

Syllabus in Petroleum Engineering

Contributed by Administrator
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- A.G.T.I Year I
- A.G.T.I Year II
- B.Tech Year I
- B.Tech Year II

- B.E (PE) Syllabus for A.G.T.I (First Year) No. Course No. Course Title Lecture Note Que&Ans 1 MA 01011 Myanmar 1 2 3 4 5 6 7 8 9 10 11 12 13 _ 1 2 3 4 5 6 7 8 9 10 11 12 2 E 01011 English 1 2 3 4 3 EM

01011 Engineering Mathematics 1 2 3 4 5 6 7 8 9 10 1 2 4 ESc 01011 Engineering Science 1 2 1 2 3 4 5 ME 01015 Engineering Mechanics 1 2 3 4 5 6 7 8 9 10 11 12 13 1 2 3 4 5 6 ME 01011 Mechanical Engineering Drawing 1 2 3 4 5 6 1 2 7 ME

01012 Workshop Technology 1 2 3 1 2 8 PE 01011 Principle of Petroleum Engineering 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 1 2 9 EcE 01012 Applied Electrical Engineering 1 2 3 4 5 6 7 8 9 10 11 1 10 PE 01012 Drilling Fluids 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 1 2 MA 01011 Myanmar See under "Department of Myanmar" E 01011 English See under "Department of English" EM 01011 Engineering Mathematics See under "Department of Engineering Mathematics" ESc 01011 Engineering Science See under "Department of Engineering Physics"

See under "Department of Engineering Chemistry" ME 01015 Engineering Mechanics See under "Department of Mechanical Engineering" ME 01011 Mechanical Engineering Drawing See under "Department of Mechanical Engineering" ME 01012 Workshop Technology See under "Department of Mechanical Engineering" PE 01011 Principle of Petroleum Engineering General composition and properties of oil and gas. Physical of oil and gas bearing rocks. Basic principles and characteristics of petroleum reservoirs Fundamentals of oil gas well drilling. Principles of oil field development. Fundamentals of production methods and equipment. Fundamentals of transportation and gathering of oil and gas. General principles of petroleum engineering. EcE 01012 Applied Electrical Engineering See under "Department of Electronic Engineering" PE 01012 Drilling Fluids Basic Functions and requirements of drilling fluids Theological and wall building properties of drilling fluids. Materials and chemicals for preparation of drilling fluids. Testing of drilling fluids. Types of drilling fluids. Mud control. Handling and storage of mud materials and chemicals. Top Syllabus for A.G.T.I (Second Year)

No. Course No. Course Title Lecture Note Que&Ans 1 E 02011 English 1 2 3 4 2 EM 02011 Engineering Mathematics 1 2 3 4 5 6 7 8 9 10 11 12 13 14 1 3 ME 02014 Strength of Materials I 1 2 3 4 5 6 7 1 2 4 ME 02015 Mechanics of Machinery 1 2 3 4 5 6 7 8 1 2 5 ME 02016 Fluid Mechanics 1 2 1 2 6 PE 02013 Production Operations and Equipment 1 2 3 4 1 2 7 PE 02015 Properties of Reservoir Rocks and Fluids 1 2 3 4 5 6 7 8 9 10 11 12 13 1 2 8 PE 02016 Gathering of Oil and Gas 1 2 3 4 1 2 9 PE 02022 Drilling Operations and Equipment 1 2 3 4 5 6 1 2 10 Geol 02022 Geology for Petroleum Engineering 1 2 3 4 5 1 2 E 02011 ENGLISH See under "Department of English" EM 02011 ENGINEERING MATHEMATICS See under "Department of Engineering Mathematics" ME 02014 STRENGTH OF MATERIALS I See under "Department of Mechanical Engineering"

Basic concepts of static equilibrium. Stress and strain. Material testing. Strain energy. Impact loading. Varying cross-section and loads. Compound bars. Temperature stresses. Stress concentration. Shear stress and shear strain. Cottered and riveted joints. Shearing force and bending moment. Theory of simple bending Eccentric Loading. Combined bending and direct stress with load eccentric to one axis. Torsion of circular shafts. Shafts of varying diameter. Shafts under action of varying torque. Compound shafts. Deflection of Beams. Strut with different end conditions. Rankin Gordon formula. ME 02015 MECHANICS OF MACHINERY See under "Department of Mechanical Engineering" ME 02016 FLUID MECHANICS See under "Department of Mechanical Engineering" PE 02013 PRODUCTION OPERATIONS AND EQUIPMENT Well head equipment. Chokes and flow control. Production packer Gas-lift valves. Specification and principles of standard pumping units. Subsurface pumps of sucker rod pumping system. Accessories for sucker rod pumping. Dynamometer. Echo sounding instruments.

Equipment of hydraulic pumping system. Equipment of submersible pumping system. oil and gas measurement and regulating instruments. Automation and process control instruments. Hazard and safety measures in handling and operating of oil field instruments and equipment. PE 02015 PROPERTIES OF RESERVOIR ROCKS AND FLUIDS Structures, properties and fluid contents of reservoir rocks. Darcy's law and the concept of permeability for single and multiple flow. Capillary phenomena and state distribution of fluids. Calculation of hydrocarbon volume in place. Elementary flow pressures in reservoirs. Chemical, physical and thermodynamic properties of petroleum and reservoir fluids. phase behaviour of multi-component hydrocarbon systems. Real gas law Liquid mixtures. flash calculations. PVT calculations of reservoir fluids. PE 02016 GATHERING OF OIL AND GAS Basic principles of oil & gas gathering system. Type of oil & gas gathering system. Oil & Gas separators; Performance types. accessories and selection; Equipment for oil & gas gathering system; Pipe & Fittings. manifolds; flow rate measurements pressure controller system. PE 02022 DRILLING OPERATIONS AND EQUIPMENT Function and composition of drilling equipment. Rotary equipment. Equipment of rig's hoisting system. Draw works and auxiliary equipment. Derrick, masts, and substructures.

Circulating equipment and accessories. Equipment of mud system Power plants. Characteristics of different prime movers. Types of power transmission. Derrick floor equipment and rig instrumentation Drilling rig instrumentation. Drilling rig selection. Maintenance and safety measures. Geol 02022 GEOLOGY FOR PETROLEUM ENGINEERING An introduction to historical geology and physical geology. Elements of crystallography and mineralogy including atomic structures, physical properties and chemical properties. Study on common types of igneous, sedimentary and

Equipment of hydraulic pumping system. Equipment of submersible pumping system. oil and gas measurement and regulating instruments. Automation and process control instruments. Hazard and safety measures in handling and operating of oil field instruments and equipment. PE 02015 PROPERTIES OF RESERVOIR ROCKS AND FLUIDS Structures, properties and fluid contents of reservoir rocks. Darcy's law and the concept of permeability for single and multiple flow. Capillary phenomena and state distribution of fluids. Calculation of hydrocarbon volume in place. Elementary flow pressures in reservoirs. Chemical, physical and thermodynamic properties of petroleum and reservoir fluids. phase behaviour of multi-component hydrocarbon systems. Real gas law Liquid mixtures. flash calculations. PVT calculations of reservoir fluids. PE 02016 GATHERING OF OIL AND GAS Basic principles of oil & gas gathering system. Type of oil & gas gathering system. Oil & Gas separators; Performance types. accessories and selection; Equipment for oil & gas gathering system; Pipe & Fittings. manifolds; flow rate measurements pressure controller system. PE 02022 DRILLING OPERATIONS AND EQUIPMENT Function and composition of drilling equipment. Rotary equipment. Equipment of rig's hoisting system. Draw works and auxiliary equipment. Derrick, masts, and substructures.

Circulating equipment and accessories. Equipment of mud system Power plants. Characteristics of different prime movers. Types of power transmission. Derrick floor equipment and rig instrumentation Drilling rig instrumentation. Drilling rig selection. Maintenance and safety measures. Geol 02022 GEOLOGY FOR PETROLEUM ENGINEERING An introduction to historical geology and physical geology. Elements of crystallography and mineralogy including atomic structures, physical properties and chemical properties. Study on common types of igneous, sedimentary and

metamorphic. Study on common types of igneous, sedimentary and metamorphic rocks, including origin, description and classification. An introduction to structural geology and tectonics, including primary structures, folds, joints, faults, foliations, limestones and plate tectonics. Laboratory works consist of exercises related to lecture courses. TopSyllabus for B.Tech (First Year) No. Course No. Course Title Lecture Note Que&Ans 1 E 03011 English 1 2 3 4 2 EM 03011 Engineering Mathematics 1 2 3 4 5 6 7 1 2 3 ME 03014 Strength of Material II 1 2 3 4 4 Geol 03005 Sedimentation and Petroleum Geology, Stratigraphy and Subsurface Geology 1 2 3 4 5 6 1 2 3 4 5 6 7 5 PE 03014 Fundamental of Natural Gas Engineering 1 2 6 PE 03021 Well Logging 1 2 3 4 5 6 7 8 1 2 7 PE 03023 Petroleum Production Engineering 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 1 2 8 PE 03032 Drilling Engineering I 1 2 3 4 5 6 7 8 9 10 11 12 13 1 2 E 03011 ENGLISH See under "Department of English" EM 03011 ENGINEERING MATHEMATICS See under "Department of Engineering Mathematics"; . ME 03014 STRENGTH OF MATERIALS II Stress and strain in two dimension. Principal stresses and strain. Mohr's stress and strain circle. Piosson's ratio. Volumetric strain. Shear strain energy. Theory of failure. Elastic constants. Combined bending and direct stress with load eccentric to both axes. Composite beams, reinforced concrete beams.

See under "Department of Mechanical Engineering" Geol 03005 SEDIMENTATION AND PETROLEUM GEOLOGY, STRAIGRAPHY AND SUBSURFACE GEOLOGY Principles of sedimentation and environments of sedimentation Origin, description and classification of sedimentary rocks. Structural features of sedimentary origin. Principles of petroleum geology including origin, migration, and accumulation and methods of finding hydrocarbons . Geology of oil fields and oil prospective regions of Myanmar.

Laboratory work consists of exercises related to lecture courses. Principles of stratigraphy and subsurface geology. stratigraphic correlation and other methods and techniques applied in stratigraphy and subsurface geology; logging and evaluating subsurface geologic data. The role of geology in petroleum production and development operations, especially dealing with the geology of sandstone and carbonate reservoirs. Laboratory work will include field description and logging of cores and drill cuttings. Subsurface methods using micro fossils, construction of structural contour maps, isopach maps and geologic cross-sections. PE 03014 FUNDAMENTALS OF NATURAL GAS ENGINEERING Chemical composition of Natural Gas Phase behaviour of Natural Gas Systems. Properties of Natural Gas and Volatile Hydrocarbon Liquids. Gas flow measurements; orifice meters. Meter-run installation. Flow control and pressure regulating instruments. Critical Flow Proverb Principles of gas transportation through pipeline . Safety measure in gas fields. PE 03021 WELL LOGGING Electric properties of rocks. Nuclear properties of rocks. Elastic wave propagation properties of rocks. Effect of drilling operation on formation conditions near the wellbore. Statement of log- interpretation problem in terms of bore- hole condition. Spontaneous potential log. Resistivity log, and Caliper log; principles of measurement, objectives and properties, units of measurements, and evaluation.

Principles of measurement, objectives and properties ,unit of measurements, and evaluation of sonic log, Electrode log, Gamma-ray log, Neutron log, Nuclear Magnetic log. Temperature Log. Common log. combinations. Interpretation in granular clean water-wet rock. granular shale water-wet rocks, granular oil-wet rocks, multiple- porosity type reservoir rocks. PE 03023 PRODUCTION ENGINEERING Inflow performance relationship. Vertical two-phase flow. Horizontal two-phase flow. Choke/Bean performance. Performance of flowing well and its design. Principles of gas-lift. Gas-lift valve mechanics. Continuous gas-lift design Intermittent gas-lift design. Principles of chamber lift and plunger lift. Sucker rod pumping design. Selection of pumping units. Application of dynamometer. Dynamometer card analysis. Design and selection of electrical submersible pumping installation. Design and selection of hydraulic pumping system.

PE 03032 DRILLING ENGINEERING I Basic physical and mechanical properties of rocks. Subsurface temperatures and pressures. General method and equipment of rotary drilling. Rotary bits. Drill string. Power and torque required at the bit and rotary table.

Drilling hydraulics, Pressure surges and anomalies. Lost circulation Casing and casing design. Fishing operations and practices, Cements and cementing operations, Coring operations, Wire line usage and service in drilling. TopSyllabus for B.Tech (Second Year) No. Course No. Title Lecture Note Que&Ans 1 E 04011 English 1 2 3 4 2 EM 4011 Engineering Mathematics 1 2 3 4 5 6 7 8 9 1 3 ME 04028 Industrial Management 1 2 3 4 5 6 7 1 2 4 PE 04024 Natural Gas Engineering 1 2 3 6 7 8 1 2 5 PE 04025 Reservoir Engineering I 1 2 3 4 5 6 7 8 9 10 11 12 13 1 2 6 PE 04026 Production Operations of Problem Wells 1 2 3 4 5 6 7 8 9 10 1 2 3 7 PE 04036 Transportation of Oil and Gas 1 2 3 4 5 1 2 8 PE 04042 Drilling Engineering II 1 2 3 4 5 6 1 2 E 04011 ENGLISH See under "Department of English" EM 4011 ENGINEERING MATHEMATICS See under "Department of Engineering Mathematics" ME 04028 INDUSTRIAL MANAGEMENT See under " Department of Mechanical Engineering" PE 04024 NATURAL GAS ENGINEERING Properties of natural gases and volatile hydrocarbon liquids. Study of gas and gas-condensate reservoirs. Deliverability. reserves, recoveries, material balances .Gas-well testing: determination of static and flowing bottom- hole pressures. Gas production from condensate and oil fields. Field separation and absorption processes. Dehydration and sweetening of natural gas. Hazard and safety measures in handling of natural gas. PE 04025 RESERVOIR ENGINEERING I Gas reservoirs: Petroleum reservoir gas volume factors, Denisities, and Gradient. Calculation of gas in place unit recovery. Material balance in gas reservoirs. Gas condensate reservoir (GCR): Phase diagram, Calculation of initial gas and oil in place for gas condensate reservoirs. Performance of volumetric retrograde GCR. Material balance with retrograde GCR.

Under saturated oil reservoirs (UOR): Gas solubility, Formation volume factors (FVF), Calculations of initial oil in place and oil reservoirs, Material balance for UOR, Solution gas, FVF, and compressibilities of gas, water, oil and rock and effective compressibility Calculation above the bubble point. Oil reservoirs under Simultaneous Drives: Characteristics of gas cap and water drive reservoirs, Generalized material balance equation, Uses and limitation of material balances, Water influx, flash and differential gas liberation, Water injection at the Rock well field, Maximum efficient rate(MER).. PE 04026 PRODUCTION OPERATIONS OF PROBLEM WELLS Well completion and perforation. Completion and workover fluids. Problem well analysis. Formation damage; causes, prevention, and removal. Surfactants for well treatment. sand control.

Well stimulation with hydraulic fracturing. Matrix and fracturing acidizing. Scale deposition, removal, and prevention. workover operations; types and selection of workover system. Corrosion ; detection, control, and prevention. PE 04036 TRANSPORTATION OF OIL AND GAS Pipeline transportation of oil and gas; principles, flow calculations, sizing and specifying pipe, selection of route, protection against corrosion Pipe laying maintenance of equipment .Pumps and compressors. Sampling And testing of oil and gas. Instrumentation and control. Safety and supervision. Economics of long distance pipeline. Rules and regulations. In transportation and storage of oil and gas. Storage of oil and gas. Types of storage tanks. Underground storage of natural gas. PE 04042 DRILLING ENGINEERING II Drilling fluid solids removal. Prediction of pore pressures and fracture gradients .Directional drilling and deviation control. Pressure control . Corrosion control in drilling operations . Straight hole drilling practices. Drill stem testing. Drilling economics. TopSyllabus for B.E (Petroleum Engineering) No. Course No. Course Title Lecture Note Que&Ans 1 E 05011 English1 2 3 4 2 PE 05033 Advance Petroleum Engineering 1 2 3 4 5 6 1 3 PE 05035 Petroleum Reservoir Engineering 1 2 3 4 4 PE 05045 Fundamentals of Enhanced Oil Recovery 1 2 3 4 5 6 1 2 5 PE 05046 Petroleum Economics, Evaluation and Accounting 1 2 3 4 5 6 7 8 9 1 2 6 PE 05033 Advance Petroleum Production Engineering 1 2 3 4 1 2 7 PE 05056 Computer Programming in Petroleum Engineering 1 2 3 1 2 8 PE 05052 Advance Drilling Engineering 1 2 3 4 5 6 7 8 9 10 11 1 2 E 05011 ENGLISH See under "Department of English" PE 05033 ADVANCED DRILLING ENGINEERING Rotary Drilling Hydraulics: Jet nozzle selection, pump pressure schedules, surge pressure, slip velocity and carrying capacity. Performance of rotary bit: Rock failure mechanics bit selection factor affecting tooth and bit wear, terminating a bit run. Casing design: Combined stresses on casing, design criteria. Prediction of pore pressure and fracture gradients: Methods of pore pressure predication, formation fracture gradient, pressure testing. Directional drilling and Control: Planning of directional trajectory calculations of trajectory, kick off and trajectory. Horizontal Drilling: Uses of horizontal well and equipment, hydraulic for horizontal holes, torque and drag. Subsurface pressure control; Wellbore pressure, equivalent circulating density, well kick and interpredicting pressure, control methods. Offshore Drilling: Floating drilling subsea guides, guide structure, casing and wellhead equipment, subsea B.O.P stack and control, marine riser and its tensioning system, guide line system. PE 05035 PETROLEUM RESERVOIR ENGINEERING Water Influx: Hydraulic analogs of water influx, water influx from solutions to the diffusivity equation, Determination of water influx independent of material balance calculations, expressing water influx analytically, simultaneous calculation of initial oil in place and water influx. Fluid Flow in Reservoirs; Darcy's Law, viscosities of water, oil and natural gas, types of fluid and compressibility flows of reservoirs fluids, productivity index, permeability variation in radial flow, productivity ratio, electric models and other well problems, zonal damage and well spacing, recovery and deliverability. Displacement of Oil and Gas; Relative permeability, Buckley-Leverett displacement mechanism, displacement of oil and gas, oil recovery by internal gas drive, relative permeability ratios from field data, productivity index decline in depletion reservoirs, displacement of oil by water in stratified reservoirs, sweep efficiency. PE 05045 FUNDAMENTALS OF ENHANCED OIL RECOVERY A treatment of the principal secondary and tertiary recovery mechanisms including water flooding. Thermal processes; steam stimulation, steam flooding. Thermal processes; steam stimulation, steam flooding, hot water injection, and in situ combustion. Chemical processes: micellar solution flooding, polymer flooding, caustic flooding. Miscible hydrocarbon displacement: LPG miscible slug process, high pressure lean gas miscible process, carbon dioxide miscible process. Some case histories. PE 05046 PETROLEUM ECONOMICS, EVALUATION AND ACCOUNTING Elements of economic evaluation. General economic consideration. Time value of money. The economic decision process. Assessment of risk and uncertainty. Simulation of the Monte Carlo method. Evaluation of future production by performance trend . Petroleum accounting practices. Cost estimation principles. Oil and gas field planning and management. Profitability analysis. Types and purpose of report. PE 05052 ADVANCED PETROLEUM PRODUCTION ENGINEERING Flowing well Performance: Surface control, Stable and unstable flowing conditions, Effects of changes in choke size and producing GLR, Effect of water cut, Determination of water cut, Combination of variables that affect a flowing well. Gas lift operation: Unloading processes, Continuous-flow gas-lift, Compressor system. Liquid production by slugs. Producing methods involving liquid slugs, Liquid buildup in an open-end vertical cylinder, Optimum cycle frequency and efficiency, GLR as a function of slug size, Sucker rod pumping: Pump size selection, Modified Goodman diagram, Structural loading of a beam type unit, Torque factors affecting selection of artificial lift equipment, Relative economics, General discussion on types of artificial Lift. PE 05056 COMPUTER PROGRAMMING IN PETROLEUM ENGINEERING What is computer, Computer types, Computer classification, advantages of computer, Computer system, hardware, memory, central processing unit, Input Output units, backing store, Software, number system, Programming, arithmetic and logic units, control unit, declaring variables, arithmetic operator symbols, Read and point, character string variables. Input, output and its application, controlling vertical line spacing, do loop and its application, ststatement and its applications, if-then-else if statement and its applications, Using logical data and operators, arrays, implied do loop, function and subroutines and its applicationsTop