SEMESTER - I
SYLLABUS

Course Code	Course Name	Category	L	T	P	Credit	Year of Introduction
MA0U10A	LINEAR ALGEBRA AND CALCULUS	BSC	3	1	0	4	2020

i) COURSE OVERVIEW:

This course introduces students to some basic mathematical ideas and tools which are at the core of any engineering course. A brief course in Linear Algebra familiarises students with some basic techniques in matrix theory which are essential for analysing linear systems. The calculus of functions of one or more variables taught in this course are useful in modelling and analysing physical phenomena involving continuous change of variables or parameters and have applications across all branches of engineering.

ii) COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Solve systems of linear equations.	Apply
CO 2	Compute maxima and minima using partial derivatives.	Evaluate
CO 3	Compute areas and volumes of geometrical shapes using multiple integrals.	Evaluate
CO 4	Identify the convergence or divergence of an infinite series.	Evaluate
CO 5	Determine the Taylor and Fourier series expansion of functions and learn their applications.	Apply

iii) SYLLABUS

Basics of Linear Algebra – Solution of systems of linear equations, row echelon form, rank, eigen values and eigen vectors, diagonalization of matrices, orthogonal transformation, quadratic forms.

Partial Differentiation and Applications – Limit and continuity of functions of two or more variables, partial derivatives, chain rule, total derivatives, maxima and minima.

Multiple Integrals – Double and triple integrals, double integrals over rectangular and non-rectangular regions, changing the order of integration, finding areas and volume, mass and centre of gravity.

Infinite series - Convergence and divergence of Infinite series, geometric series and p-series, test of convergence, Alternating series, absolute and conditional convergence

Taylor series, Binomial series and series representation of exponential, trigonometric, logarithmic functions-Fourier Series- Euler's formulas, Fourier sine and cosine series, Half range expansions.

iv) a) TEXT BOOKS

1) H. Anton, I. Biven, S. Davis, *Calculus*, Wiley, 10th Edition, 2015.

2) Erwin Kreyszig, *Advanced Engineering Mathematics,* John Wiley & Sons, 10thEdition, 2016.

b) REFERENCES

1) J. Stewart, *Essential Calculus*, Cengage,2ndEdition,2017.
2) G. B. Thomas and R. L. Finney, *Calculus and Analytic geometry*,9thEdition, Pearson, Reprint,2002.
3) Peter V. O'Neil, *Advanced Engineering Mathematics*, Cengage, 7th Edition 2012.

v) COURSE PLAN

Module	Contents	No. of hours
I	Linear Algebra: Systems of linear equations, Solution by Gauss elimination, row echelon form and rank of a matrix, fundamental theorem for linear systems (homogeneous and non-homogeneous, without proof), Eigen values and eigen vectors. Diagonalization of matrices, orthogonal transformation, quadratic forms and their canonical forms.	12
II	Multivariable calculus-Differentiation: Concept of limit and continuity of functions of two variables, partial derivatives, Differentials, Local Linear approximations, chain rule, total derivative, Relative maxima and minima, Absolute maxima and minima on closed and bounded set.	12
III	Multivariable calculus-Integration: Double integrals (Cartesian), reversing the order of integration, change of coordinates (Cartesian to polar), finding areas and volume using double integrals, mass and centre of gravity of inhomogeneous laminas using double integral. Triple integrals, volume calculated as triple integral, triple integral in cylindrical and spherical coordinates (computations involving spheres, cylinders).	12
IV	Sequences and Series: Convergence of sequences and series, convergence of geometric series and p-series(without proof), test of convergence (comparison, ratio and root tests without proof); Alternating series and Leibnitz test, absolute and conditional convergence.	12
V	Series representation of functions: Taylor series (without proof, assuming the possibility of power series expansion in appropriate domains), Binomial series and series representation of exponential, trigonometric, logarithmic functions (without proofs of convergence); Fourier series, Euler formulas, Convergence of Fourier series (without proof), half range sine and cosine series, Parseval's theorem (without proof).	12
	Total hours	**60**

Course Code	Course Name	Category	L	T	P	Credit	Year of Introduction
PH0U10A	ENGINEERING PHYSICS-A (For Circuit Branches)	BSC	3	1	0	4	2020

i)   COURSE OVERVIEW:

The aim of the course is to develop scientific attitude in students and offer them an understanding of physical concepts behind various engineering applications. It creates an urge in students to think creatively in emerging areas of Physics.

ii)   COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Describe the characteristics of different types of oscillations and waves.	Remember
CO 2	Apply the principles of wave optics to explain natural physical processes and related technological advances.	Understand
CO 3	Use the principles of quantum mechanics to analyse the behaviour of matter in the atomic and subatomic level	Understand
CO 4	Apply the fundamental ideas of magnetism and vector calculus to arrive at Maxwell's equations.	Understand
CO 5	Describe the principles behind various superconducting applications, solid-state lighting devices and fibre optic communication system.	Apply

iii)   SYLLABUS

Oscillations and Waves: Damped oscillations, Forced oscillations, One dimensional and three-dimensional wave equations, Transverse vibrations along a stretched string

Wave Optics: Interference of light- Air wedge, Newton's rings, Antireflection coating, Diffraction-Fraunhofer diffraction at a single slit, Grating equation, Rayleigh's criterion

Quantum Mechanics & Nano technology: Wave function, Time dependent and time independent Schrodinger wave equations, One-dimensional potential well, Introduction to nanoscience and technology, Quantum confinement, Properties of nanomaterials

Magnetism & Electro Magnetic Theory: Magnetic field and Magnetic flux density, fundamental laws, magnetic permeability and susceptibility, classification of magnetic materials, fundamentals of vector calculus and theorems, equation of continuity, Maxwell's equations in vacuum, velocity of electromagnetic waves in freespace.

Superconductivity & Photonics: Super conductivity- Meissner effect, Type I &II superconductors, applications of superconductors, Introduction to photonics-photonic devices-Light Emitting Diode, Photo detectors -Junction and PIN photodiodes, Solar cells- I-V characteristics, Optical fibre -Principle, Numerical aperture, Types of fibres, Applications

iv) (a) TEXT BOOKS

1) M.N. Avadhanulu , P.G. Kshirsagar, T.V.S Arun Murthy*, A Text book of Engineering Physics*, S.Chand &Co., Revised Edition, 2014
2) H.K. Malik, A.K. Singh, *Engineering Physics,* McGraw Hill Education, 2nd Edition, 2017

(b) REFERENCES

1) Arthur Beiser, *Concepts of Modern Physics*, Tata McGraw Hill Publications, 6thEdition, 2003.
2) Aruldhas G., *Engineering Physics*, Prentice Hall of India Pvt. Ltd., 2015
3) Ajoy Ghatak, *Optics*, Mc Graw Hill Education, 6th Edition, 2017
4) David J. Griffiths, *Introduction to Electrodynamics*, Addison-Wesley publishing, 3rd Edition, 1999.
5) Premlet B., *Advanced Engineering Physics*, Phasor Books,10thEdition, 2017.

v) COURSE PLAN

Module	Contents	No. of hours
I	Oscillations and Waves: Harmonic oscillations, damped harmonic motion-derivation of differential equation and its solution, over damped, critically damped and under damped cases, Quality factor-expression, forced oscillations-differential equation-derivation of expressions for amplitude and phase of forced oscillations, amplitude resonance-expression for resonant frequency, Quality factor and sharpness of resonance, electrical analogy of mechanical oscillators. Wave motion- derivation of one-dimensional wave equation and its solution, three-dimensional wave equation and its solution (no derivation), distinction between transverse and longitudinal waves, transverse vibration in a stretched string, statement of laws of vibration	12
II	Wave Optics: Interference of light-principle of superposition of waves, theory of thin films - cosine law (Reflected system), derivation of the conditions of constructive and destructive interference, interference due to wedge shaped films -determination of thickness and test for optical planeness, Newton's rings- measurement of wavelength and refractive index, antireflection coatings. Diffraction of light, Fresnel and Fraunhofer classes of diffraction, diffraction grating-Grating equation, Rayleigh criterion for limit of resolution, resolving and dispersive power of a grating with expression (no derivation)	12
III	Quantum Mechanics & Nanotechnology: Introduction for the need of Quantum mechanics, wave nature of Particles, uncertainty principle, Applications-absence of electrons inside a nucleus and natural line broadening mechanism, formulation of time dependent and independent Schrodinger wave equations-physical meaning of wave function, Particle in a one dimensional box- derivation for normalised	12

	wave function and energy eigen values, Quantum mechanical tunnelling (qualitative). Introduction to nanoscience and technology, increase in surface to volume ratio for nanomaterials, quantum confinement in one dimension, two dimension and three dimension-nano sheets, nano wires and quantum dots, properties of nanomaterials-mechanical, electrical and optical, applications of nanotechnology (qualitative ideas)	
IV	**Magnetism and Electromagnetic theory:** Magnetic field and Magnetic flux density, Gauss's law for Magnetic flux density, Ampere's Circuital law, Faraday's law in terms of emf produced by changing magnetic flux, Magnetic permeability and susceptibility, classification of magnetic materials-para, dia and ferromagnetic materials Fundamentals of vector calculus, concept of divergence, gradient and curl along with physical significance, line, surface and volume integrals, Gauss divergence theorem & Stokes' theorem, equation of continuity, derivation of Maxwell's equations in vacuum, comparison of displacement current with conduction current, electromagnetic waves, velocity of electromagnetic waves in free space, flow of energy and Poynting's vector (no derivation)	**12**
V	Superconductivity & Photonics: Superconducting phenomena, Meissner effect and perfect diamagnetism, types of superconductors-Type I and Type II, BCS Theory (Qualitative), high temperature superconductors-applications of super conductivity Introduction to photonics-photonic devices-Light Emitting Diode, Photo detectors -Junction and PIN photodiodes, Solar cells-I-V characteristics, Optic fibre-principle of propagation of light, types of fibres-step index and graded index fibres, numerical aperture – derivation, fibre optic communication system (block diagram), industrial, medical and technological applications of optical fibre, fibre optic sensors-intensity modulated and phase modulated sensors.	**12**
	Total hours	**60**

Course Code	Course Name	Category	L	T	P	Credit	Year of Introduction
ES0U10A	ENGINEERING MECHANICS	ESC	2	1	0	3	2020

i)   COURSE OVERVIEW

Goal of this course is to expose the students to the fundamental concepts of mechanics and enhance their problem-solving skills. It introduces students to the influence of applied force system and the geometrical properties of the rigid bodies while stationary or in motion. After this course students will be able to recognize similar problems in real-world situations and respond accordingly.

ii) COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Explain the principles and theorems related to rigid body mechanics.	Understand
CO 2	Describe the components of system of forces acting on the rigid body.	Understand
CO 3	Apply the properties of distributed areas and masses for solving problems involving rigid bodies.	Apply
CO 4	Apply the conditions of equilibrium to various practical problems involving different force systems.	Apply
CO 5	Apply appropriate principles to solve problems in rigid body mechanics.	Apply

iii) SYLLABUS

Statics of rigid bodies: Classification of force systems, Composition and resolution of forces, Resultant and equilibrium equations, Methods of projections, Varignon's Theorem of moments.

Friction: Analysis of single and connected bodies. Parallel coplanar forces, couple. Beam reactions.

Properties of surfaces: Centroid of composite areas, Moment of inertia of areas, Polar moment of inertia, Theorem of Pappus-Guldinus, Forces in space.

Dynamics: D'Alembert's principle, Motion on horizontal and inclined surfaces, Motion of connected bodies. Impulse momentum and work energy relation. Curvilinear translation.

Rotation: Kinematics of rotation. Plane motion of rigid body: Instantaneous centre. Simple harmonic motion: Mechanical vibrations.

iv) (a) TEXTBOOKS

1)   Timoshenko, S., Young, D. H., Rao, J. V. and Pati, S., *Engineering Mechanics*, Mc-Graw Hill Publishers, 2017.

2) Beer, F. P. and Johnston, R., *Vector Mechanics for Engineers: Statics and Dynamics*, Tata Mc-Graw Hill Publishing Company Limited, New Delhi, 12thEdition, 2005.
3) Bansal, R. K., *A Textbook of Engineering Mechanics*, Laxmi Publications, 8thEdition, 2016.
4) Sharma, D. P., Hibbeler, R. C. and Shames, I. H., *Engineering Mechanics*, Pearson Publishers, 2011.

(b) REFERENCES

1) Bhavikkatti, S. S., *Engineering Mechanics*, New Age International Publishers, 2016.
2) Merriam, J. L. and Kraige, L. G., *Engineering Mechanics* - Vols. 1 and 2, John Wiley, 7thEdition, 2006.
3) Hibbeler, R. C. and Gupta, A., *Engineering Mechanics*, Vol. I Statics, Vol II Dynamics, Pearson Education, 2009.
4) Shames, I. H., *Engineering Mechanics - Statics and Dynamics*, Prentice Hall of India,4th Edition 2005.

v)   COURSE PLAN

Module	Contents	No. of hours
I	Introduction to engineering mechanics - Introduction on statics and dynamics - Basic principles of statics - Parallelogram law, Equilibrium law - Superposition and transmissibility, Law of action and reaction. Free body diagrams - Degree of freedom-Types of supports and nature of reactions -Exercises for free body diagram preparation - Composition and resolution of forces, Resultant and equilibrium equations. Concurrent coplanar forces - Analysis of concurrent forces - Methods of projections - Methods of moment - Varignon's Theorem of Moments.	9
II	Friction - Sliding friction - Coulomb's laws of friction - Analysis of single bodies - Analysis of connected bodies. Parallel coplanar forces - Couple - Resultant of parallel forces - Centre of parallel forces - Equilibrium of parallel forces - Simple beam subject to concentrated vertical loads. General coplanar force system - Resultant and equilibrium equations.	9
III	Centroid of regular geometrical shapes - Centroid of Composite areas. Moment of inertia- Parallel axis theorem - Perpendicular axis theorem -Polar moment of inertia, Radius of gyration. Mass moment of inertia of ring, cylinder and uniform disc. Theorem of Pappus Guldinus. Introduction to forces in space -Vectorial representation of forces, moments and couples - Resultant and equilibrium equations for concurrent forces in space - Concurrent forces in space.	9
IV	Introduction to dynamics - Rectilinear translation - Equations of kinematics.	9

	Introduction to kinetics - Equation of motion - D'Alembert's principle - Motion on horizontal and inclined surfaces - Motion of connected bodies. Curvilinear translation - Projectile motion - Introduction to kinetics - equation of motion. Impulse momentum equation and work energy equation. Moment of momentum and work energy equation (Curvilinear translation).	
V	Rotation - Kinematics of rotation- Equation of motion for a rigid body rotating about a fixed axis - Rotation under a constant moment. Plane motion of rigid body- Instantaneous centre of rotation (concept only). Introduction to harmonic oscillation - Free vibrations - Simple harmonic motion – Differential equation and solution. Degree of freedom - Examples of single degree of freedom (SDOF) systems - Idealisation of mechanical systems as spring-mass systems (concept only). SDOF spring mass system - Equation of motion -Undamped free vibration response - Concept of natural frequency. Effect of damping on free vibration response (concept only).	9
	Total hours	**45**

Course Code	Course Name	Category	L	T	P	Credit	Year of Introduction
ES0U10C	BASICS OF CIVIL AND MECHANICAL ENGINEERING	ESC	4	0	0	4	2020

i)   COURSE OVERVIEW

The goal of this course is to provide an insight on the essentials of Civil and Mechanical Engineering discipline to the students of all branches of Engineering and to provide the students an illustration of the significance of the Civil and Mechanical Engineering Profession in satisfying the societal needs.

ii)   COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Explain different types of buildings, their components, materials, construction techniques and basic infrastructure services.	Understand
CO 2	Describe the importance, objectives and principles of surveying.	Understand
CO 3	Apply the principles of levelling to find the level difference between points.	Apply
CO 4	Summarise the different materials and systems in the context of green buildings.	Understand
CO 5	Analyse thermodynamic cycles and Illustrate the working and features of IC Engines	Apply
CO 6	Explain the basic principles of Refrigeration and Air Conditioning and working of hydraulic machines	Understand
CO 7	Explain the working of power transmission elements, basic manufacturing, metal joining and machining processes	Understand

iii) SYLLABUS

Introduction to Civil Engineering: Relevance and major disciplines of Civil Engineering, Introduction to buildings: Types and different components of buildings, Building rules and regulations, Building area.

Introduction to surveying: Objectives, Principle, Classification, Levelling, Introduction to modern surveying instrument- Total Station.

Construction materials: Bricks, Stones, Sand, Timber, Cement, Cement mortar, Concrete, Steel, Modern construction materials.

Building construction: Foundations, Brick masonry, Roofs and floors, Basic infrastructure services, Green buildings.

Basics of Mechanical Engineering: Fundamental of thermodynamics. Analysis of thermodynamic cycles and working of internal combustion engines. CRDI, MPFI and concept of hybrid vehicles.

Refrigeration and power transmission systems - Analysis of reversed Carnot cycle and vapour compression cycle. Introduction to psychrometry. Layout of unit and central air conditioner.

Description and basic analysis of hydraulic pump and turbine. Working of different power transmission devices.

Manufacturing methods and machine tools - Description of various manufacturing, metal joining process and basic machining operations.

Working of different machines tools and CNC machine. Introduction to CAD/CAM, additive and rapid manufacturing.

iv)   (a) **TEXT BOOKS**

  1) Mamlouk, M. S., and Zaniewski, J. P., *Materials for Civil and Construction Engineering*, Pearson Publishers, 4th Edition, 2017.
  2) Rangwala, S. C., *Essentials of Civil Engineering*, Charotar Publishing House, 1st Edition, 2012.
  3) Clifford, M., Simmons, K. and Shipway, P., *An Introduction to Mechanical Engineering Part I* - CRC Press, 2009.
  4) Kumar, P., *Basic Mechanical Engineering*, Pearson India, 2013.

  (b) REFERENCES

  1) Chen, W. F. and Liew, J. Y. R. (Eds), *The Civil Engineering Handbook*, CRC Press (Taylor and Francis), 2nd Edition, 2002
  2) Punmia, B. C., Ashok, K. J. and Arun, K. J., *Surveying*, Vol. I, Laxmi Publications (P) ltd., New Delhi, 17th Edition, 2016
  3) *Kerala Municipal Building Rules*, LSGD, Govt. of Kerala, 2019
  4) SP 7: 2016*, National Building Code of India*, BIS, New Delhi, 2016.
  5) Wylen, G. J. V., Sonntag, R. and Borgnakke, C., *Fundamentals of Classical Thermodynamics*, John Wiley & Sons,2012.
  6) Sawhney, G. S., *Fundamentals of Mechanical Engineering*, PHI Learning; 3rd Revised Edition, 2015.

v)   **COURSE PLAN**

Module	Contents	No. of hours
I	**General Introduction to Civil Engineering:** Relevance of Civil Engineering in the overall infrastructure development of the Country. Responsibility of an engineer in ensuring the safety of built environment. Brief introduction to major disciplines of Civil Engineering like Structural Engineering, Transportation Engineering, Geotechnical Engineering, Water Resources Engineering and Environmental Engineering. **Introduction to buildings:** Types of buildings, selection of site for buildings, components of a residential building and their functions. **Building rules and regulations:** Relevance of NBC, KBR & CRZ norms (brief discussion only).	10

	Building area: Plinth area, built up area, floor area, carpet area and floor area ratio for a building as per KBR. **Surveying:** Importance, classification, objectives and principles, instruments used. Levelling- principles, dumpy level, simple levelling, differential levelling- problems. Introduction to modern surveying instruments-Total Station.	
II	**Construction materials:** Conventional construction materials: types, properties and uses of building materials: bricks, stones, cement, sand and timber. **Cement Mortar:** Materials and properties. **Cement concrete:** Constituent materials, properties and types. **Steel:** Steel sections and steel reinforcements, types and uses. **Modern construction materials:** Architectural glass, ceramics, plastics, composite materials, thermal and acoustic insulating materials, decorative panels, waterproofing materials. Modern uses of gypsum, pre-fabricated building components (brief discussion only).	**10**
III	**Building Construction: Foundations:** Bearing capacity of soil (definition only), functions of foundations, types – shallow and deep (brief discussion only). Load bearing and framed structures (concept only). **Brick masonry:** Header and stretcher bond, English bond and Flemish bond. **Roofs and floors:** Functions, types; flooring materials (brief discussion only). **Basic infrastructure services:** MEP, HVAC, elevators, escalators and ramps (Civil Engineering aspects only), fire safety for buildings. **Green buildings:** Materials, energy systems and water management and environment for green buildings (brief discussion only).	**10**
IV	**Fundamentals of thermodynamics**: Review of basics of thermodynamics- system, surroundings, process, cycle- quasistatic process, laws of thermodynamics. Analysis of thermodynamic cycles: Carnot, Otto, Diesel cycles, Derivation of efficiency of these cycles, Problems to calculate heat added, heat rejected, net-work and efficiency. **IC Engines**: CI, SI, 2- Stroke, 4-Stroke engines. Listing the parts of different types of IC Engines. Efficiencies of IC Engines (Definitions only), Air, Fuel, cooling and lubricating systems in SI and CI Engines, CRDI, MPFI. Concept of hybrid engines.	**10**
V	**Refrigeration**: Unit of refrigeration, reversed Carnot cycle, COP, vapour compression cycle (only description and no problems); Definitions of dry, wet & dew point temperatures, specific humidity and relative humidity, Cooling and dehumidification, Layout of unit and central air conditioners. **Hydraulic machines**: Working principle of Reciprocating pump, Centrifugal pump, Pelton turbine, Francis turbine and Kaplan turbine.	**10**

	Overall efficiency, Problems on calculation of input and output power of pumps and turbines (No velocity triangles) **Power Transmission Devices**: Belt and Chain drives, Gear and Gear trains, Single plate clutches.		
VI	**Manufacturing Process**: Basic description of the manufacturing processes – Sand Casting, Forging, Rolling, Extrusion and their applications. Metal Joining Processes: List types of welding, Description with sketches of Arc Welding, Soldering and Brazing and their applications. **Basic Machining Operations**: Turning, Drilling, Milling and Grinding. Lathe, Drilling machine, Milling machine. **Computer Aided Machining**: CNC Machine. Principle of CAD/CAM, Rapid and Additive manufacturing.		**10**
	Total hours		**60**

Course Code	Course Name	Category	L	T	P	Credit	Year of Introduction
HS0U10A	LIFE SKILLS	HSC	2	0	2	-	2020

i) **COURSE OVERVIEW**:

This course is designed to enhance the employability and maximize the potential of the students by introducing them to the principles that underly personal and professional success, and help them acquire the skills needed to apply these principles in their lives and careers.

ii) **COURSE OUTCOMES**

After the completion of the course, the student will be able to:

CO 1	Identify different skills required in personal and professional life.	Understand
CO 2	Apply well defined techniques to cope with emotions and stress and to provide an awareness of the self.	Apply
CO 3	Apply appropriate thinking tools and techniques for creative problem solving.	Apply
CO 4	Explain the importance of teamwork, team performance and team conflicts.	Understand
CO 5	Explain the basic mechanics of effective communication and demonstrate these through presentations.	Understand

iii) **SYLLABUS**

Overview of Life Skills: Meaning and significance of life skills, Life skills identified by WHO, Life skills for professionals, personality development, IQ, EQ, and SQ.

Self-awareness & Stress Management: Definition and need for self-awareness; Tools and techniques of SA, Stress, reasons and effects, the four A's of stress management, Techniques and Approaches, PATH method and relaxation techniques.

Critical Thinking & Problem Solving: Creativity, Lateral thinking, Critical thinking, Multiple Intelligence, Problem Solving, Six thinking hats, Mind Mapping & Analytical Thinking.

Teamwork: Groups, Teams, Group Vs Teams, Team formation process, Stages of Group, Group Dynamics, Managing Team Performance & Team Conflicts.

Leadership Skills: Leadership, Levels of Leadership, Making of a leader, Types of leadership, Transactions Vs Transformational Leadership, VUCA Leaders, Leadership Grid & leadership Formulation**.**

iv) (a) **TEXT BOOKS**

1. Remesh S., Vishnu R. G., *Life Skills for Engineers*, Ridhima Publications, 1st Edition, 2016.
2. *Life Skills for Engineers*, Complied by ICT Academy of Kerala, McGraw Hill Education (India) Private Ltd., 2016.

(b) REFERENCES

1. Shiv Khera, *You Can Win*, Macmillan Books, NewYork,2003.
2. Barun K. Mitra, *Personality Development & Soft Skills*, Oxford Publishers, Third impression, 2017.
3. Caruso, D. R. and Salovey P, *The Emotionally Intelligent Manager: How to Develop and Use the Four Key Emotional Skills of Leadership*, John Wiley & Sons,2004.
4. Larry James, *The First Book of Life Skills*; Embassy Books, 1stEdition,2016.

v) **COURSE PLAN**

Module	Contents	No. of hours
I	**Overview of Life Skills**: Meaning and significance of life skills **Life skills identified by WHO**: Self- awareness, Empathy, Critical thinking, Creative thinking, Decision making, problem solving, Effective communication, interpersonal relationship, coping with stress, coping with emotion. **Life skills for professionals:** positive thinking, right attitude, attention to detail, having the big picture, learning skills, research skills, perseverance, setting goals and achieving them, helping others, leadership, motivation, self-motivation, and motivating others, personality development, IQ, EQ, and SQ.	6
	Activities based on Creative thinking tools	
II	**Self-awareness**: Definition, need for self-awareness; Coping With Stress and Emotions, Human Values, tools and techniques of SA: questionnaires, journaling, reflective questions, meditation, mindfulness, psychometric tests, feedback. **Stress Management**: Stress, reasons and effects, identifying stress, stress diaries, the four A's of stress management, techniques, Approaches: action-oriented, emotion-oriented, acceptance- oriented, resilience, Gratitude Training, Coping with emotions: Identifying and managing emotions, harmful ways of dealing with emotions, PATH method and relaxation techniques. **Morals, Values and Ethics**: Integrity, Civic Virtue, Respect for Others, Living Peacefully. Caring, Sharing, Honesty, Courage, Valuing Time, Time management, Cooperation, Commitment, Empathy, Self-Confidence, Character, Spirituality, Avoiding Procrastination, Sense of Engineering Ethics.	6
	Case studies on Morals and Ethics	
III	**21st century skills**: Creativity, Critical Thinking, Collaboration, Problem Solving, Decision Making, Need for Creativity in the 21st century, Imagination, Intuition, Experience, Sources of Creativity, Lateral Thinking, Myths of creativity, Critical thinking Vs Creative thinking, Functions of Left Brain & Right brain, Convergent & Divergent Thinking, Critical reading & Multiple Intelligence.	6

	Steps in problem solving: Problem Solving Techniques, Six Thinking Hats, Mind Mapping, Forced Connections. Analytical Thinking, Numeric, symbolic, and graphic reasoning. Scientific temperament and Logical thinking Thinking Hats, Mind Mapping, Forced Connections.		
	Problem solving using Mind map/Six Thinking Hats		
IV	**Group and Team Dynamics**: Introduction to Groups: Composition, formation, Cycle, thinking, clarifying expectations, Problem Solving, Consensus, Dynamics techniques, Group vs Team, Team Dynamics, Virtual Teams. Managing team performance and managing conflicts, Intrapreneurship.	**6**	
	Group Discussion: Differences between group discussion and debate; Ensuring success in group discussions.		
V	**Leadership**: Leadership framework, entrepreneurial and moral leadership, vision, cultural dimensions. Growing as a leader, turnaround leadership, managing diverse stakeholders, crisis management. Types of Leadership, Traits, Styles, VUCA Leadership, Levels of Leadership, Transactional vs Transformational Leaders, Leadership Grid, Effective Leaders.	**6**	
	Presentation **Presentation Skills:** Oral presentation and public speaking skills; business presentations		
	Total hours	**30**	

Life skills- Practical part- Total 15 hours

1. Activities based on Creative thinking tools - 3 hours
2. Case studies on Morals and Ethics - 3 hours
3. Problem solving using Mind map/Six Thinking Hats - 3 hours
4. Group Discussion: Differences between group discussion and debate; Ensuring success in group discussions - 3 hours
5. Oral presentation and public speaking skills; business presentations - 3 hours

vi) **CONTINUOUS ASSESSMENT EVALUATION PATTERN**

Mark distribution

Total Marks	CIE	ESE	ESE Duration
100	50	50	2 hrs

Continuous Internal Evaluation   **: 50 marks**
Evaluation   **: 50 marks**
Attendance   : 10 marks
Regular assessment   : 15 marks
Series test (one test only, should include first three modules)   : 25 marks

vii) CONTINUOUS ASSESSMENT EXAMINATION PATTERN

Group Discussion (Marks: 9)

Create groups of about 6 students each and engage them on a GD on a suitable topic for about 20 minutes. Parameters to be used for evaluation are as follows:

- Communication Skills   : 3 marks
- Subject Clarity   : 2marks
- Group Dynamics   : 2 marks
- Behaviours & Mannerisms :2 marks

Presentation Skills (Marks: 6)

Identify a suitable topic and ask the students to prepare a presentation (preferably a power point presentation) for about 10 minutes. Parameters to be used for evaluation are as follows:

- Communication Skills   : 2 marks
- Platform skills   : 2 marks
- Subject Clarity/Knowledge : 2 marks

viii) END SEMESTER EXAMINATION PATTERN

Evaluation

Total Marks: 50   Time: 2 hrs

Course Code	Course Name	Category	L	T	P	Credit	Year of Introduction
PH0U18A	ENGINEERING PHYSICS LAB	BSC	0	0	2	1	2020

i) COURSE OVERVIEW:

The aim of this course is to enable the students to gain practical knowledge in Physics to correlate with the theoretical studies. It equips the students to utilize the acquired skills in an appropriate way to explore the prospects of modern technology. It brings more confidence in students and develop the ability to fabricate engineering and technical tools.

ii) COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Determine the frequency of tuning fork using a Melde's string apparatus by setting up wave pattern in a stretched string.	Understand
CO 2	Examine wave patterns using CRO to measure basic physical quantities viz. frequency and amplitude.	Remember
CO 3	Determine the wavelength of a monochromatic beam of light and thickness of thin wire using principle of interference	Apply
CO 4	Demonstrate diffraction of light using plane transmission grating.	Understand
CO 5	Draw the I-V characteristics of non ohmic devices.	Remember

iii) SYLLABUS

1. Melde's string apparatus- Measurement of frequency in the transverse mode.
2. Wave length measurement of a monochromatic source of light using Newton's Rings method.
3. Determination of diameter of a thin wire or thickness of a thin strip of paper using air wedge method.
4. Measurement of wavelength of a source of light using grating.
5. Determination of dispersive power and resolving power of a plane transmission grating.
6. Determination of the wavelength of any standard laser using diffraction grating
7. I-V characteristics of solar cell.
8. CRO-Measurement of frequency and amplitude of wave forms.

iv) REFERENCES

1) S.L. Gupta and V. Kumar, *Practical physics with viva voce*, Pragati Prakashan Publishers, Revised Edition, 2009.
2) M.N. Avadhanulu, A.A. Dani and Pokely P.M., *Experiments in Engineering Physics*, S. Chand &Co, 2008.
3) S. K. Gupta, *Engineering Physics practicals*, Krishna Prakashan Pvt. Ltd., 2014
4) P. R. Sasikumar, *Practical Physics*, PHI Ltd., 2011.

Course Code	Course Name	Category	L	T	P	Credit	Year of Introduction
ES0U18A	CIVIL AND MECHANICAL WORKSHOP	ESC	0	0	2	1	2020

i) COURSE OVERVIEW

The course is designed to train the students to identify and manage the tools, materials and methods required to execute basic Civil and Mechanical Engineering activities. Students will be introduced to a team working environment where they develop the necessary skills for planning, preparing and executing a basic Engineering activity. It also enables the student to familiarize various tools, measuring devices, practices and different methods of manufacturing processes employed in industry for fabricating components.

ii) COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Name different devices and tools used for Civil Engineering measurements.	Remember
CO 2	Explain the use of various techniques and devices used in Civil Engineering measurements.	Understand
CO 3	Choose materials and methods required for basic Civil Engineering activities like field measurements, masonry work and plumbing.	Apply
CO 4	Demonstrate the steps involved in basic Civil Engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work.	Apply
CO 5	Identify the tools and equipment used in fitting, carpentry, sheet metal, foundry, welding and smithy and various machine tools.	Remember
CO 6	Prepare simple models in fitting, carpentry, sheet metal, foundry, welding and smithy trades.	Apply
CO 7	Demonstrate general safety precautions in different mechanical workshop trades.	Understand

iii) SYLLABUS

A) CIVIL WORKSHOP

1) Set out a one room building of given plan using tape only method and using tape and cross staff.

2) a) Use screw gauge and vernier calliper to measure the diameter of a steel rod and thickness of a flat bar.

   b) Calculate the area of a built-up space and a small piece of land- Use standard measuring tape and digital distance measuring devices.

3) a) Construct a wall using currently used building blocks such as bricks (1 ½ thick brick wall using English bond), hollow blocks, solid blocks, etc. Use spirit level to assess the tilt of walls.

   b) Estimate the number of different types of building blocks required to construct a wall of given dimensions.

   c) Transfer the level from one point to another point using a water level.

4) Find the level difference between any two points using dumpy level (differential levelling).

5) a) Introduce the students to plumbing tools, different types of pipes, types of connections, traps, valves, fixtures and sanitary fittings.

   b) Study of installation of rain water harvesting system in an educational campus.

6) Introduce students to the principle and working of Total Station.

7) Demonstration of a simple construction work using concrete.

B) MECHANICAL WORKSHOP

1) General: Introduction to workshop practice, Safety precautions, Shop floor ethics, Basic First Aid knowledge, Study of mechanical tools
2) Carpentry: Understanding of carpentry tools and making minimum one model.
3) Foundry: Understanding of foundry tools and making minimum one model.
4) Sheet metal: Understanding of sheet metal working and making minimum one model.
5) Fitting: Understanding of fitting tools and making minimum one model.
6) Welding: Understanding of fitting tools and making minimum one model.
7) Smithy: Understanding of smithy tools and making minimum one model.
8) Machine Tools: Demonstration of various machines like shaping and slotting machine, Milling machine, Grinding Machine, Lathe, Drilling Machine, CNC Machines, Power Tools.
   Demonstration of 3D Printer.

iv) REFERENCES

1) Khanna, P. N., *Indian Practical Civil Engineering Handbook*, Engineers Publishers, 2012.
2) Punmia, B. C., Ashok, K. J. and Arun, K.J., *Surveying*, Vol. I, Laxmi Publications (P) ltd., New Delhi, 17th Edition, 2016.
3) Arora, S. P. and Bindra, S. P., *Building Construction*, Dhanpat Rai Publications, 43rd Edition, 2019.
4) Rangwala, S. C., *Engineering Materials*, Charotar Publishing House, Anand, 43rd Edition, 2019.
5) Sawhney, G.S., *Mechanical Experiments and Workshop Practice*, Dream tech Press, 2019.
6) Varun, B., *Engineering Workshop: Civil and Mechanical Engineering Practice*, Notion Press, 1st Edition, 2020.

v)   COURSE PLAN

Experiment No.		List of exercises/experiments	No. of hours
A)	CIVILWORKSHOP		
I		Set out a one room building of given plan using tape only method and using tape and cross staff.	2
II	a)	Use screw gauge and vernier calliper to measure the diameter of a steel rod and thickness of a flat bar.	2
	b)	Calculate the area of a built-up space and a small piece of land- Use standard measuring tape and digital distance measuring devices.	
III	a)	Construct a wall using currently used building blocks such as bricks (1 ½ thick brick wall using English bond), hollow blocks, solid blocks, etc. Use spirit level to assess the tilt of walls.	2
	b)	Estimate the number of different types of building blocks required to construct a wall of given dimensions.	
	c)	Transfer the level from one point to another point using a water level.	
IV		Find the level difference between any two points using dumpy level (differential levelling).	3
V	a)	Introduce the students to plumbing tools, different types of pipes, types of connections, traps, valves, fixtures and sanitary fittings.	2
	b)	Study of installation of rain water harvesting system in an educational campus.	
VI		Introduce students to the principle and working of Total Station.	2
VII		Demonstration of a simple construction work using concrete.	2
		Total hours	15
B)	MECHANICAL WORKSHOP		
I		Workshop practice, shop floor precautions, ethics and First Aid knowledge. Studies of mechanical tools, components and their applications: (a) Tools: Screw drivers, spanners, Allen keys, cutting pliers etc. and (b) Accessories: Bearings, seals, O-rings, circlips, keys etc.	1
II		**Carpentry -** Understanding of carpentry tools and making minimum one model. • Lap joint • Cross lap joint • Dovetail joint • Mortise joints	2
III		**Foundry -** Understanding of foundry tools and making minimum one model.	2

	• Bench Moulding • Floor Moulding • Core making • Pattern making	
IV	**Sheet metal -** Understanding of sheet metal working and making minimum one model. • Cylindrical shape • Conical shape • Prismatic shaped job from sheet metal	**2**
V	**Fitting -** Understanding of fitting tools and making minimum one model. • Square Joint • V- Joint • Male and female fitting	**2**
VI	**Welding -** Understanding of welding equipment's and making minimum one model. • Minimum any one welding practice • Making Joints using electric arc welding	**2**
VII	**Smithy -** Understanding of smithy tools and making minimum one model. • Square prism • Hexagonal headed bolt • Hexagonal prism • Octagonal prism	**2**
VIII	**Machine tools –** Demonstration of various machine tools like • Shaping and slotting machine • Milling machine • Grinding Machine • Lathe • Drilling Machine • CNC Machines • Power Tools **Demonstration of 3D Printer**	**2**
	Total hours	**15**