Seventh Semester

Course Title: Reservoir Study - II

Course Code: PTE 701

Course Duration: One semester

Marks (University Exam): 100 marks (total)

Progressive Assessment: 50 marks

Practical: - No

Time of examination: 2 hours and 30 mins.

Note for Examiner: The course schedule includes 3 lectures, 1 tutorial.

Objective: The course will provide information on Classification and categorization of Reserves, Monitoring of Recovery of Hydrocarbon and various Oil Recovery techniques.

SN	Topic	No. of Lectures
PTE 701	Reservoir Study – II Unit I Classification and categorization of Reserves. Estimation of Hydrocarbon Reserves: Volumetric analysis, Decline curve, Material Balance equation and Mathematical Simulation on Development of Oil and Gas Fields, Unit II Monitoring of Recovery of Hydrocarbon and Integrated Approach to Reservoir Management, Unit III Primary recovery (Drive Mechanisms), Water Flooding and Pressure Maintenance, Water Flood Surveillance Techniques, Unit IV Enhanced Oil Recovery (EOR) and Improved Oil Recovery Techniques, EOR Field Pilot Design and Performance Evaluation, Well Stimulation, Field Wide Application of EOR, Advantages of Early Introduction of EOR-Balol-Santhal Field Study.	**48**

Outcome:

- Student will be able to characterize the reserves and estimate total hydrocarbon in place.
- Analyze the application of different method for getting maximum hydrocarbon recovery

Books

- Berg, R.R. Reservoir Sandstones, Prentice Hall, New Jersey, 1986.
- Moore, C. H. Carbonate Reservoirs, Elsevier, Amsterdam, 2001.
- Barwis, J.H. Sandstone Petroleum Reservoir, Springer-Verlag, Berlin, 1990.
- Zimmerle, W. Petroleum Sedimentology, Kluwer Academic Publishers, Dordrecht, 1995.
- BhagwanSahay, Well-site Geological Techniques for Petroleum Exploration: Methods and Systems of Formation Evaluation, Oxford &IBH Publishing. INR 9,999.

Course Title: Drilling Engineering-2

Course Code: PTE 705

Course Duration: One semester

Marks (University Exam): 100 marks (total)

Progressive Assessment: 50 marks

Practical: - No

Time of examination: 2 hours and 30 mins

Note for Examiner: The course schedule includes 3 lectures and 1 tutorial.

Objective: To understand Deepwater drilling environment, equipment & drilling Operations. To learn deepwater production operations & transportation of produced Fluids

SN	Topic	No. of Lectures
PTE 701	**Unit-I: Overview of Subsea Engineering** Overview of physical ocean environment, geotechnical aspect –sea floor marine soils, composition & properties of sea water, seawater corrosion, offshore rigs, floating drilling vessels, comparison, fixed offshore structures, wind, wave, current and other forces acting on offshore structures, principle motions, metacenter, stability calculations, ballast control, **Unit-II: Deepwater Drilling:** Deepwater well construction problems & solutions, Deepwater cementation, high temp. High pressure wells, construction, casing & mud policy. Drilling logs, gas hydrates. Wellbore stability & rock mechanics, Mohr's coulomb criteria 2D-3D system, insitu- stress, Poisson ratio, mud window for vertical, horizontal deep water drilling. **Unit-III: Offshore Structures, Installations and Vessels** Offshore structures: Fixed steel structures, Concrete Gravity Base Structures, TLPs, Semisubmersible and Floating Production systems, SPM, SPAR: Application depths and design limitations. Installation of offshore platforms, Typical Platform Layout, Process flow diagram, Static and Rotary Equipment. Safety systems. **Unit IV: Subsea Control:** Types of Control Systems, Topside Equipment, Subsea Control Module Mounting Base, Subsea Control Module, Subsea Transducers/Sensors, Subsea Production Control System. **Unit-V Development and Production** : Risers for Production operations, Deepwater completion, Subsea completion, planning, tree selection, design considerations of offshore platform,	48

	production & processing of oil & gas, separators, design & planning to stage separation, selection, specification & operations, Production monitoring & control system. Multilayer producing fields, EOR, offshore field development considerations in Deepwater. **Unit-VI Transport and other facilities**: Offshore storage, handling and transportation by oil and gas tankers**,** vessels and buoys. Structural considerations functions & operations.	

Outcomes:

- Understand components of physical ocean environment
- Realize well problems and apply knowledge of rock mechanics
- Develop awareness offshore structures and their installations
- Understand the subsea control system
- Understand development and production operations related to subsea
- Acquaintance of offshore storage facilities and transport of oil and gas

Books:

- Bai Young and Qiang Bai, 2010, Subsea Engineering Handbook, Elsevier, 910 pp.
- Chakraborty S.K.: Handbook of offshore engineering volume I & II 3 IADC Deepwater control guidelines.
- Design of Concrete Gravity Structures - Edited by Ivar Holand, Ove T.Gudmestad And Erik Jersin
- James G. Speight, 2014, Handbook of Offshore Oil and Gas Operations, Gulf Professional Publishing, 428 pp

Course Title: Production Engineering-2

Course Code: PTE 704

Course Duration: One semester

Marks (University Exam): 100 marks (total)

Progressive Assessment: 50 marks

Practical:- No

Time of examination: 2 hours and 30 mins

Note for Examiner: The course schedule includes 3 lectures and 1 tutorial.

Objective:

- To study separation and treatment of produced oil and associated surface facilities.
- To study offshore production technology.
- To understand well investigation techniques and remediation of well production Problems

SN	Topic	No. of Lectures
PTE 704	**Production Engineering-2** Reservoir Rock and Fluid Inhomogeneity,Review of Oil and Gas flow through Petroleum Reservoir: Single Phase, Two-Phase and Multi Phase Flow Equations for One, Two and Three Dimensional Models. Two phase oil and gas separation equipment, types, construction detail, Surface facilities for water injection and maintenance of injection water quality. Filters, Vacuum towers. Review of fluid flow equations and pressure drop in piping Wireline operations and Procedures Production logging Well Production problems: mechanical failure, critical wells with	48

	casing pressures, recompletions, plug and abandonment, work over economics Multilateral and Intelligent-Well Completions. Subsea and Downhole Processing. Cold Heavy-Oil Production with sand Emerging, Peripheral Technologies and Production optimization	

Outcomes:

- demonstrate working principle and design of separators
- Illustrate various equipment and processes for the treatment on produced emulsion
- Understand mechanism and factors of oil field corrosion and methods for prevention.
- Understand and apply production logging operations.
- Do problem well analysis and apply new techniques to sustain production rates
- Comprehend emerging and peripheral technologies for lifelong learning.

Books:

- Bourdarot, G. "Well Testing, Interpretation Methods", 1 st Edition, 1996
- ChaudhryAmanatU, "Oil Well Testing Handbook" Gulf Professional Publishing, 2004. 3. Lee W. J, "Well Testing", Textbook Series, SPE, Richardson, TX, USA, 1982.
- Horn R A, "Modern Well Test Analysis, A Computer Aided Approach", Petroway, Second edition, 1995.
- Earlougher, R.C., "Advances in Well Test Analysis", Monograph Series, SPE,19
- Arnold K. and Stewart M., "Surface Production Operations", Vol. I and II, Gulf Publishing Company, 1986.
- Mian, M.A., "Petroleum Engineering Hand Book for Practicing Engineers" Vol. I and II, Pennwell Publications, 1992.
- Galambhor and Guo, "Petroleum Production Engineering a Computer Assisted Approach",
- Construction of Offshore and Marine Structures - Ben C. Gerwick, Jr.
- An Introduction to Offshore Engineering - Angus Mather.
- Wireline operations and procedures – Book 5 of vocational training series – American Petroleum Institute.
- Production logging – Theoretical and interpretive Elements by A.D.Hill.

Course Title: Process Control

Course Code: PTE 703

Course Duration: One semester

Marks (University Exam): 100 marks (total)

Progressive Assessment: 50 marks

Practical:- No

Time of examination: 2 hours and 30 mins

Note for Examiner: The course schedule includes 3 lectures and 1 tutorial.

Objective: To introduce control equipment's used to control the production process and to introduce the control mechanism through automation and computers.

SN	Topic	No. of Lectures
PTE 703	Unit –I**:** Principles of Measurement: Error, Accuracy, Sensitivity, Primary & Secondary Standards; Sensors: Pressure, Temperature, Level, Flow, Composition, pH Measurements; Amplifiers: Types, Performance Characteristics Unit –II: Recorders: Types, Sensitivity, Performance; Basic Concepts of Feedback Control: Control Loop and its Elements; Dynamic Behavior of First, Second and Higher Order Physical Systems; Dead Time, Lumped and Distributed Parameter Systems Unit –III: Linearization: Linear System, Transient Analysis using Laplace Transforms; Frequency Response Analysis; Controller Hardware, Control Valve, Choice of Controller and Settings Unit- IV: Introduction to Advanced Control System; Feed forward, Cascade, Ratio Control etc.; Control Schemes with application to Distillation Systems; Chemical Reactors, and Heat Exchangers etc.	48

Outcome: Gains knowledge required to designing a control system and identifying the alternative control configuration for a given process plant or entire plant.

Books

- G. Stephanopoulos, Chemical Process Control an introduction to theory and practice, PHI, 1990.
- CoughnowrandKoppel,"ProcessSystemsAnalysisandControl",McGraw-Hill,New York, 1986.
- George Stephanopolous, "Chemical Process Control", Prentice-Hall of India Pvt. Ltd., New Delhi, 1990.
- Patranabis.D, Principles of Process control, II edition, Tata McGraw-Hill Publishing Co.Ltd., 1981.
- Peter Harriott, Process control, Tata McGraw-Hill Publishing Co., Reprint 2004.
- Thomas, E.Marlin, Process Control, 2nd Edn, McGraw-Hills International Edn. 2000.
- George Stephanopoulos, Chemical Process Control, Prentice Hall of India 2003.
- Norman H.Ceaglske, Automatic process control for chemical engineers, John Wiley &Sons, Japan.
- Emenule, S.Savas, "Computer Control of Industrial Processes", McGraw-Hill, London, 1965.
- Eckman, D.P., "Industrial Instrumentation", Wiley, 1978