

B.TECH-PETROLEUM (UPSTREAM) DETAIL COURSE STRUCTURE*(In line with Oklahoma University)***First Year, II Semester**

ENGL - Principles of English Composition II or Expo – Expository Writing (ENGL-1213)										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	--	--	3	3	--	--	--	--	--	100
<p>Systematic analysis of effective argumentative discourse with regular practice and close individual assistance. Study of argumentative prose models.</p>										

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B.TECH-PETROLEUM (UPSTREAM) DETAIL COURSE STRUCTURE*(In line with Oklahoma University)***First Year, II Semester**

PE - Elements of Engineering										
Teaching Scheme					Exam Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
4	1	--	--	5	30	60	10	--	--	100

Unit I**Hours: 12**

Introduction : Prime movers and its types, Concept of Force, Pressure, Energy, Work, Power, System, Heat, Temperature, Specific heat capacity, Change of state, Path, Process, Cycle, Internal energy, Enthalpy, Statements of Zeroth Law and First law.

Properties of Gases: Gas laws, Boyle's law, Charle's law, Combined gas law, Gas constant, Relation between Cp and Cv, Various non-flow processes like constant volume process, constant pressure process, Isothermal process, Adiabatic process, Poly-tropic process.

Properties of Steam: Steam formation, Types of Steam, Enthalpy, Specific volume, Internal energy and dryness fraction of steam, use of Steam tables, steam calorimeters.

Heat Engines: Heat Engine cycle and Heat Engine, working substances, Classification of heat engines, Description and thermal efficiency of Carnot; Rankin; Otto cycle and Diesel cycle.

Steam Boilers: Introduction, Classification, Cochran, Lancashire and Babcock and Wilcox boiler, Functioning of different mountings and accessories.

Unit II**Hours: 10**

Internal Combustion Engines: Introduction, Classification, Engine details, four-stroke/ two-stroke cycle Petrol/Diesel engines, Indicated power, Brake Power, Efficiencies.

Pumps and Air Compressors: Types and operation of Reciprocating, Rotary and Centrifugal pumps. Types and operation of Reciprocating and Rotary air compressors.

Refrigeration & Air Conditioning: Refrigerant, Vapour compression refrigeration system, vapours absorption refrigeration system, Domestic Refrigerator, Window and split air conditioners.

Couplings: Clutches and Brakes: Construction and applications of Couplings (Box; Flange; Pin type flexible; Universal and Oldham), Clutches (Disc and Centrifugal), and Brakes (Block; Shoe; Band and Disc).

Transmission of Motion and Power: Shaft and axle, Belt drive, Chain drive, Friction drive, Gear drive.

Unit III**Hours: 10**

Introduction to Civil Engineering: Branches of Civil Engineering, Scope of Civil Engineering.

Surveying Levelling and Mapping: Definition of Surveying, Aims and applications, Fundamental principles of surveying, Classification of surveying, Plans and maps, Scales, Units of measurement. Methods of Linear measurement, Instruments used in chain surveying, Selection of stations, Chaining, Ranging, Offsetting, Errors in chaining and correction. Methods of angular measurements, Instruments used, Types of compass, Types of meridians and bearings, Measurement of bearings, computation of angles. Compass traversing and correction of bearings for local attraction. Aims and applications of levelling, Definition of various terms, Instruments for leveling, Methods of leveling, Recording observations in level-book, Computing reduced levels by HI and rise & fall method. Introduction to planimeter, introduction to Global positioning system (GPS), remote sensing (RS) and Geographical information system (GIS).

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B.TECH-PETROLEUM (UPSTREAM) DETAIL COURSE STRUCTURE

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First Year, II Semester

Unit IV

Hours: 10

Elementary Concepts: Introduction of Electrical Current, Voltage, Power and Energy; Sources of Electrical Energy – Independent and Dependent Source, Source conversion; Ideal electrical circuit elements - Resistor, Inductor and Capacitor; Fundamental laws of electric circuits - Ohm's Law and Kirchoff's Laws; Analysis of series, parallel and series-parallel circuits; Star – Delta conversion.

Electrostatics: Electric charge and Laws of electrostatics; Definitions - Electric field, lines of force, electric field intensity, electric flux and flux density; Electrostatic induction; Gauss's law and its application; Dielectric strength; Capacitor; Capacitor in series and parallel, Energy stored in a capacitor.

Electromagnetism: Faradays Laws; Lenz's Law; Fleming's Rules; Effect of magnetic field on current carrying conductor; Magnetic circuits; Statically and dynamically induced EMF; Concepts of self inductance, mutual inductance and coefficient of coupling; Inductance in series and parallel; Hysteresis and Eddy current losses; Energy stored in magnetic fields.

Single Phase A.C. Circuits: Generation of sinusoidal voltage, Definition of average value, root mean square value, form factor and peak factor; Phasor representation of alternating quantities; Analysis with phasor diagrams of R, L, C, R-L, R-C and R-L-C circuits; Concepts of Real power, Reactive power, Apparent power and Power factor, Series, Parallel and Series - Parallel circuits; Power in AC circuit, Power factor improvement; Resonance in series and parallel circuits, Q-factor, Bandwidth and Selectivity.

Safety Protections: Circuit protection devices: Fuses, MCB, ELCB & Relays.

Total Hours: 47

Textbook For Elements of Mechanical Engineering:

1. Elements of Mechanical Engineering by H.G.Katariya, J.P.Hadiya and S.M.Bhatt, Books India Publication.

Reference Books for Elements of Mechanical Engineering:

1. Basic Mechanical Engineering by Pravin Kumar, Pearson
2. Thermal Science and Engineering by Dr. D.S. Kumar, S.K. Kataria & sons, Publication New Delhi
3. Fundamental of Mechanical Engineering by G.S. Sawhney, PHI Publication New Delhi
4. Elements of Mechanical Engineering by Sadhu Singh S. Chand Publication
5. Introduction to Engineering Materials by B.K. Agrawal Tata Mcgrahill Publication, New Delhi.
6. Thermodynamics- An Engineering Approach by Yunus A, Cengel & Bole Tata Mcgraw Hill, New Delhi
7. Engineering Thermodynamics by P. K. Nag, Tata Mcgraw Hill, New Delhi
8. Engineering Thermodynamics by R.K.Rajput, EVSS Thermo Laxmi Publications
9. Rayner Joel , Engineering Thermodynamics, ELBS Longman.
10. Fundamentals of Engineering Thermodynamics by R.Yadav, Central Publishing House, Allahabad

Textbook For Elements of Civil Engineering:

1. Elements of Civil Engineering by Dr.R.B.Khasiya, Mahajan Publishing House.

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(In line with Oklahoma University)

First Year, II Semester

Reference Books for Elements of Civil Engineering:

1. Surveying Vol. I by Dr. B. C. Punmia, Ashokkumar Jain, Arunkumar Jain 16th Edition, Laxmi Publication Delhi
2. Surveying Theory and Practice (7th Edition) by James M Anderson and Edward M Mikhail Publisher: McGraw Hill Education, India Pvt. Ltd.
3. Surveying and Leveling by R. Subramanian Publisher: Oxford University
4. Surveying and Leveling by N. N. Basak, Tata McGraw Hill Education, Pvt. Ltd. New Delhi
5. Surveying Vol. I by S. K. Duggal Tata McGraw Hill Publication New Delhi
6. Elements of Civil Engineering by Dr. R.K. Jain and Dr. P.P. Lodha, McGraw Hill Education, India Pvt. Ltd.
7. Building drawing by M.G.Shah, C.M.Kale and S.Y.Patki, Tata McGraw Hill
8. Civil Engg. Drawing by S. C. Rangwala Charotar Pub. House Anand
9. Building Construction by Dr. B. C. Punmia, Ashokkumar Jain, Arunkumar Jain, Laxmi Pub. Delhi
10. Building Construction and Construction Material by G.S.Birdie and T.D. Ahuja Dhanpat Rai Publishing Company.
11. Irrigation Engineering and Hydraulic Structures by Santoshkumar Garg, Khanna Publishers Delhi.

Textbook for Elements of Electrical Engineering:

1. Elements of Electrical Engineering by J.N.Swamy and N.V.Sinha 8th Edition, Mahajan Publishing House.

Reference Books for Elements of Electrical Engineering:

1. Electrical Technology, Vol – 1, by B.L. Theraja, S. Chand.
2. Theory and Problems in Basic Electrical Engineering, by D.P. Kothari and I.J. Nagrath, Prentice Hall, India.
3. Electrical Circuit Theory and Technology, Forth edition, by John Bird, Routledge, Taylor and Francis Group.

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B.TECH-PETROLEUM (UPSTREAM) DETAIL COURSE STRUCTURE***(In line with Oklahoma University)*****First Year, II Semester**

CHEM – General Chemistry II (CHEM 1415)										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
5	-	--	5	5	--	--	--	--	--	100
Nature of solutions, equilibrium, thermodynamics, acid and base properties, kinetics and electrochemistry										

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B.TECH-PETROLEUM (UPSTREAM) DETAIL COURSE STRUCTURE*(In line with Oklahoma University)***First Year, II Semester****MATH - Mathematics II**

Teaching Scheme					Exam Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	1	--	4	4	30	60	10	--	--	100

Unit I**Hours: 12**

Infinite Sequences and Series: Introduction of Convergence, Divergence of Sequences and Infinite Series The nth term test for Divergence, Integral Test, Comparison Test, Ratio Test, Root Test, Alternating Series, Absolute convergence, Conditional convergence, Power Series & Radius of convergence Taylor's series, Maclaurin's series, Successive differentiation, Leibnitz theorem (without proof)

Curve Sketching: Concavity Curve sketching, Polar co-ordinates, Relation between Polar and Cartesian Co-ordinates, Graphs in Polar co-ordinates

Indeterminate Forms: Indeterminate form $(\frac{0}{0}, \frac{\infty}{\infty}, \infty \times 0, \infty - \infty)$, Indeterminate form $(0^0, 1^\infty, \infty^\infty)$

Unit II**Hours: 11**

Partial Derivatives: Function of 2-variables, graphs, level curves, Limit, continuity of function of several variables, Partial derivatives and Clairauts' theorem, Tangent plane, Normal line, Linear approximation, Total differential, Chain rule, implicit differentiation, Euler's theorem for homogeneous function, Maximum and minimum values by second derivative test, Lagrange multipliers, Taylor's formula for two variables.

Improper Integrals: Improper integrals of Type- I and Type – II, Convergence and divergence of improper integrals

Unit III**Hours: 10**

Multiple Integrals: Double integrals over rectangles and Fubini's theorem, Properties of double integrals Double integrals over general region, Double integrals in polar co-ordinates, Triple Integrals, Triple integrals in cylindrical coordinates, Triple integrals in spherical co-ordinates, Change of Order of Integration, Jacobian of several variables, Change of variable in multiple integrals.

Application of Integration: Volume by slicing, Volume of solids of revolution by disk method, Volume of solids of revolutions by washer method, Volume by cylindrical shell.

Unit IV**Hours:09**

Vector Functions: Vector & Scalar Functions and Fields, Derivatives Curve, Arc length, Curvature & Torsion Gradient of Scalar Field, Directional Derivative, Divergence of a Vector Field, Curl of a Vector Field,

Vector Calculus: Line Integrals, Path Independence of Line Integrals, Green's Theorem in the plane, Surface Integrals, Divergence Theorem of Gauss, Stokes's Theorem.

Total Hours: 42**Textbook For Calculus:**

- Higher Engineering Mathematics Vol. 1 by Dr. K.R.Kachot, Mahajan Publishing House

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First Year, II Semester

Reference Books for Elements of Mechanical Engineering:

1. Higher Engineering Mathematics, by B. S Grewal, Khanna Publication, Delhi.
2. Calculus (5th Edition), by James Stewart, Thomson (2003).
3. Higher Engineering Mathematics, by R. K. Jain & S. R. K. Iyernagar
4. Thomas' Calculus, eleventh edition, Pearson.
5. E.Kreyszig, Advanced engineering mathematics (8th Ed.), John Wiley (1999).
6. Advance Engineering Mathematics, by Michael D. Greenberg.
7. Engineering Mathematics, A Programmed Approach, by C. W. Evans, Stanley Thornes Publishers Ltd.
8. Calculus, Volumes 1 and 2, by T. M. Apostol, Wiley Eastern.
9. Calculus, by Robert T. Smith & Ronald B. Minton, McGraw-Hill.
10. Calculus – Single and Multivariable, by Hughes – Hallett et al., John-Wiley and Sons.

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MATH - Differential and Integral Calculus II (MATH 2924)										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
4		--	4	4	--	--	--	--	--	100
<p>Further applications of integration, the natural logarithmic and exponential functions, indeterminate forms, techniques of integration, improper integrals, parametric curves and polar coordinates, infinite sequences and series</p>										

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PHYS - General Physics I (PHYS 2514)										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
4	1	--	4	4	--	--	--	--	--	100
<p>Vectors, kinematics and dynamics of particles, work and energy systems of particles, rotational kinematics and dynamics, oscillations, gravitation, fluid mechanics, waves.</p>										

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B.TECH-PETROLEUM (UPSTREAM) DETAIL COURSE STRUCTURE*(In line with Oklahoma University)***First Year, II Semester**

PE-Intro to Petroleum Engineering Systems										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
1	0	0	3	1	30	60	10	--	--	100
Unit I										Hours : 5
Nature of Petroleum- composition & properties; Overview of Petroleum geology & basic rock properties: Source, migration and accumulation of petroleum, Seal and trap; Overview of Petro physical properties of rock and fluid; Brief study of fluid flow through porous media.										
Unit II										Hours : 4
Fundamentals of reservoir engineering; classification of reservoir flow systems; Darcy's law of fluid flow; Pressure distribution and pressure gradient for linear, radial, compressible, steady state flow; Average permeability calculations for beds in series and beds in parallel for linear and radial reservoir geometry; Overview of drilling operation: Rig Components, Drill String, Casing policy, Drilling fluid and Cementing; Concept of oil production, gathering, treatment & storage and transportation.										
Unit III										Hours : 5
Thermal and Physical properties of crude; Crude characterization techniques; Overview of Refining operations; Introduction to each unit of refinery – Distillation, Sweetening, Cracking, Reforming, Isomerisation, Alkylolation, Polymerization; Major equipments used in refinery; Various catalysts used in refining units;										
Unit IV										Hours : 2
Introduction to gas processing, Pre-treatment of gas – Merox Process, Sulphur Removal, Dehydration; General processes concerning gas Processing; Overview of LNG Value Chain; Introduction to Gas Distribution										
										Total Hours: 16
Texts and References:										
<ol style="list-style-type: none"> 1. Levenson, '<i>Geology of Petroleum</i>' CBS Publishers and Distributors 2. O Serra, '<i>Fundamentals of Well Log Interpretation</i>' Elsevier 3. Carl Gatlin, '<i>Petroleum Engineering</i>', Prentice Hall Inc. 4. Kermit Brown, '<i>Technology of Artificial Lift Methods</i>', Pennwell Publishing Company 5. Dr. B.K. Bhaskara Rao, Modern Petroleum refining Processes (5th Edition) 										

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PE – Introduction to Petroleum Engineering (PE 2011)

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

Overview of petroleum engineering systems including: uses of petroleum products, exploration, exploitation subjects such as drilling, production, reservoir and formation evaluation, transportation and refining; marketing; government regulation and political influence.

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