg Geology : H.K.Dass
- c) Geology : Shailee
- d) Geology of Petroleum---- A.L.Leverson
- e) Petroleum Geology----F.K.North
- f) Introduction to Petroleum Geology----- G.D. Hobson & E.L. Tiratsoo
- g) Petroleum Geology----R.E.Chapman

- h) Principles of Petroleum Geology W.L. Russle
- i) Structural Geology for Petroleum---Russell and Badgley
- j) Geology of Petroleum : A.L.leversson
- k) Introduction to Petroleum Engineering by Geltin

03 BPE -105:

DRILLING FLUIDS AND CEMENTS

Course/Paper: 03 BPE -105

BPE Semester-III

COURSE CONTENT:

UNIT 1: Drilling: Introduction, objectives of drilling, Site selection for drilling,

UNIT 2: Drilling Fluids: Types, functions, Testing of drilling Fluids ,selection and maintenance of drilling fluids, Composition and invasion of drilling fluids.

UNIT 3: Cements: types of cements, classification of cement, composition of cement, test of cement, additive and cement slurry.

UNIT 4: Cementing: objective, equipments used in cementing, slurry design for cementing, various techniques of cementing.

UNIT 5: lifts: types of lifts, objectives, pumping system, ESP, gas lift, progressive cavity pumps, PCP rod pumps.

References

Oil well drilling Engineering ,Principles & Practices :Rabia H , Graham and Totmanltd 1985

Cementing : Smith P K ,SPE Publications 1984

Cementing Technology : Powel Schlumberger Publication 1984

Reference Book

.....
 Drilling Fluids Processing Handbook The Shale Shaker Committee of the American Society of Mechanical Engineers,
 Publisher: Gulf Professional Publishing

Oil well Drilling Technology: Mc Craycole ,Oscar Publication

03 BPE -106:

DRILLING TECHNOLOGY

Course/Paper: 03 BPE -106

BPE Semester-III

COURSE CONTENT:

UNIT – I

Drilling operations – Location to Rig. Release Well Bore Diagram, Crews – Operator – Drilling, contractor – Third Party Services – Rig Types – Land Types – Marine types

UNIT – II

Components- Overall Drilling Rig, Drilling Sub systems – Power – Hoisting Line – speeds and Loads Power – Loading Components – Drill Pipe, Heavy Weight Drill Pipe (HWDP), Drill String Loads Uniaxial.

UNIT – III

Directional Drilling, Well Planning, Two Dimensional, Horizontal, Tools, Techniques, MWD, surveying – Radius of Curvature, Long’s Method – Errors, Muds, Mud Use, Property measurements, Types, - Pneumatic (Air, Gas, Mist, Foam), Water based, Oil based, solids Control, Definitions, Equipment, Problems, Contaminations Effect.

UNIT – IV

Hydraulics, Classifications of Fluids, Rheological Models – Rotary Drilling Hydraulics – Jet Hydraulic Optimizing and Maximizing – Circulations Rate Selection – Drill Bit – Jet Sizing – Equivalent Circulations Density, Hole Cleaning. Theory – Vertical and Deviated Holes, Annular Velocities – Carrying Capacity – Pills and Slugs.

UNIT – V

Origin of Overpressure, Kick Signs, shut –in Procedures, Kill sheets, Kill Procedures, Driller’s Methods – Engineer’s Method (Wait and Weight)

References

- a) ‘Oil Well Drilling Engineering, Principles And Practices’: Rabia.H. , Graham And Trotman Ltd. 1985.
- b) ‘Fundamentals Of Formation Evaluation’: D.P Helander
- c) Applied Drilling Engineering: SPE Text Book series vol-2
- d) Drilling and Well completion : Carl Gatlin
- e) Petroleum Engineering ,Drilling and well Completion: Gatlin C ,Prentice Hall Inc1960

- f) Standard Handbook of Petroleum and Natural Gas Engineering, 2nd Edition, William C Lyons, Gary C Pilisga, Gulf Professional Publishing.
- g) Drilling Engineering : Neal J.Addmas , Penwell

PRACTICAL

03BPE -201

PETROLEUM ENGINEERING PRACTICAL 1

Course/Paper: 03 BPE -201

BPE Semester-III (Drilling fluids lab)

- a) Measurement & control of the basic Property of Drilling Fluids(density ,Viscosity ,Filtration Lubricity & Electrochemical Properties)and cement slurries(Density, Viscosity, Filtration ,Thickening time.)
- b) Testing methods of refinery products—Volatility, Viscosity ,Melting Point, Oxidation, Combustion, Corrosion Ash ,Carbon Residue ,Density & Sp. Gravity ,Gas Chromatography ,Saponification Value of oil ,P H Test
- c) General processing& crude distillation
- d) Cementing techniques
- e) Drilling practices
- f) Drilling technology operations

03BPE -202

GEOLOGY FOR PETROLEUM ENGINEERS PRACTICAL

Course/Paper: 03 BPE -202

BPE Semester-III

1. Normal Consistency of cement
2. Initial & final setting time of cement
3. Compressive strength of cement
4. Fineness of cement by air permeability and Le-chatalier's apparatus.
5. Soundness of cement.
6. Tensile strength.

II. Coarse Aggregate:

1. Crushing value of aggregate
2. Impact value of aggregate
3. Water absorption of aggregate
4. Sieve Analysis of aggregate
5. Specific gravity, bulk density
6. Grading of aggregates.

III. Fine Aggregate:

1. Sieve analysis of sand
2. Silt content of sand
3. Bulking of sand

IV. Lime:

1. Fineness of lime
2. Setting time and soundness of lime.
- V. Physical and mechanical properties of reinforcing steel.

VI. Bricks:

1. Water absorption
2. Dimension Tolerance
3. Compressive Strength
4. Efflorescence.

VII. Geology:

1. Megascopic study of minerals (physical properties and identification).
2. Determination of Specific Gravity of minerals.

3. Megascopic study of the following rocks with special reference to their suitability in Civil Engineering works
 - (a) Igneous rocks
 - (b) Sedimentary rocks
 - (c) Metamorphic rocks
4. Determination of strike and dip & completion of outcrop.
5. Preparation of geological section and study of geological maps with emphasis on the site Selection for dams, tunnels and highways.

03BPE- 203

THERMAL ENGINEERING LAB. I

Course/Paper: 03 BPE -203
BPE Semester-III

LIST OF EXPERIMENTS:

Group I:

1. Comparative study of 4 - stroke Petrol and Diesel Engines
2. Comparative study of 2 - stroke Petrol and Diesel Engines
3. Study of fuel supply system for Petrol engines
4. Study of fuel supply system for Diesel engines
5. Study of Cooling, lubrication and ignition system in diesel and petrol engines

Group - II:

1. Study of various types of Boilers
2. Study of various boiler accessories and mountings
3. Study of various types of Dynamometers
4. Study of Multi usage Compressor and perform load test

Group - III:

1. To determine B.H.P. and break thermal efficiency of a 4 - stroke diesel engine
2. Study of vapor compression refrigeration system and to find out actual C.O.P. of the system
3. To determine the volumetric composition of exhaust gases and to determine the specific heats and gas constant of the mixture.

03BPE-204

GEOPHYSICAL LAB

Course/Paper: 03 BPE -204
BPE Semester-III

NAME OF EXPERIMENTS

1. Determination of Resistivity for various rock structures.
2. Determination of Gravity for various sedimentary formations.
3. Determination of Magnetic method for various lithostratigraphic beds.
4. Determination of Seismic Methods.

IV Semester Petroleum Technology

04 BPE -101:

ELEMENTS OF PRODUCTION ENGINEERING

Course/Paper: 04 BPE -101
BPE Semester-IV

1. Characteristics of crude oil and natural gas, classification of crude and its physicochemical properties.
2. Introduction to oil & gas field development.
3. **Well equipment:** Christmas tree, valves, hangers, flow control devices, packers, tubular and flow lines.
4. **Introduction to Well completion:** Systems, types and applications.
5. **Introduction to Processing in oil fields:** GGS/CTF - layout, sequential treatment, separation, storage and transportation of petroleum.

6. **Introduction to well servicing and stimulation system** - objectives and applications; Production problems.
7. Principles of crude oil refining process; Natural gas processing and utilization.
8. Introduction to petrochemicals. Value added products from fossil fuels.

References

- a) Gas Production Engineering : S.Kumar-Gulf Publishing co,1987
- b) Principles of Well Production : T.E.W .Nind ,Mc .Graw hill book Co Ltd New York 1981,ISBN 0070465762
- c) Production Operations :: T.O. Alen and A.P. Roberts , SPE volume 14 edition

04 BPE -102:

ELEMENTS OF RESERVOIRS ENGINEERING

Course/Paper: 04 BPE -102 BPE Semester-IV

UNIT – I

Fluid characteristics. Introduction to the production system. Characteristics of the reservoir rocks. Porosity, Flow of Fluids through Porous Media Permeability cross plots. Fluid saturation, capillary pressure. Reservoir Pressure Measurements and Significance, . PVT properties and application

UNIT – II

Multi phase flow: Relative permeability: fractional flow. Well performance – inflow performance, tubing performance., Reserve estimation

UNIT – III

Well testing – Basic well testing theory – oil well testing: gas well testing – Practical well testing – Gas field reservoir engineering – Fluid phase behaviour – Gas in place volumes and recovery estimations. Reservoir testing and performance analysis: well test – drill stem tests (DST); production tests, pressure tests on gas wells; formation interval testing and other well testing techniques. Coning of water and gas; effects of partial penetration.

UNIT – IV

Material balance techniques: Production forecasting – Gas condensate reservoir engineering Fluid phase behaviour development – options.

UNIT – V

Well performance – Reservoir management and simulation – reservoir data acquisition – Reservoir simulation. Mathematical basis of bottom hole analysis; Differential equations for radial flow in a porous medium. Pressure draw down and build up analysis

References

- a) Fundamental of Reservoir Engg by L.P Dake
- b) Petroleum Reservoir Engg by Amyx, McGraw Hill 1998
- c) Reservoir Engg by Dandekar
- d) Applied Petroleum Reservoir Engineering ,Craft B.C and Hawkins M.F , Prentice Hall Engle wood cliffs,N J 1991
- e) Practice of Reservoir Engineering :Dake L P ,Elsevier 2001
- f) Standered Hand Book of Petroleum & Natural Gas engineering ,William C Lyons ,J Plisga, Gulf Publishing Burlington USA 2005

04 BPE -103:

FLUID MECHANICS

Course/Paper: 04 BPE -103 BPE Semester-IV

COURSE CONTENT:

UNIT - 1

Basic Definitions and Fluid Properties ; Definition of Fluid, Incompressible and compressible fluids, Fluid as a continuum, Mass, Density, specific weight, relative density, specific volume, Bulk modulus, velocity of sound Ideal fluid Viscosity. Newtonian and Non -

Newtonian fluid, Kinematic viscosity, Effect of temperature and pressure on viscosity, surface tension capillarity, vapour pressure and cavitations.

Fluid Static's : General differential equation, Hydrostatics Manometry, Fluid forces on submerged surfaces. Curved surfaces, Aerostatics, Isothermal atmosphere, polytropic atmosphere. The international standard atmosphere, static stability The international standard atmosphere submerged bodies. Floating bodies.

UNIT - 2

Kinematics and conservation of Mass : Flow classifications. Fluid velocity and acceleration, streamlines and the stream function. Pathlines and streak lines. Deformation of a fluid element, vorticity and circulation. Irrotational and Rotational flow. Flownet, Laplace equation. Conservation of mass and the continuity equation for three dimensions.

Fluid Momentum : The Momentum theorem Applications of the momentum theorem Equation of motion, Euler's equation of motion Integration of Euler's equation of motion. Bernoulli's equation. Applications of Bernoulli's Pitot tube, Equation of motion for Viscous fluid, Navier Stoke's equation.

UNIT - 3

Orifice discharging free, Jet, vena contracts, co-efficient of contraction, velocity and discharge, coefficient of resistance. Orifices and mouthpieces Nozzles and weirs. Flow Through Pipes : Reynold's experiment Darcy's Weisback equation. Loss of head due to sudden enlargements, contraction, entrance, exit obstruction, bend, pipe fittings. Total and Hydraulic gradient lines, Flow through pipe line. Pipes in series, parallel Transmission of power through pipes.

UNIT - 4

Laminar Flow: Simple solution of Navier Stokes equations. Hagen – Poiseuille flow. Plans Poiseuille flow and Couette flow.

Turbulent Flow; Variation of friction factor with Reynold's number. The Prandtl Mixing length hypothesis applied to pipe flow, velocity distribution in smooth pipes, rough pipes. The Universal pipe friction laws, Colebrook. White formula.

Dimensional Analysis: Buckingham variables, Model Similitude, Force ratio, Reynolds, Froude's Mach, Weber and Euler numbers and their applications. Undistorted model distorted model scale effect.

UNIT - 5

The Boundary Layer: Description of the boundary layer. Boundary Layer thickness boundary layer separation and control. The Prandtl boundary layer equation. Solution for laminar boundary layer. The momentum equation for the boundary layer. The flat plate in uniform free stream with no pressure gradients. Approximate momentum analysis laminar boundary

Aerofoil Theory. Flow round a body; Drag skin friction drag, pressure drag, combined skin friction & pressure drag (Profile drag) wave drag, lift induced drag. Flow past sphere & Cylinder

References

- a) Engineering Fluid Mechanics : K.L.Kumar, Eurasia Publishing House Pvt Ltd
- b) Fluid Mechanics and Machines : F.M. White ,John Wiley & Sons
- c) Fluid Mechanics and Machines: A.K. Jain
- d) Fluid Mechanics: V.L. Streeter, Mc Graw Hill
- e) Fluid Mechanics and Hydraulic Machines: R.K. Bansal, Laxmi Publication New Delhi
- f) Fluid Mechanics With Applications : S.K.Gupta V.Gupta, New Age Publications
- g) Fluid Mechanics for Chemical engineers : Noel de Nevers ,Mc Graw Hill III Edition 1991
- h) Fluid mechanics for chemical engineers: James O wikes and Stacy G Bikes, Prentice Hall PTR (International series in chemical engineering) 1999

04BPE-104:

ENVIRONMENTAL ASPECTS IN OIL AND ALLIED INDUSTRIES

Course/Paper: 04 BPE -104 BPE Semester-IV

Industrial pollution and its impact. Magnitude of industrial waste, Legislative regulations. Recycle and reuse of, waste water , recovery of by/c0- product from industrial effluents. Philosophy of waste treatment, scope of air and water

pollution problems, economic considerations of waste disposal, separation and segregation of wastes, gaseous, liquid and solid waste disposal with special reference to oils and allied, product processing. Waste Management Pollution prevention and environment Management system ISO 14000. Waste audit, Quality, management systems, Different regulation means & acts for air, water& solid pollution control.

WASTE LIQUID TREATMENT:

Pretreatment methods, centrifugation filtration, evaporator and concentrator, extraction and distillation, treatment of, dilute wastewater. Treatment

requirements, Neutralization liquid-solid separation, biological oxidation, plant control, programme, absorption, liquid phase system, reclamation of waste water effluent and by-product recovery, ion exchange system, acid and alkali purification, continuous ion-exchange,. Case studies on vegetable oil processing, soaps and detergents.

WASTE GAS TREATMENT:

Air pollution control by mechanical method: mechanical collectors, electrostatic precipitator, filters, wet scrubbers, vapour phase system, activated

carbon. Typical air purification system.

References

- a) Gilbert.M.Masters, 'Introduction to Environmental Engineering and Science, 2nd Edition Pearson Education 2004.
- b) T.G.Miller, 'Environmental Science' Wads Worth publishing Co.
- c) C.Townsend.J.Harper and Michael Bgon, 'Essentials of Ecology' Blackwell Science.
- d) R.K.Trivedi and P.K. Goel' Introduction to Air pollution Techno science publications.
- e) Bharuche Evach, 'The Biodiversity of India' Mapin Publishing Limited, Ahmedabad, India.
- f) 'R.K. Trivedi' handbook of Environmental laws, Rules, Guidelines, Compliances and Standards, Vol I and II, Enviromedia.
- g) Cunningham.W.P.Cooper, T.H.Gorhani, Enviromental Encyclopedia. Jaico Publication House, Mumbai.

04 BPE - 105

NUMERICAL AND STATISTICAL METHODS

**Course/Paper: 04 BPE -105
Semester-IV**

Unit 1 Forward, backward , central and Divided differences, Newton's formula of interpolation for equal and unequal intervals. Lagrange's interpolation formula, Stirling's and Bessell's formula,

Unit 2

Solutions of systems of equations (Gauss elimination, Gauss Jordan, and Partition method for linear system of equations, power method for partition, method for linear system of equations, power method for finding eigen values),

Unit 3

Numerical differentiation, Numerical Integration:- Trapezoidal, Simpson's rule and Gaussian integration (only formula applications) Differential equations and their solutions. Numerical methods for ordinary differential equations (Picard method, Taylor series method, Euler's method, Ranga Kutta Method, Predictor- corrector method, Adams- Bashforth method).

Unit 4

Sampling theory: Introduction: Moments, Moment generating functions, Skewness, Kurtosis, Correlation and Regression, Normal sampling distributions; Binomial distribution, Poisson distribution, Normal distribution; Sampling distribution of the means; sampling distribution of the differences of the means; sampling distributions of proportions.

Unit 5

Tests of Significance; t-distributions, chi square distributions, F-distributions. Regression And Correlation; Linear regression; correlation, multiple correlation & partial correlation Confidence Limits; Large samples, small samples, error bands in regression

Reference

- a. Numerical Methods and Applied Statistics : Nupur Srivastva,Dr Anita Bhagora Dr Vivek Kumar Sharma—

- Geneous Publication Jaipur
- b. Numerical Methods and Applied Statistics: Gokharoo, Jain ,Pareekh –Unique Publication Ajmer
 - c. Computer Based Numerical & Statistical Techniques: Udit Aggarwal- Dhanpat Rai Publication Delhi

04 BPE -106

SURVEYING

**Course/Paper: 04 BPE -106
BPE Semester-IV**

Surveying, Distance measurement by chain and tape, Electronic Distance Measurement (EDM), chain Surveying, compass traversing. Leveling, Theodolite, Traversing with a theodolite, Total Station, Global Positioning System (GPS)

References

- a) Arora,K.R."Surveying" Volume I & II.
- b) Punmia,B.C. "Surveying" Vol. I & II. Laxmi publication
- c) Principles and use of surveying instruments by Clendinning and oliver.
- d) Kanitkar "Surveying"
- e) Duggal S.K., "Text book-Surveying" Vol. I & II.

PRACTICAL:

04BPE201

PETROLEUM ENGINEERING PRACTICAL LAB II

**Course/Paper: 04 BPE -201
BPE Semester-IV**

(Production and Product Testing Lab.)

1. Petroleum refining processes and operation.
2. Testing of Thermal cracking,
3. Checking of catalytic cracking,
4. Study of hydro-forming, catalytic reforming, alkylation's, polymerization, isomerisation
5. Study of breaking, de-waxing & de-asphalting operations
6. Study of: Liquid, Solid and gas lubricants.
- 7 Study of lubricating greases: properties ingredients & additives

04BPE202

TRANSDUSER & MEASUREMENT LAB

**Course/Paper: 04 BPE -202
BPE Semester-IV**

1. Study the performance of piezo electric transducer for measuring acceleration.
2. Plot the characteristic of potentiometric transducer.
3. To draw the V-I characteristics of Solar panel.
4. To study the operation of Hall effect transducers.
5. Study the performance for measuring distance using ultrasonic transmitter and receiver.
6. Study the performance for measuring displacement-using LVDT.
7. Draw the characteristics for the following temperature transducers: (a) RTD (Pt-100) (b) Thermistors (c) Thermocouple
8. To study and draw the characteristics of LDR.
9. Measure the speed of *table* fan by using stroboscope.
10. Measurement of strain/force with the help of strain gauge load cell.
11. Study the various pressure and force sensors.
12. Study the Flapper Nozzle mechanism

04BPE203

SURVEYING LAB-I

Course/Paper: 04 BPE -203

BPE Semester-IV

1. Ranging and Fixing of Survey Station.
2. Plotting Building Block by offset with the help of cross staff.
3. To determine the magnetic bearing of a line a.
Using surveyor's compass
- b. Using prismatic compass
4. Measurement and adjustment of included angles of traverse using prismatic compass.
5. To determine the reduced levels using Tilting Level.
6. To determine the reduce levels in closed circuit using Dumpy Level.
7. To carry out profile leveling and plot longitudinal and cross sections for road.
8. To carryout temporary adjustment of Theodolite.
9. Measurement of horizontal angle.
 - a. By method of repetition.
 - b. By method of Reiteration.
10. To determine the tachometric constant.
11. To determine the horizontal and vertical distance by tachometric survey.
12. To study the various minor instruments.
13. To determine the area of a figure using a planimeter.

04BPE204

FLUID MECHANICS LAB

Course/Paper: 04 BPE -204

BPE Semester-IV

LIST OF EXPERIMENTS:

1. Determine Metacentric height of a given body.
2. Determine Cd, Cv & for given orifice
3. Determine flow rate of water by V-notch.
4. Determine velocity of water by pitot tube.
5. Verify Bernoulli's theorem.
6. Determine flow rate of air by Venturi meter.
7. Determine flow rate of air by orifice meter.
8. Determine head loss of given length of pipe
9. Determine flow rate of air by nozzle meter.
10. Study of Pelton, Kaplan Turbine models.

V Semester Petroleum Technology

05 BPE -101:

THERMODYNAMICS OF PETROLEUM RESERVOIR FLUIDS

Course/Paper: 05 BPE -101

BPE Semester-V

Maxwell relations and basic thermodynamic relations, Work calculation, Thermodynamics of Gases and Liquid Hydrocarbons, Perfect & imperfect gaseous mixtures, Equation of state, Law of corresponding states, Joule Thompson

effect, Fugacity and fugacity coefficient of gases and gaseous mixtures, Solution Thermodynamics, Phase Rules, Statistical Thermodynamics

Books

- a) Engineering thermodynamics : P.K. Nag, Tata Mc-Graw Hill Publishing Ltd., New Delhi Mc Graw Hill
- b) Engineering thermodynamics: C.P. Gupta, Rajendra Prakash, Nemi Chand & Bros
- c) Thermodynamics by-Yunus A Cengel (university of Nevada Reno & Michall A Boles North Caralina State University (Publisher Tata MC Graw hill)
- d) Chemical Engg Thermodynamics by—Pandey and chaudhri
- e) Chemical Thermodyamics : J.C.Vanness In India adopted by B.I Bhatt Ahemdabad Publisher Tata MC Grawhill

05 BPE -102:

PETROLEUM PRODUCTION OPERATION

Course/Paper: 05 BPE -102

BPE Semester-V

Well completion, Well equipment, Drill Stem Tests, Vertical Lift Performance, Design & analysis of artificial methods of Petroleum Production. Field development, Processing in oil fields, Introduction to well servicing and stimulation system, Principles of refining process, Natural gas processing and . Introduction to petrochemicals. Value added products from fossil fuels. Flow measurement system, Liquid level controllers ,Emulsion Problems ,oil emulsions ,Emulsifying agents and demulsifies oil storage & tank farms, gauging & sampling ,quality control ,Underground storage system ,Water disposal ,corrosion, Water injection Systems ,Subsurface equipments

References

- a) Gas Production Engineering : S.Kumar-Gulf Publishing co,1987
- b) Principles of Well Production : T.E.W .Nind ,Mc .Graw hill book Co Ltd New York 1981,ISBN 0070465762
- c) Production Operations :: T.O. Alen and A.P. Roberts , SPE volume 14 edition

05 BPE -103:

APPLIED ELECTRICAL ENGINEERING

Course/Paper: 05 BPE -103

BPE Semester-V

3-phase induction motor. Ward- Leonard method of speed control for DC motor. Thyristor controlled variable speed AC and DC motor. Electrical power distribution, Load factor, Sub-station arrangement. Protective relays, Power Cables, Intrinsically safe circuits. Diesel-electrical oil rigs IE rules applied to oilfields.

Books

- a) A Course in Power System :J.B. Gupta ,Publisher S.K. Kataria & Sons New Delhi
- b)Electrical Machines : P.S. Bhimbra , Khanna Publishers New Delhi
- c)Electric Drives & Control: J.K. Dubey
- d)Electrical Machines : H. Cotton

05 BPE-104:

SEDIMENTARY AND PETROLEUM GEOLOGY

Course/Paper: 04 BPE -104

BPE Semester-V

Sedimentary rocks, structures morphology and Role of sediment logy in petroleum exploration. Origin, migration & entrapment of oil. Petroleum Geology of producing Indian oil fields. Porosity and Permeability relationship – Porosity. Permeability. Porosity – Permeability relationship. Electrical properties of rocks. Measurement of formation resistivity. Correlation of FR with porosity, permeability and water saturation. FR of Shaley Reservoir rocks. Effect of stree on porous rocks. Formation evaluation

References

- a) Applied Petroleum Reservoir Engineering : Craft B.C and Hawkins M.F. ,Prentice hall 1991
- b) Theory and practice of Measuring Reservoir Rocks and Fluid Transport Properties : Djebbar Tiab
- c) Introduction to Petroleum Geology----- G.D. Hobson & E.L. Tiratsoo
- d) Principles of Sedimentology and Stratigraphy: Boggs S., Merrill Publishing co Toronto 1995
- e) Petroleum Reservoir Engineering : Amyx J W. Bass D.M., and Whiting R.L. ,Mc Graw Hill 4998

05 BPE -105:

APPLIED PETROLEUM RESERVOIR ENGG AND MANAGEMENT

Course/Paper: 05 BPE -105

BPE Semester-V

Production behavior of gas, gas condensate and oil reservoirs. Generalized MBE etc. Drive mechanism and recovery factors. Performance prediction and reservoir pressure maintenance.

Geology of Reservoirs, Rock & fluid Properties Reservoir system, Reservoir Heterogeneities/Anisotropies .Geo statistics in Reservoir characterization

Reservoir management concepts and Processes, Fundamentals, Data acquisition, Interpretation and integration, Treatment of fractional flow & front. Reservoir modeling and simulation for reservoir management.

, Integration of Exploration and development technology

Reservoir Performance analysis and Prediction .conservation of Reservoir Energy ,Influence of Reservoir structure on water control .Reservoir Economics ,Risk and un certainties, Economic evaluation and optimization

Application of Improved Recovery Processes, New Drilling and completion and production technology , Use of artificial intelligence

References

- a. Applied Reservoir Engineering Second edition :craft B.C. and Hawkins M.F. Prentice Hall 1991
- b. Mathematical Methods and modeling in Hydrocarbon exploration and production Part I and II : Amin Iske and Trygve Randen ,Springer 2004
- c. Practical Reservoir Simulation : Carlson M.,Penwell2003
- d. Integrated Petroleum Studies :Cossentino, Technip 2001
- e. Reservoir Simulation : Mattex CC and Dalton R.L ,SPE textbook Series 1984
- f. Integrated Petroleum Reservoir Management : Satter A. and Thakur G.C , Penwell Pubs 1994
- g. Reservoir Management: Dallas , SPE Reprint series 1998

05 BPE -106:

UNIT OPERATIONS AND PROCESS ENGINEERING

Course/Paper: 05 BPE -106

BPE Semester-V

UNIT I

Methods of expressing compositions of mixture and solutions, wet and dry basis concept. Ideal and real gas laws – Gas constant – normal molal volume, calculations of pressure, volume and temperature using ideal gas law. Gas mixtures – Use of partial pressure and pure component volume in gas calculations.

UNIT II

Concept of material balance: Application of material balance to unit operations like distillation, evaporation, drying, crystallization and mixing,-Material balance involving key components, Recycle and by passing operations – concept of purge.

UNIT III

Material balance with chemical reaction:Limiting and excess reactants – Degree of completion, Application of material balance to various types of chemical reactions .Calculation of absolute humidity, molal humidity, relative humidity and percentage humidity – Dew point – Use of humidity in

condensation and drying – Wet and dry bulb temperatures, Humidity chart, solving problems using psychrometric charts.

UNIT IV

Calculation of orsat analysis of products of combustion of solid, liquid and gas fuels – Calculation of hydrogen to carbon ratio and percentage excess air from flue gas analysis, calculation of sulphur and sulphur compounds burning operations)

UNIT V Heat capacity of solids, liquids, gases – mean heat capacity – calculation of sensible heat using heat capacity, Kopp's rule, various types of latent heats. Energy balances – enthalpy data including steam tables and psychrometric charts, heat capacity data, phase change, mixing, heat of solutions, heat of formation, combustion and reaction.

Text Books :

1. Batt, B.L Vora, S.M. "Stoichiometry" 3rd Edition, Tata Mc.Graw – Hill, 1996.
2. Himmelblau, D.M. "Basic Principles of Calculations in Chemical Engineering" EEE, Sixth Edition, Prentice Hall Inc. 2003.
3. K.V.Narayanan & B.Lakshmikutty, Stoichiometry and Process engineering calculations, Prentice Hall Inc. 2006.

Reference Books:

1. Houghen O.A, Watson K.M. and Ragatz R.A, "Chemical Process Principles" Part I, CBS Publishers (1973).
2. Warren K.Lewis, Arthur.M, Radash & H.Clay Lewis, "Industrial Stoichiometry, Mc.Graw Hill Book Co., New York, 1995.

PRACTICAL:

05BPE201

CAD LAB

Course/Paper: 05 BPE -201
BPE Semester-V

- A. Turbo C Graphics:** To make C programs to Animate/ different Mechanisms:
 1. Slider Crank Mechanism
 2. Quick Return Mechanism
 3. Cam Follower etc.
- B. Auto CAD**
 1. To make a component drawing.
 2. To make a assembly drawing.
 3. To make sectional views using concept of layers
 4. To develop 3D surface models
 5. To develop 3D solid models
 - 6.
- C. MINI PROJECT** Using Turbo C/ Auto CAD

05BPE202

SEDIMENTRY & PETROLIUM GEOLOGY PRACTICAL

Course/Paper: 05 BPE -202
BPE Semester-V

1. Physical Properties of Minerals
2. Physical Properties of Rocks
3. Identification of Minerals in Hand Specimen
4. Identification of Rocks in Hand Specimen
5. Identification of Geological features through wooden Models
 - a) Structural Geological Diagrams

- b) Petrological Diagrams
- c) Engineering Geological Diagrams
- 6. Interpretation of Geological Map (10 Nos.)
- 7. Dip & Strike Problems (8 Nos.)
- 8 Estimation of Thickness, distance &Depth of ore body
- 9 Estimation of Throw &nature of the faults
- 10 Identification of important sedimentary rocks in Microscopic level

05BPE203

PROD. ENGG. LAB

Course/Paper: 05 BPE -203

BPE Semester-V

1. Study of foundry shop equipment.
2. To Prepare mould of a given moulding sand sample
3. To determine the moisture content in the given moulding sand
4. To determine the permissibility of the given sample of moulding sand
5. To study the sieve shaker equipment and to determine the grain fineness number of a given sample
6. To perform the clay content test

SHEET METAL SHOP

To prepare a funnel and solder to joint

WELDING SHOP

Demonstration of various welding defects and dye penetrate test.

PATTERN SHOP

1. To prepare a two piece pattern as per draw
2. To prepare a pattern with core prints and a core box draw
3. For the job given, prepare a drawing with all types of allowances and casting consideration. Show the position of riser runner, chills & chaplets etc, needed for directional solidification Drag.
4. Quiz and Viva based on the above shops at an appropriate time will be arranged

TURNING SHOP

1. Study of lathe machine, lathe tools, cutting speed, feed and depth of cut
2. To perform step turning, knurling & chamfering on lathe machines per drawing.
3. Taper turning by tail stock off-set method and to grind it by grinding attachment as per drawing
4. To taper turn using turning attachment as per drawing
5. To perform square threading, drilling and taper turning by compound rest as per drawing

METROLOGY:

1. Study of the following measuring instruments. Vernier Calliper, Vernier height gauge, depth micrometer, inside, outside micrometer.
2. Study & use of bevel protector and combination set.Quiz and Viva based on the above shop will be arranged at an appropriate time
- 3 To calibrate pneumatic comparator and measure taper of a given work piece.

05BPE-204

SURVEYING PRACTICALS

Course/Paper:05BPE-204

BPE Semester V

1. To determine the height of an object by trigonometrically leveling (Single plane method)
2. To determine the height of an object by trigonometrically leveling (two plane method)
3. To determine the height of an unknown point by double leveling
4. To measure and adjust the angle of a braced quadrilateral
5. To prepare a contour map by indirect contouring
6. To prepare a map of a given area by plane tabling
7. To carry out leveling through help of a theodolite.

VI Semester

VI Semester Petroleum Technology

06 BPE -101:

DRILLING SYSTEM DESIGN AND DIRECTIONAL DRILLING

Course/Paper: 06 BPE -101

BPE Semester-VI

Casing Design, Cementing Practices, , Directional Drilling, and methods tools, Well Surveying, Measurements While Drilling etc.

Well Planning, Two Dimensional, Horizontal, Tools, Techniques, MWD, surveying – Radius of Curvature, Long’s Method – Errors, Muds, Mud Use, Property measurements, Types, - Pneumatic (Air, Gas, Mist, Foam), Water based, Oil based, solids Control, Definitions, Equipment, Problems, Contaminations Effect.

Hydraulics, Classifications of Fluids, Rheological Models – Rotary Drilling Hydraulics – Jet Hydraulic Optimizing and Maximizing – Circulations Rate Selection – Drill Bit – Jet Sizing – Equivalent Circulations Density, Hole Cleaning. Theory – Vertical and Deviated Holes, Annular Velocities – Carrying Capacity – Pills and Slugs.

References

- a) Drilling & Casing Operations : J.A. Jim Short , Penwell Publishing Company South Sheridan Road Tulsa Oklahoma 74101
- b) Drilling engineering & Well completion: A.A Khan ,Mishra ,R. Pataria
- c) Petroleum Engineering ,Drilling and well Completion: Gatlin C ,Prentice Hall Inc 1960
- d) Well Design Drilling & Production : Craft B.C. et al Prentice Hall 1962

06 BPE -102:

PETROLEUM FORMATION EVALUATION

Course/Paper: 06 BPE -102

BPE Semester-VI

UNIT – I Aims and objectives of well logging. Direct Methods and Indirect Methods Special Type of Logging Tools Reservoir formations. Borehole conditions. Fundamental concepts in borehole geophysics physical properties of reservoir rocks. Formation parameters and their relationships: formation factor, porosity, permeability, resistivity, water and hydrocarbon saturations, and movable oil. Archie’s and Humbles equations.

UNIT – II Principles, instrumentation, operational procedures and applications of different geophysical logs: S.P., electrical, induction, nuclear, sonic, caliper, temperature, dip and direction. Natural gamma ray spectrometry log, nuclear magnetic log, litho density log, neutron activation technique, thermal neutron decay time log, chlorine and oxygen logs.

UNIT – III Recording, transmission and processing of log data. Formation evaluation for hydrocarbons. Qualitative and quantitative interpretations of well log data. Overlays and cross-plots. Determination of reservoir parameters – porosity, resistivity, permeability, water and hydrocarbon saturation, movable oil. Lithology determination by neutron, density and sonic cross-plots, dual mineral method, triporosity method, litho porosity cross-plot (M-N plot), clean sand and shaly sand interpretations.

UNIT – IV Sub-surface correlation and mapping from log data. Delineation of fractures from logs. Production logging. Well logging for metallic and non-metallic minerals: radioactive and non-radioactive evaporates, coal, sulphur. Borehole geophysics for groundwater exploration. Effective pay thickness of an aquifer. Saline water-fresh water interface from log data. Determination of groundwater flow direction by logs.

UNIT – V Theoretical computations of normal and lateral log responses. Identification and delineation of sub-surface formations from well log data. Calculation of reservoir parameters: formation factor, porosity, permeability, resistivity, water and hydrocarbon saturations, and movable oil. Sub-surface correlation of formations and interpretation of field data.

References

- a) Oil well Drilling Technology: Mc Craycole , Oscar Publication
- b) Well Logging and Formation Evaluation (Gulf Drilling Guides): [Darling](#), Gulf Professional Publishing 2005 ,**ISBN-10:** 0750678836 **ISBN-13:** 978-0750678834

06 BPE -103:

NATURAL GAS ENGINEERING

Course/Paper: 06 BPE –103

BPE Semester-VI

UNIT – I Natural gas technology and earth science: Branches of petroleum Industry. Sources of Information for natural gas engineering and its applications. Geology and earth sciences: Earth sciences-Historical geology, Sedimentation process, Petroleum reservoirs, Origin of petroleum. Earth temperatures & pressure, Earth pressures, Earth pressure. Petroleum: Natural gas, LP gas, Condensate, & Crude oil.

UNIT – II Properties of Natural Gases: and hydrocarbon, Liquids. typical compositions. Equations of state: general cubic equations, specific high accuracy equations. Use of equation of state to find residual energy properties, gas measurement gas hydrates, condensate stabilization, acid gas treating, gas dehydrations, compressors, process control deliverability test, gathering and transmission, and natural gas liquefaction.

UNIT – III Gas Compression: Positive displacement and centrifugal compressors; fans. Calculation of compressor requirements. Compressible Flow in Pipes: Fundamental equations of flow: continuity, momentum, energy equations.

UNIT – IV Isothermal flow in pipes: the Weymouth equation. Static and flowing bottom-hole pressures in wells. Fundamentals of Gas flow in porous media: Steady state flow equations. Definition of pseudo-pressure function.

Transmission of Natural Gas, Underground storage and conservation Gas flow in cylindrical reservoirs: general equation for radial flow of gases in symmetrical homogeneous reservoirs

UNIT – V Non-dimensional forms of the equation; derivation of coefficients relation dimensionless to real variables.

Infinite reservoir solution: Pseudo-steady-state solution. Gas Well Deliverability Tests: Flow-after-flow tests: prediction of IPR curve and AOF for the well. Isochronal tests. Draw down tests: need for data at two flow rates.

Sweetening and Processing for LPG, LNG, CNG, system., Unconventional source of Gas

References

- a) Natural Gas Engineering (Production & Storage): Katz D.L.etal ,Mc Graw –hill Singapore
- b) Slandered Hand Book of Petroleum & Gas Engineering II Edition William C Plisga< Gulf Professional Publishing
- c) Gas Production Operations : Beggs DH ,Technip1984
- d) Gas reservoir Engineering : LeJ Wattenbarger R a ,Society of Petroleum engineers TX USA 1996
- e) Natural Gas production engineering : Ikoku Chi, John Wiley and Sons 1984
- f) Gas Production Engineering :Kumar Sanjay, Gulf Professional publishing TX USA 1987
- g) Hand Book ofNatural Gas Transmission & Processing : Mokhatab S Poe and W A & Speight , Gulf Professional Publishing 2006

06 BPE -104:

HEAT AND MASS TRANSFER

Course/Paper: 06 BPE -104

BPE Semester-VI

UNIT I

Introduction to various modes and mechanisms of heat transfer. Fourier's law of heat conduction – one dimensional steady state heat conduction equation for flat plate, Composite walls, Hollow cylinder, Rate equations. Heat conduction

with heat generation, Thermal conductivity measurement, Effect of temperature on thermal conductivity. Critical radius of insulation, Heat transfer in extended surfaces, Transient heat condition

UNIT II

Concepts of heat transfer by convection – Natural and forced convection, analogies between transfer of momentum and heat transfer. Reynolds's analogy, Prandtl and Colburn analogy. Dimensional analysis in heat transfer. Correlations for calculation of heat transfer co-efficient, heat transfer co-efficient for flow through a pipe, Free convection. Heat transfer to fluids with phase change – heat transfer from condensing vapors, dropwise and film wise condensation, Nusselt's equation for vertical and horizontal tubes, effect of non-condensable gases on rate of condensation.

UNIT III

Parallel and Counterflow heat exchangers – Log Mean Temperature Difference – single pass and multipass heat exchangers, plate heat exchangers. Effectiveness by using NTU, Fouling factors design of various types of heat exchangers.

UNIT IV

Diffusion in fluids – Molecular and eddy diffusion measurement and calculation of diffusivities. Ordinary diffusion in multi component gaseous mixtures. Difusional heat transfer based on shell balances approach for one-dimensional steady state and transient transfer with heat.

UNIT V

Fluid dynamics in Porous Media – Hydrostatic pressure and geothermal gradients. Porosity – permeability relationships and rock microstructure. Diffusivity equation steady state, pseudo-steady state and transfer flow Radial flow and well models. Skin, partial penetration and well productivity index. Horizontal wells. Gas flow and Klinkenberg effect.

Text Books:

1. Neol de Nevers, "Fluid Mechanics for Chemical Engineers." II Edition, McGraw Hill 1991.
2. James O.Wilkes and Stacy G.Bikes, "Fluid Mechanics for Chemical Engineers" Prentice Hall PTR (International Series in Chemical Engineering) – 1999
3. McCabe W.L.Smith, J.C and Harriot..P "Unit operations in Chemical Engineering", McGraw Hill, V Edition, 2001.

Reference Books:

1. White F.M., "Fluid Mechanics", IV Edition, McGraw – Hill Inc. 1999.
2. Bireswar Majumdar, "Fluid Mechanics", PHI Learning Private Limited, 2011.
3. R.K.Bansal "Fluid mechanics and Hydraulic machines" laxmi publications(P) Ltd, 1983
4. A.K Mohanty, "Fluid Mechanics" PHI Learning Private Limited, 2010.

06 BPE -105:

OBJECT ORIENTED PROGRAMMING AND ADVANCED NUMERICAL METHODS

Course/Paper: 06 BPE -105

BPE Semester-VI

UNIT 1

Introduction to Object Oriented Programming: Basic concepts: Class, Object, Method, Message passing, Inheritance, Encapsulation, Abstraction, Polymorphism.

UNIT 2

Basics of C++ Environment: Variables; Operators; Functions; user defined, passing by reference, passing an array to the function, inline function, scope, overloading; Pointers: objects and lvalue, arrays and pointers, the new and delete operators, dynamic arrays, arrays of pointers and pointers to arrays, pointers to pointers and functions; Strings: String I/O, character functions in ctype.h, string functions in string.h.

UNIT3

Object oriented concepts using C++: Classes: Member functions, Friend functions, Constructors, Access functions, Private member functions, class destructor, static data and function members; Overloading: inline functions, this operator, overloading various types of operators, conversion operators; the String Class; Composition and Inheritance: Hierarchy and types of inheritance, protected class members, private versus protected access, virtual functions and polymorphism, virtual destructors, abstract base classes.

UNIT 4

Templates and Iterators: function and class templates, container classes, subclass templates, iterator classes; Libraries: standard C++ library, contents of a standard C headers, string streams, file processing: Files and streams classes, text files, binary files, classification of files, the standard template library.

UNIT 5

Advance Numerical methods for solving different complex equations

References

- Object Oriented Programming with C++: E.Balagumswamy, Tata Mc-Graw Hill Publishing Ltd., New Delhi McGraw Hill
- Object Oriented Programming with C++: Vikash Thada College Book Centre
- Object Oriented Programming with C++: Lalit Arora, Katsons

06 BPE -106:

PETROLEUM REFINING AND PETROCHEMICALS

Course/Paper: 06 BPE -106

BPE Semester-VI

UNIT I

Origin, exploration and production of Petroleum, Types of crudes, composition, characteristics, Products Pattern, Indigenous and imported crudes.

Crude heating, primary distillation principles, separation of cuts, gaps / overlaps, stripping. Desalting heat balance in distillation, energy input and recovery, vacuum distillation, types of trays, drawoffs, intermediate product, quality control.

UNIT II

Lube oil and wax processing, solvent extraction, dewaxing desilting, deasphalting, clay contacting, principles operating parameters, feed and product equalities and yields.

Types and functions of secondary processing, cracking, thermal cracking and visbreaking, different feed stocks, products, yields and qualities.

UNIT III

Fluid catalytic feed stocks and product yields and qualities. Catalyst and operating parameters.

Steam Reforming, Hydrogen, Synthesis gas, cracking of gaseous and liquid feed stocks, olefins, Diolofins, Acetylene and Aromatics and their separation.

UNIT IV

UNIT PROCESSES

Alkylation, oxidation, dehydrogenation, nitration, chlorination, sulphonation and isomerisation.

UNIT V

POLYMERISATION

Models and Techniques, production of polyethylene, PVC, Polypropylene, SAN, ABS, SBR, Polyacrylonitrile, Polycarbonates, Polyurethanes, Nylon, PET

References

- "Modern Petroleum Refining Processes" Edition 3, :B.K. Bhaskara Rao ,Oxford and IBH Publishing Company Pvt. Ltd., New Delhi.
- "Unit Processing in Organic Synthesis" Edition 5: Groggins, Tata McGraw Hill 198
- "Petroleum Refining Technology" by Ram Prasad ,Khanna Publishers Delhi
- "Advance Petrochemicals " by G. B N Sarkar ,Khanna Publishers Delhi
- "Petroleum Refining " by Dr G N Sarkar, Khanna Publishers Delhi
- Nelson W.L., "Petroleum Refinery Engineering", McGraw Hill Publishing Company Limited, 1985

g) Watkins, R.N., "Petroleum Refinery Distillation, second edition, Gulf Publishing Company, Texas 1981

PRACTICALS:

06BPE201

PETROLEUM ENGINEERING PRACTICAL – III

Course/Paper: 06 BPE -201

BPE Semester-VI

1. PETROLEUM FORMATION EVALUATION: Direct Methods and Indirect Methods. Special Type of Logging Tools.
2. Study of flow of fluids.
3. Study of engineering. gas flow measurement, Natural Gas dehydration, sweetening and Processing for LPG, LNG.
4. Techniques of transmission of Natural Gas.

06BPE202

OBJECT ORIENTED PROGRAMMING AND ADVANCED NUMERICAL METHODS

Course/Paper: 06 BPE -202

BPE Semester-VI

List of programs in C:

1. Program for revising control statements, arrays and functions.
2. Program using string handling and various functions described in string.h, ctype.h.
3. Program using structures and sorting algorithm (Insertion, Selection, Quick, Heap sort) and functions described in math.h.
4. Program using file handling and related functions defined in stdio.h, io.h.
5. Program using pointers, array and pointers, pointers to structures, dynamic memory allocation.

List of Programs in C++

6. Program using basic I/O and control statements.
7. Program using class, objects, objects as function parameters.
8. Program using functions and passing reference to a function, inline functions. Program using Inheritance and virtual base class.
9. Program using pointers, arrays, dynamic arrays. Program using functions defined in c type.h and string.h.
10. Program using constructors, destructors. Program using function and operator over loading List of program in C++ implementing Data Structures
11. Creating and managing (add, delete, print, insert) nodes of a Linked list.
12. Creating and managing (create, pop, push etc.) stacks and queues.

Note: Students should submit and present a minor project at the end of the lab.

06BPE203

PRODUCTION PRACTICE LAB

Course/Paper: 06 BPE -203

BPE Semester-VI

1. To study of single point cutting tool geometry & to grind the tool to the given tool geometry. Write importance of various angles and to prepare a capacity chart of the Tool & cutter grinder.
2. a. To study milling machine, milling cutters, indexing methods and various indexing heads.

b. Prepare a gear on milling machine.
3. Prepare a hexagonal/octagonal nut using indexing head on milling m/c and to cut bsw/ metric internal threads on lathe (to meet with job).
4. a. To prepare the capacity chart for a lathe machine.
b. To cut multi-start square/metric thread.
c. To cut external metric threads & to mesh it with the nut (drg).
d. Prepare the process chart for the job.
5. To prepare the job by eccentric turning on lathe machine drawing.
6. To study shaper machine & its mechanism and calculate its quick return ratio To prepare a job on shaper from given ms rod drawing

7. To study the effect of rake angle on chip thickness ratio and the shear angle in orthogonal machining.
8. Using drill dynamometer measure the torque and thrust force in drilling and to plot the characteristics, torque, force & power v/s speed & feeds.
9. To measure a gap by means of slips gauges. To compare & assess the method of small-bore measurement with the aid of spheres.
10. To check the accuracy of a ground machined/lapped flat surface. To check the accuracy of machined cylindrical surface.
11. To measure effective diameter of a screw thread by three wire method.
12. To perform alignment test on a center lathe
13. Measure the taper of a given test piece with the help of a single bar and Compare it.
14. To plot tangential, feed and radial force as a function of cutting speed a feed in turning.

THERMAL LAB.- II

Course/Paper: 06 BPE -204
BPE Semester-VI

I.C. Engine Lab.

1. To find the valve timing of a four stroke single cylinder diesel engine and show the valve timing on actual P.V.diagram
2. To conduct load test on diesel engine.
 - a) Determine the Willien's line by graphical and regression method.
 - b).To find out brake power, brake and indicated thermal efficiency, mechanical efficiency, bsfc, isfc, IMEP. BMEP, Air fuel ratio, specific brake output, mean piston speed, clearance volume.
 - c. Plot-Load v/s above parameter
3. To measure the smoke density by smoke meter in diesel engine and plot load v/s smoke density at constant speed.
4. To find out the corrected performances parameters (as indicated in Exp. 2(b)) on diesel engine and to plot the heat balance sheet.
5. Study of Zenith carburetor and a simple carburetor used in two wheelers.
6. To plot the pressure ratio profile along the length of a given nozzle by using different back pressures and to compare actual and theoretical area
7. To perform load test on dual fuel engine at (I) constant load variable gas supply. (II) Variable perform load test on 2-stroke petrol engine at constant speed variable throttle and variable speed constant gas supply
8. To perform load test on 2 stroke engine at constant speed variable throttle and variable speed constant throttle
9. To study the (A) Wankle Engine (B) electronic Ignition System (C) Conductivity of Metal rod

VII Semester Petroleum Technology

07 BPE -101:

PETROLEUM ENGINEERING DESIGN

Course/Paper: 07 BPE -101
BPE Semester-VII

Review of various geological, reservoir engineering and petroleum production principles and methods with reference to oil and gas field development. Drainage of oil and gas reservoirs by wells.
 Theoretical fundamentals of oil field development. Necessity and scope of development plan. Various stages in the life of oil and gas field development.
 Requirement of data sources. Various field data sample collection. Well surveys. Laboratory analysis.
 Creation of integrated approach for statistical. Technical and cost database.
 Hydrocarbon reserves in place. Planning for field exploitation under natural mechanism. Well spacing and location. Well Performance. Field production performance evaluation.
 Need of additional energy for pressure maintenance of a reservoir.
 Field evaluation for EOR. Field development with application of secondary and tertiary recovery. Field development with reservoir management. Application of mathematical modeling and computer simulation for optimum field development.

Economics of field development. Consideration of down stream utilization and consumption.
Special consideration for gas field developments. Development of marginal fields. Indian Scenario.
Planning of various surface installations, Group Gathering Stations
Basic principles, Techniques ,descriptions of artificial lift methods.

References

- a) Oil and Gas field Development : SantKumar,2000 India
- b) Oil & Gas Field of India: Laxman Singh ,Indian Petroleum Publishers2000
- c) API Gas Lift Manual : American Petroleum Institute, Third Edition 1994
- d) Technology of Artificial Lift : Brown K ,Penwell Publishing Co Tulsa 1984
- e) Oil and Gas Field Development. ; Santkumar, 2000 India
- f) Oil and Gas Fields of India.: Laxman Singh, Indian Petroleum, Publishers. 2000

07 BPE -102:

ON SHORE AND OFFSHORE DRILLING

Course/Paper: 07 BPE -102

BPE Semester-VII

UNIT-I

Introduction to offshore oil and gas operations.. Sea States and Weather, Offshore Fixed and mobile Units, Offshore Drilling, Difference in drilling from land, from fixed platform, jack up, ships and semi submersibles. Offshore Well Completion, Offshore Production systems, Deep-water technology, Divers and Safety, Offshore Environment.

UNIT-II

Introduction; classification, properties of marine sediments. Consolidation and shear strength characteristics of marine sediments. Planning and site exploration.

UNIT-III

Drilling. Sampling techniques. Laboratory testing, In situ testing methods and geophysical methods. Current design practices of pile supported and gravity offshore structures.

UNIT-IV

Dynamic analysis of offshore structures. Centrifugal modeling. Anchor design. Break out resistance analysis and geotechnical aspects of offshore pipeline and cable design. Field instrumentation and performance observation.

UNIT-V

Offshore soil mechanics; offshore pile foundations and caissons; Design of breakwaters; Buoy design and mooring systems; Offshore drilling systems and types of platforms; Ocean mining and energy systems. ROV. Onshore drilling-on shore oil rigs. onshore drilling equipments-onshore rig structures-hydraulics applied in onshore rigs.

References

- a) Standard Hand Book of Petroleum & Natural Gas Engineering” – 2nd Edition 2005-William C. Lyons & Gary ,Gulf professional publishing comp (Elsevier).
- b) Well site Geological Techniques for petroleum Exploration by Sahay. B et al.
- c) Drilling & Producing Off shore: Stewart H.R , Penwell Publishers
- d) Offshore Drilling completion and production: MazurkiewiczB.K.,Eta offshore seminar , Penwell Publishers
- e) Offshore platforms and Pipelines : Mazurkiewicz B.K,TransTech Publication 1987
- f) Petroleum Exploration Hand Book by Moody, G.B.

07 BPE -103:

PETROLEUM FIELD INSTRUMENTATION & CONTROL

Course/Paper: 07 BPE -103

BPE Semester-VII

COURSE CONTENT:

Unit 1:Introduction:

Classification of instruments, metrological terms, definitions, units and standards, performance characteristics, calibration requirement, Hierarchy of standards and traceability, measurement of uncertainty codes and symbols etc.

Unit 2:Process Instrumentation:

Instruments for indicating, recording and control of pressure (including mud pressure), flow, temperature, viscosity, level, pH, density, weight, penetration. torque. RPM, magnetic flux.

Unit 3:Petroleum Field Instrumentation:

Instrumentation at drilling site, separation, transportation and storage of oil and gas operations. Aspects of process safety and reliability related to instrumentation, pipeline monitoring.

SECTION – II

Unit 4:Elements of Process Control:

Introduction to process control, basic principles. Applications of Process Control. Control loop and its components. Concept of transfer function and transient response of first and second order elements

Unit 5: Introduction to Controllers:

Working mechanism of pneumatic, hydraulic and electronic controllers, Alarm systems, onoff controller. Limit switches. Solenoid valves. Characteristics of control valves.

Unit 6:Process Control of Petroleum Field Operations:

Applications of controls for drilling, separation, transportation and storage of oil and gas operations. DCS. SCADA. Introduction to Ladder Logic Logics for safe shutdown and startup.

Reference Books:

1. Bela Liptak; Instrument Engineer's Handbook; Chilton Book Co.
2. Coughanowr D.R.; Koppel L.B.; Process System Analysis and Control; McGraw Hill.
3. Eckman D. T.; Industrial Instruments; Wiley Eastern.
4. Harriot P.; Process Control; Tata McGraw Hill Ed.
5. Mian M. A.; Petroleum Engineering Handbook Vol. I and II; Penwell Books

07 BPE -104:

PETROLEUM EXPLORATION - GEOPHYSICAL METHODS

Course/Paper: 07 BPE -104

BPE Semester-VII

Basic concepts of magnetic, gravity, Electrical resistivity and seismic methods. Common depth point (CDP) profiling & stacking. Time corrections applied to seismic data. Vertical Seismic Profiling (VSP). Data processing and 3D data and interpretation. Introduction to 4D- a Reservoir Management Tool. Attribute analysis.

References

- a) Introduction to Geophysical Formation Evaluation :James K. Hallenborg, *Geophysical Consultant, Tulsa, OK 1997*
ISBN: 9781566702638 ISBN 10: 1566702631
- b) Standard Methods of Geophysical Formation Evaluation :James K. Hallenborg, *Geophysical Consultant, Tulsa*
ISBN: 9781566702614, 1997
- c) Non Hydrocarbon Methods of Geophysical Formation :James K. Hallenborg, *Geophysical Consultant, Tulsa, OK 1997*,ISBN: 9781566702621
- d) Non-Hydrocarbon Methods of Geophysical Formation Evaluation: James K. Hallenborg 1998,CRC-Press; ISBN-10:1566702623 ,ISBN-13: 978-1566702621
- e) Well Logging and Formation Evaluation (Gulf Drilling Guides));Darling ,Gulf Professional Publishing- 2005,ISBN-10: 0750678836 ,ISBN-13: 978-0750678834

07 BPE -105:

PETROLEUM EXPLORATION - GEOLOGICAL METHODS

Course/Paper: 07 BPE -105
BPE Semester-VII

Surface indications of subsurface oil and gas accumulations. Oil accumulation parameters etc, Development Geology and principles of prognostication of hydrocarbon reserves. Plate tectonics PACKAGING OF in Hydrocarbon accumulation onshore and offshore.

References

- a) Wellsite Geological Techniques for Petroleum Exploration: Sahney. B. et al
- b) Petroleum Hand book : Moody ,G.B
- c) Advance Geological Methods in Petroleum Exploration and Development
- d) Hydrocarbon Exploration and Production : Jahn F. Cook Grahaham .M ,Elsevier1984
- e) Geology in Petroleum Production: Dickkers B.J , Elsevier publishers
- f) Geological models and Petroleum entrapment: Magara K. , Elsevier Applied Scienet Publishers
- g) Slanderred Hand Book of Petroleum & Natural Gas Engineering : William C. Lyon s & GrayJ Plisga ,Gulf Professional Publishing Com(Elsevier)

07 BPE -106:

COAL BED METHANE AND GAS HYDRATES

Course/Paper: 07 BPE -106
BPE Semester-VII

COAL BED METHANE:

Introduction to shale gas & basin centered gas, Present status of coal bed methane. Formation and properties of coal bed methane. Thermodynamics of coal bed methane. Exploration & Evaluation of CBM. Drilling, completion and logging of coal bed methane wells. Hydro-fracturing of coal seam. Production installation and surface facilities. Well operation and production equipment. Treating and disposing produced water. Testing of coal bed methane wells.

NATURAL GAS HYDRATES:

Introduction & present status of gas hydrates. Formation and properties of gas hydrates. Thermodynamics of gas hydrates. Exploration & Evaluation 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.

BPE -201

PRACTICAL:

07BPE201

MINOR PROJECT

Course/Paper: 07 BPE -201
BPE Semester-VII

07BPE202

PETROLEUM FIELD INSTRUMENTATION AND CONTROL LAB

Course/Paper: 07 BPE -202

BPE Semester-VII

List Experiments:

1. To determine control valve characteristics.
2. To determine transient response of first and second order systems.
3. To determine response of feedback control loop using PID controller: Three practical.
4. To determine controller tuning parameters using open loop response.
5. To determine static and dynamic characteristics and to understand calibration of a temperature measuring instrument.
6. To determine static a dynamic characteristics and to understand calibration or a levelmeasuring instrument.
7. To determine static and dynamic characteristics and to understand calibration of a flow-measuring instrument.
8. To determine static and dynamic characteristics and to understand calibration of a pressure-measuring instrument.
9. To learn to use user interfaces of SCADA and PLC with reference to a simple control scheme.
10. To determine characteristics of mass flow meter.
11. To determine characteristics of optical pyrometer

07BPE203

SEMINAR

Course/Paper: 07 BPE -203

BPE Semester-VII

Format of the Seminar report should be as follows:

1. The report should be neatly written or typed on white paper. The typing shall be with normal spacing and on one side of the paper (A-4 size).
2. The report should be submitted with front and back cover of card paper neatly cut and bound or spirally together with the text.
3. Front cover: This shall have the following details.
 - a. Title of the seminar report.
 - b. The name of the candidate with roll number examination seat number at the middle.
 - c. Name of the guide below the candidate's details.
 - d. The name of the institute and year of submission on separate lines at the bottom.
4. Seminar approval sheet.
5. The format of the text of the seminar reports:

The report shall be presented in the form of a technical paper. The introduction should be followed by literature survey. The report of analytical or experimental work done, if any, should then follow. The discussion and conclusions shall form the last part of the text. They should be followed by nomenclature and symbols used followed by acknowledge the bibliography should be at the end. References should be written in the standard format. SPE format for Petroleum Engineering be followed in giving references. The total number of typed pages, excluding cover shall be about 25 to 30 only. All the pages should be numbered. This includes figures and diagrams. Two copies of the seminar report shall be submitted to the college. The candidate shall present the seminar before the examiners. The total duration of presentation and after-discussion should be about 30 minutes. (25 min + 5 min. Audience can ask questions only if the examiner permits. Such questions will not have any bearing on marks).

INDUSTRIAL TRAINING

Course/Paper: 07 BPE -204

BPE Semester-VII

Industrial visit (20 marks) is for the duration of 10 days at the end of V semester and Practical Training (80 marks) is for the duration of 30 days at the end of VI semester. Both will be evaluated during the VII semester.

VIII Semester Petroleum Technology

08 BPE -101:

RESERVOIR MODELING AND SIMULATION

Course/Paper: 08 BPE -1016+
BPE Semester-VIII

Reservoir Modeling:

Introduction to general modeling : Introduction to concept geological modeling. Types of model and designing of various models depending on reservoir complexities, rock properties, fluid properties – concept of back oil model, compositional model.

Reservoir Simulation :

1. **Overview :** Introduction, Historical background, application of simulator, various types of models.
2. **Flow Conditions :** Single phase, two phase and multiphase flow equations for one, two and three dimension models.
3. **Special Concept :** Explicit and implicit, grid system, finite difference & finite element method, matrix solution, iterative method, stability criteria.
4. **Data Preparation :**
5. **Pseudofunctions**
6. **Reservoir model Solution Techniques :** Implicit Pressure and Explicit Saturation (IMPES), Implicit pressure and Implicit saturation (IMPIS).
7. **Preview of numerical solution methods :** Direct process, iterative process.
8. **History Matching :** Mechanics and parameters of match
9. **Special Concept** on Coning and Compositional Models simulation.
10. **Optimization** using Economic and Techno-economic evaluation : Computation of economic indices viz. different variants base on technical and economic consideration.
11. **Introduction to streamline simulation** & comparison of conventional/Streamline simulation.

08 BPE -102:

SURFACE OPERATIONS FOR OIL & GAS PRODUCTION

Course/Paper: 08 BPE -102
BPE Semester-VIII

Field Processing of Oil & Gas. Storage & Transport and metering. Transport of Oil & Gas. Treatment of oil & gas, surface facility for oil pumping station, gas pumping station, water injection, gas injection and EOR processes.

References

- a) Surface Production Operations, Volume 2., Second Edition: Ken Arnold Maurice Stewart ,Gulf Professional Publishing; 2 edition-1999,ISBN-10: 0884158225 ,ISBN-13: 978-0884158226
- b) SURFACE PRODUCTION OPERATIONS, VOLUME 1:Maurice Stewart, President, Stewart Training Company Ken Arnold ISBN-13: 978-0-7506-7853-7,ISBN-10: 0-7506-7853-4,GULF PROFESSIONAL PUBLISHING
- c) Surface Production Operations: Design Of Oil Handling Systems And Facilities(Volume 1):Maurice Stewart Ken Arnold
- d) Surface Production Operations, Volume 2: Design of Gas-Handling Systems and Facilities: Ken Arnold & Maurice Stewart ISBN: 0884158225

08 BPE -103:

OIL & GAS WELL TESTING AND ENHANCED OIL RECOVERY

Course/Paper: 08 BPE -103
BPE Semester-VIII

Well Test Analysis, Pressure Transient Tests, Enhanced Oil Recovery , methods and evaluation. Like Gas Injection, Miscible Flooding, Polymer Flooding, Carbon Dioxide Flooding and steam Flooding

References

- a) Advances in Well Test Analysis: Earlougher R.C. ,SPE Monograph,1997
- b) Well Testing : Lee W.J. ,SPE Text Book Series1982
- c) Well testing in Heterogeneous Formations : Strltsova T.D. ,John Wileyand Sons 1988
- d) Von Pollen. H.K. and Associates. Inc., “Fundamentals of Enhanced oil Recovery” – Penn Well publishing co., Tulsa (1980).
- e) Enhanced Oil Recovery : Lake L ,Penwell publishers1991
- f) Latil. M. et al., “Enhanced oil recovery” – Gulf publishing co. Houston (1980)
- g) Enhanced Oil Recovery : Green W.W. and Willhite G.P., SPE2003
- h) Standard Hand Book of Petroleum & Natural Gas Engineering” – 2nd Edition 2005-William C.Lyons & Gary J.Plisga-Gulf professional publishing comp (Elsevier).

08 BPE -104:

PIPE LINE ENGINEERING

**Course/Paper: 08 BPE -104
BPE Semester-VIII**

Pipeline systems definition and applications, codes and standard related to pipelines. Pipeline hydraulics: single phase gas and liquids, multiphase fluids and heavy /waxy crude. Design considerations for strength, stability and installation.

Pipeline materials and components. design aspects, covering such issues as risers,slug catchers, pigging facilities, etc. Basic design considerations for pipeline facilities. Pipeline construction for cross country and offshore systems focusing on

welding. Pressure testing, pre-commissioning and commissioning Pipeline integrity aspects including inline inspection. Leak detection and emergency planning Considerations

Flow through pipe, Flow through perforated pipes and porous media. Two phase flow. Line sizing for steam, vacuum, and slurry pipeline.

Piping networks. Piping manifolds. Piping systems for petroleum products, yard piping; fire fighting, Distillation and heat exchangers. Long distance pipelines.

Corrosion and materials of construction. Flow measurement. Pipe stress analysis and pipe supports. Pipe racks. Fabrication, installation and testing. Statutory regulations and safety aspects. Thermal insulation. Costing for piping. Design and construction of on/ offshore pipelines, Fields Problems in pipeline, Hydrates, scaling & wax etc and their mitigation

References

- a) Piping design handbook:Macetta.John , M dekar1992
- b) Pipeline & risers : Young Boi ,Elsevier Ocean Engineering Book series 2001Volume 3
- c) Pipe Line Corrosion Cathodic Protection : Parker M E and Peattie E G , ElsevierUSA 2001 Third edition

- 1. Develop various Geological model.**
- 2. Running simulation model**
- 3. Varify geological model with simulation software**