### Teaching Scheme

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### Exam Scheme

**Hours: 10**  
Overview of English, Writing Program Policies, Writing Tutors, Campus Resources and Internet Addresses

**Hours: 09**  
Introduction to Academic Writing, Arguments, and Analysis

**Hours: 10**  
Reasoning, appropriacy of style and tone, using appropriate format and fluency, inference, analysis, evaluation and creativity, appreciating literary conventions

**Hours:10**  
Narrative/ Expository prose models, prose comprehensions, sentence comprehensions

**Total Hours: 39**

### Texts Books:


### References books:

Hacker, Diana. Rules for Writers. 5thed. Boston: Bedford, 2004
Unit I

**Systems of Linear Equations and Matrices:** Matrix, Some Definitions Associated with Matrices, Systems of Linear Equations, Matrices and Elementary Row Operations, The Inverse of a Square Matrix, Matrix Equations, Rank of the Matrix, Applications of Systems of Linear Equations.

**Linear Transformation:** Linear Transformations, Composition of Linear transformation, The Null Space and Range, Isomorphisms, Inverse Linear Transformation, Matrix Representation of Linear Transformations, Similarity.

**Eigen Value and Eigen Vectors:** Eigen value and Eigen Vectors, Diagonalization, Cayley-Hamilton Theorem, Quadratic Form.

Unit II

**Vector Spaces:** Euclidean Vector Space, Vector Spaces, Subspaces, Linear Combination, Span, Linear Dependence and Independence, Basis, Finite Dimensional Vector Space, Basis and Dimension for Solution Space of the Homogeneous Systems, Reduction and Extension of Basis, Coordinate Vector Relative to Basis, Change of Basis, Row Space, Column Space and Null Space, Rank and Nullity

Unit III

**Inner Product Spaces:** Introduction, The Dot Product on \( \mathbb{R}^n \) and Inner Product Spaces, Orthogonal Basis, Orthonormal Bases, Gram-Schmidt Process, Orthogonal Complements, Application: Least Squares Approximation, Orthogonal Projection, Diagonalization of Symmetric Matrices, Application: Quadratic Forms

Unit IV

**Complex Analysis:** Complex numbers, Exponential, Trigonometric, De Moivre’s Theorem, Roots of a complex number, Function of a Complex variable, Analytic function, Cauchy Riemann equations, Laplace Equation, Harmonic Functions, Harmonic Conjugate functions and their Engineering Applications, Conformal mapping and its type, Some standard & special conformal mappings, Definition of a Complex line integral, Cauchy’s integral theorem, Cauchy’s Integral formula, Residue theorem, Calculation of residues, Evaluation of real definite integrals.

**Total Hours:** 39
Textbook For Calculus:


Reference Books for Elements of Mechanical Engineering:

6. Introduction to Linear Algebra with Application, by Jim DeFranza, Daniel Gagliardi, Tata McGraw-Hill
11. Linear Algebra and its Applications, by David C. Lay, Pearson Education
**Teaching Scheme**

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**Unit I**

**Vector concepts & applications in Physics:** Introduction to vector algebra, Physical concepts in vector fields and Scalar fields with examples, Physical and mathematical concepts of gradient, divergence and curl, Green’s theorem, Gauss theorem, applications in gravitation and electrostatics. Stokes' theorem and its applications.

**Electrostatics and Electrodynamics:** Gauss’s law in dielectric medium, Equation of continuity, Biot Savart law – Ampere’s law – magnetization and magnetic intensity, Faraday’s law of induction – generalization of Ampere’s law, displacement current, Maxwell’s equations, wave equation for electromagnetic radiation, electromagnetic wave propagation in free space and isotropic dielectric medium, Poynting theorem & Poynting vector.

**Unit II**

**Waves and Oscillations:** Types of waves, Simple harmonic motion, Damped simple harmonic motion, types of damping, Forced oscillation, resonance, Energy Transport in Wave motion.

**Acoustics & Ultrasonic:** Introduction to Sound, Sabine’s reverberation theory, Acoustical defects and their remedies, Doppler Effect. Ultrasonic waves, methods of their generation and detection, properties and application of ultrasonic waves.

**Unit III**

**Kinematics and Dynamics:** Kinematics and dynamics of particles, work and energy system of particles, rotational kinematics and dynamics.


**Unit IV**

**Laser & Fibre Optics:** Concepts of maser and laser, Interaction of radiation of matter-quantum mechanical view, Einstein coefficients spontaneous and stimulated emission, principles involves in laser, Meta stable state, Population inversion, three and four level laser system, and optical amplification and optical resonator, characteristics of laser, Ruby, He-Ne and semiconductor lasers, Application of lasers, Optical Fiber, physical structure and basic theory, modes in optical fibers, step index and graded index fibers, losses in optical fibers, applications of optical fibers in communication.

**Total Hours:** 26
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17BPE104 - Geology for Petroleum Engineers

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Unit - I

**The Earth**
Introduction to origin, age, internal structure and constitution of earth; introduction to earth’s lithosphere, atmosphere, hydrosphere, and biosphere; plate tectonic theory, tectonic elements of continents and oceans; continental drift; concept of isostacy.

Unit - II

**Crystallography, Mineralogy and Petrology**
Crystallography – unit cell, crystal systems, crystal faces, and crystal symmetry; concept of stereographic projection. Mineralogy – classification of minerals, physical and optical properties of rock forming minerals; classification and structure of silicates; brief descriptions of common silicates viz., olivine, pyroxene, amphibole, mica, feldspar and quartz; Concepts of solid solution and binary eutectic; Bowen’s reaction series. Petrology – introduction; classification of rock types; formation, classification, texture and structure of igneous, metamorphic, and sedimentary rocks. Description of common Igneous Rocks viz., Rhyolite, Granite, Pegmatite, Basalt, Dolerite, and Gabbro; Sedimentary Rocks viz. Conglomerate, Breccia, Sandstone, Shale, and Limestone; Metamorphic Rocks viz., Slate, Schist, Gneiss, Quartzite, and Marble. Rock cycle; introduction to weathering of rocks with an emphasis on chemical weathering.

Unit –III

**Structural Geology**
Domain of Structural Geology; concepts of strike and dip; parameters controlling deformation of rocks; deformation in rocks – descriptions of folds, joints, faults and their classifications; unconformity; geological maps and sections; map symbols.

Unit – IV

**Paleontology and Stratigraphy**
Paleontology – definition of fossils and classification of organisms; evolution of life; nature of fossil records and processes of fossilization; uses of fossils; introduction to different fossil groups viz., microfossils, invertebrates, vertebrates, and plant fossils. Stratigraphy – Geological Time Scale; principles of stratigraphy; stratigraphic units; concept of stratigraphic columns; stratigraphic correlation. Physiographic divisions of India; Indian stratigraphy – Precambrian basement of Indian peninsula; stratigraphy of type sections viz., Vindhyan, Gondwana, Jurassic, Cretaceous, and Tertiary.

Total Hours – 39

**Texts and References:**
1. Read H.H.: *Rutley’s Elements of Mineralogy*
2. Best M.G.: *Igneous and Metamorphic Petrology*
3. Sengupta S.M. – *Introduction to Sedimentology*
4. Hobbs B. E., Means W.D. & Williams P. F.: *An
### Teaching Scheme

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### Texts and References:

1. GD Rai, Energy Resources.
2. United Nations Framework Classification for Fossil Energy and Mineral Resources
17BPE106 - Engineering Drawing

### Teaching Scheme

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**Unit I**

Introduction to Engineering Graphics, Drawing instruments and accessories, lettering, lines and dimensioning. BIS - SP46. Use of plane scales and Representative Fraction, Free hand sketching Engineering Curves: Classification of Engineering Curves, Construction of Conics, Cycloidal Curves, Involute and Spirals. Projections of Points & Lines: Introduction to principal planes of projections, Projections of the points located in same quadrant and different quadrants, Projections of line with its inclination to one reference plane and with two reference planes. True length of the line and its inclination with the reference planes.

**Unit II**

Projections of Solids & Section of Solids: Classification of solids. Projections of solids like Cylinder, Cone, Pyramid and Prism with its inclination to one reference plane and with two reference planes. Development of Lateral Surfaces: Concept of development of the different surfaces. Parallel Line Development and Radial Line Development.

**Unit III**

Orthographic Projections: Principle of projection, Principal planes of projection, Projections from the pictorial view of the object on the principal planes for View from Front, View from Top and View from Side using first angle projection method and third angle projection method, Full Sectional View.

**Unit IV**

Isometric Projections and Isometric View or Drawing: Isometric Scale, Conversion of orthographic views into isometric projection, isometric view or drawing.

### Texts and References:

17BPE107 - Physics Practical

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List of Experiments

1. Study of Interference using Michelson’s Interferometer.
2. Introduction to Oscilloscope.
4. Experiment to determine volumetric coefficient of expansion of liquids.
5. Experiment to determine thermal conductivity of different solid bodies.
6. Experiment with solar collector.
8. Experimental to determine linear thermal expansion coefficient of solid bodies.
9. Experiment on reflection of Ultrasonic waves.
10. Experiment to determine heat capacities.
11. Experiment to determine critical temperature.
12. Study of effect of electric force.
15. Study of conducting electricity by means of electrolysis.
17. Determining Plank’s constant and Inverse square law.
18. Experiments on diffraction with He-Ne Laser Kit.
21. Experiment to study forced oscillations.
22. Study of charging and discharging of capacitive plates.
23. Study of Bio-Savart’s Law
25. Experiments on spectroscopy.
27. Study of Photoconductivity.
28. Study of Interference using ultrasonic Interferometer.
29. Determining e/m by Thomson’s method.
30. Study of Polarization of light using LASER.
31. Millikan’s oil drop experiment.
32. Study of Holography.
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1. Study of Crystal: Clinographic projection of cube
2. Study of common silicates in Hand Specimens: Quartz, Feldspar, Mica, Garnet, kyanite, Sillimanite
3. Study of Other Minerals in Hand Specimen: Graphite, Gypsum, Barite, Calcite, Aragonite, Corundum, haematite
4. Study of common Igneous Rocks in Hand Specimens: Granite, Basalt, Rhyolite, Syenite, Dolerite, Gabbro
5. Study of common Metamorphic Rock in Hand Specimen: Slate, Phyllite, Schist (Mica, Talc, Chlorite), Gneiss, Marble, Quartzite
7. Study of Thin Sections of Minerals (quartz, feldspar, mica, pyroxene) & Rocks (Granite, Basalt, Gabbro, Schist, Shale, Sandstone, Limestone)
8. Study of Selected Fossils in Hand Specimen
9. Study of Topographic & Geological Maps
# 17BPE110 - Swami Vivekananda

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## Unit I

### Life of Young Naren

Early years – Young Naren and his friends, At the feet of Sri Ramakrishna, Training of the disciple, As a wandering monk, On the World Stage - Trip to America, The parliament of Religions, Vedanta in America, Experiences in the West, Triumphal Return to India – Calcutta and North India, The Himalayas, At Belur Math, Second visit to The West, To Europe, The Journey’s End – Last Days, The passing.

## Unit II

### Insights – Karma, Raja, Jnana and Bhakti Yoga


## Unit III

### Swamiji’s Thoughts and Story


## Unit IV

### Modern, Rational and Universal Teachings


*Total Hours: 26*

## Texts and References:

2. Desh Raj Sirswal; *Value Education and Philosophy* (A tribute issue to Swami Vivekananda); Milestone Education Review, 2014
# 17BPE111 – Gandhian Thoughts

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## Unit I
- Life and Basic Works of Mahatma Gandhi, Sarvodaya.  
  \[ \text{Hours: 05} \]

## Unit II
- Truth and Non – Violence, Gandhian Approach to Science, Technology and Development  
  \[ \text{Hours: 07} \]

## Unit III
- The Constructive work and Human Liberation, Satyagraha and Peace Making  
  \[ \text{Hours: 07} \]

## Unit IV
- Gandhian way of Management and Trusteeship, Gandhian Futurology, Gandhian Life Style, Contemporaries of Mahatma Gandhi.  
  \[ \text{Total Hours: 26} \]

## Text and Reference Books

1. Gandhi, M. K. My experiments with truth
3. Gupta, A. A. Gandhian Thoughts