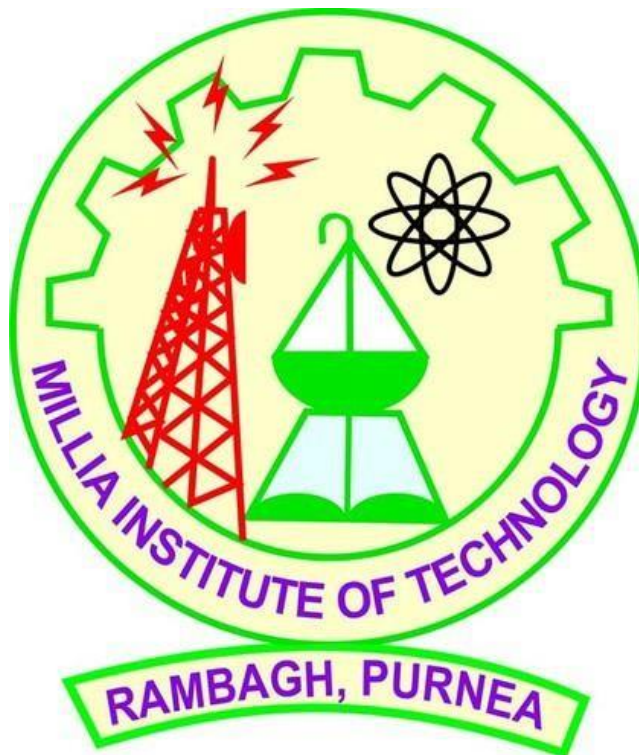# Millia Institute of Technology Rambagh, Purnea

Affiliated to STATE BOARD OF TECHNICAL EDUCATION, Patna

NAAC Accredited & ISO 9001:2015

SYLLABUS

Department of Civil Engineering

2nd SEMESTER

Semester – II
Teaching & Learning Scheme

Course Codes	Category of Course	Course Titles	Teaching & Learning Scheme (Hours/Week)					
			Classroom Instruction (CI)		Lab Instruction (LI)	Notional Hours (TW+ SL)	Total Hours (CI+LI+TW+SL)	Total Credits (C)
			L	T				
2400102A	ASC	**Applied Physics -A** (ME, ME (Auto), CE, MIE, AE, CHE, FTS, CRE)	03	-	04	02	09	06
2418103	BCC	**Python Programming** (CE, CSE, AIML, EE, ME, ME (Auto)., ELX, ELX (R), MIE, FTS, CRE, CHE, TE, CACDDM, GT)	03	-	04	02	09	06
2425104	BEC	**Engg. Mechanics** (CE, EE, ME, ME (Auto), MIE, FTS, AE, CRE, CHE, ELX, ELX (R), TE)	03	-	04	02	09	06
2400105A	ASC	**Applied Mathematics -A** (ME, ME (Auto), CE, MIE, AE, CHE, FTS, CRE)	02	01	-	02	05	04
2400006	NRC	**Environmental Education and Sustainable Development** (Common for All Programmes)	01	-	01	01	03	02
2400207	NRC	**Indian Constitution** (Common for All Programmes)	01	-	-	-	01	01
2418107	BCC	**ICT Tools** (CE, ME, ME (Auto), FTS, CSE, AIML, MIE, CRE, CHE, FPP, TE, CACDDM, GT)	-	-	04	02	06	03
2400108	NRC	**Essence of Indian Knowledge System and Tradition** (Common for All Programmes)	01	-	-	-	01	01
2400111	NRC	**Principles of Management** (CE, AIML, AE, CHE, CSE, ME (Auto), FTS, MIE)	01	-	-	-	01	01
Total			**15**	**1**	**17**	**11**	**44**	**30**

Note: Prefix will be added to Course Code if applicable (T for Theory, P for Practical Paper and S for Term Work)

Legend:

CI: Classroom Instruction (Includes different instructional/implementation strategies i.e. Lecture (L), Tutorial (T), Case method, Demonstrations, Video demonstration, Problem based learning etc. to deliver theoretical concepts)

LI: Laboratory Instruction (Includes experiments/practical performances /problem-based experiences in laboratory, workshop, field or other locations using different instructional/Implementation strategies)
Notional Hours: Hours of engagement by learners, other than the contact hours for ensuring learning.

TW: Term work (includes assignments, seminars, micro projects, industrial visits, any other student activities etc.)

SL: Self Learning, MOOCs, spoken tutorials, online educational resources etc.

C: Credits = (1 x CI hours) + (0.5 x LI hours) + (0.5 x Notional hours)

Note: TW and SL have to be planned by the teacher and performed by the learner under the continuous guidance and feedback of teacher to ensure outcome of learning.

Semester - II
Assessment Scheme

Course Codes	Category of Course	Course Titles	Theory Assessment (TA)		Term work & Self-Learning Assessment (TWA)		Lab Assessment(LA)		Total Marks (TA+TWA+LA)
			Progressive Theory Assessment (PTA)	End Theory Assessment (ETA)	Internal	External	Progressive Lab Assessment (PLA)	End Laboratory Assessment (ELA)	
2400102A	ASC	**Applied Physics-A** (ME, ME (Auto), CE, MIE, AE, CHE, FTS, CRE)	30	70	20	30	20	30	200
2418103	BCC	**Python Programming** (CE, CSE, AIML, EE, ME, ME (Auto)., ELX, ELX (R), MIE, FTS, CRE, CHE, TE, CACDDM, GT)	30	70	20	30	20	30	200
2425104	BEC	**Engg. Mechanics** (CE, EE, ME, ME (Auto), MIE, FTS, AE, CRE, CHE, ELX, ELX (R), TE)	30	70	20	30	20	30	200
2400105A	ASC	**Applied Mathematics -A** (ME, ME (Auto), CE, MIE, AE, CHE, FTS, CRE)	30	70	20	30	-	-	150
2400006	NRC	**Environmental Education and Sustainable Development** (Common for All Programmes)	15	-	10	-	10	15	50
2400207	NRC	**Indian Constitution** (Common for All Programmes)	25	-	25	-	-	-	50
2418107	BCC	**ICT Tools** (CE, ME, ME (Auto), FTS, CSE, AIML, MIE, CRE, CHE, FPP, TE, CACDDM, GT)	-	-	20	30	20	30	100
2400108	NRC	**Essence of Indian Knowledge System and Tradition** (Common for All Programmes)	25	-	-	-	-	-	25
2400111	NRC	**Principles of Management** (CE, AIML, AE, CHE, CSE, ME (Auto), FTS, MIE)	25	-	-	-	-	-	25
Total			**195**	**280**	**150**	**150**	**90**	**135**	**1000**

Note: Prefix will be added to Course Code if applicable (T for Theory, P for Practical Paper and S for Term Work)

Legend:
PTA: Progressive Theory Assessment in class room (includes class test, mid-term test and quiz using online/offline modes)
PLA: Progressive Laboratory Assessment (includes process and product assessment using rating Scales and rubrics)
TWA: Term work & Self Learning Assessment (Includes assessment related to student performance in assignments, seminars, micro projects, industrial visits, self-learning, any other student activities etc.

Note:
- ETA & ELA are to be carried out at the end of the term/ semester.
- Term Work is to be done by the students under the guidance of internal faculty but its assessment will be done **internally (40%)** as well as **externally (60%)**. Assessment related to planning and execution of Term Work activities like assignment, micro project, seminar and self-learning is to be

I)   **Course Curriculum Detailing:** This course curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Classroom Instruction (CI), Laboratory Instruction (LI), Term Work (TW) and Self Learning (SL). Students are expected to demonstrate the attainment of Theory Session Outcomes (TSOs) and Lab Session Outcomes (LSOs) leading to attainment of Course Outcomes (COs) upon the completion of the course. While curriculum detailing, NEP 2020 related reforms like Green skills, Sustainability, Multidisciplinary aspects, Society connect, Indian Knowledge System (IKS) and others must be integrated appropriately.

J)   **Theory Session Outcomes (TSOs) and Units: T2400102A**

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
TSO 1a. Distinguish between fundamental and derived physical quantity. *TSO 1b.* Estimate the errors in the measurement of given physical quantity. *TSO 1c.* Derive dimensional formula of a given physical quantity. *TSO 1d.* Apply dimensional analysis for inter conversion of units. *TSO 1e.* Establish relation between physical quantities using dimensional analysis. *TSO 1f.* Use dimensional analysis to check the correctness of a given equation.	**Unit-1.0 Unit and Measurements** 1.1 Physical quantities, fundamentals and derived units and system of units 1.2 Accuracy, precision and errors (systematic and random) in measurements, Method of estimation of errors (absolute and relative) in measurement, propagation of errors, significant figures 1.3 Dimensions and dimensional formulae of physical quantities, Principle of homogeneity of dimension in an equation 1.4 Applications of dimensions: conversion from one system of units to other, corrections of equations and derivation of simple equations 1.5 Ancient astronomical instruments: Chakra, Dhanuryatra, Yasti and Phalaka yantra. (IKS)	**CO1**
TSO 2a. Explain circular motion and various terms related to circular motion. *TSO 2b.* Apply the concept of centripetal and centrifugal forces in a given situation. *TSO 2c.* Distinguish between translational and rotational motion. *TSO 2d.* Explain the terms torque and angular momentum. *TSO 2e.* Apply the principle of conservation of angular momentum in a given situation. *TSO 2f.* Find the moment of inertia of a given regular shape body.	**Unit-2.0 Circular and Rotational Motion** 2.1 Circular motion, angular displacement, angular velocity, frequency, time period, angular acceleration, relation between angular & linear velocity, linear acceleration & angular acceleration 2.2 Centripetal and centrifugal forces: banking of roads and bending of cyclist 2.3 Translational and rotational motion, torque and angular momentum, conservation of angular momentum and its applications 2.4 Moment of inertia and its physical significances, radius of gyration of rigid body, theorem of parallel and perpendicular axes (statements only), moment of inertia of rod, ring, disc and sphere (hollow and solid)	**CO2**
TSO 3a. Explain the stress-strain curve of a given elastic or plastic body. *TSO 3b.* Interrelate different coefficient of elasticity.	**Unit-3.0 Physical Properties of Matter and Heat** 3.1 Elasticity: Hooke's law, Coefficient of elasticity; Young's modulus, Bulk Modulus and modulus of rigidity and their inter-relation (No	**CO3**

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
TSO 3c. Apply the concepts of surface tension and viscosity to solve a given engineering problem. TSO 3d. Explain the behavior of given fluids on the basis of their viscosity. TSO 3e. Determine the various modes heat transfer in a given engineering problem. TSO 3f. Establish relation between coefficients of thermal expansion.	derivation), Poisson's ratio, stress-strain curve, elastic potential energy 3.2 Surface tension: Intermolecular Force, cohesive and adhesive forces, Surface Tension, Surface Energy, angle of contact, Ascent formula (No derivation), applications of surface tension, capillary action, effect of temperature and impurity on surface tension 3.3 Viscosity: Fluid, Viscosity and coefficient of viscosity, Critical Velocity, Reynold's number, streamline and turbulent flow, Terminal velocity, Stokes law and effect of temperature on viscosity. 3.4 Heat: Concept of Heat and Temperature and it's difference, modes of heat transfer: conduction, convection, radiation, coefficient of thermal conductivity, thermal expansion of solid, liquid and gas, coefficient of linear, surface and cubical expansions and relation amongst them.	
TSO 4a. Differentiate among periodic, oscillatory and simple harmonic motion. TSO 4b. Explain the various terms related to SHM. TSO 4c. Derive the expression for time period of given Bar pendulum. TSO 4d. Distinguish between mechanical and electromagnetic waves with examples TSO 4e. Differentiate between longitudinal and transverse waves with examples TSO 4f. Find the relation between the terms used to describe wave motion. TSO 4g. Explain the principle of Superposition of waves and beat formation with examples.	**Unit-4.0 Simple Harmonic Motion and Wave Motion** 4.1 Periodic and Oscillatory Motion 4.2 Simple Harmonic Motion (SHM): Displacement, Amplitude, phase, velocity, acceleration, time period, frequency and their interrelation, Conservation of energy in SHM, Compound pendulum: Bar pendulum 4.3 Types of waves: Mechanical and Electromagnetic waves, Transverse and longitudinal waves, wave velocity, frequency and wave length and their relationship, wave equation, amplitude, phase, phase difference, superposition of waves, Beats formation	CO4
TSO 5a. Apply the concept of photoelectric effect to explain the of photonic devices. TSO 5b. Explain Laser, components of laser and its various engineering applications. TSO 5c. Explain propagation of light in optical fiber and its engineering applications. TSO 5d. Describe the properties of nanomaterials and its various applications.	**Unit-5.0 Modern Physics** 5.1 Photoelectric effect; Photon, threshold frequency, work function, Stopping Potential, Einstein's photoelectric equation. 5.2 Lasers: Properties, Energy levels, ionization and excitation potentials; spontaneous and stimulated emission; population inversion, pumping methods, types of lasers: Ruby laser, He-Ne Laser, engineering and medical applications of lasers. 5.3 Optical fibers: Total internal reflection, acceptance angle and numerical aperture, Optical fiber types, applications of optical fibers 5.4 Nanotechnology: Properties (optical, magnetic and dielectric properties) of Nanomaterials and its application, Metallic, Bhasma (Ancient Ayurveda, IKS)	CO5

Note: One major TSO may require more than one Theory session/Period.

K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: P2400102A

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
LSO 1.1. Use Vernier caliper to measure the known and unknown dimensions of a given small object. LSO 1.2. Estimate the mean absolute error up to two significant figures.	1.	Vernier caliper	CO1
LSO 2.1. Use screw gauge to measure the diameter/ thickness of a given object. LSO 2.2. Estimate the mean absolute, relative and percentage errors up to three significant figures.	2.	Screw gauge	CO1
LSO 3.1. Use Spherometer to measure radius of curvature of given convex and concave mirror/surface. LSO 3.2. Estimate errors in the measurement.	3.	Spherometer	CO1
LSO 4.1. Determine the spring constant of a given spring.	4.	Spring Oscillator	CO4
LSO 5.1. Determine the time period of oscillation of given bar pendulum. LSO 5.2. Determine the radius of gyration and moment of inertia about an axis perpendicular to the plane of oscillation and passing through its center of mass of given bar pendulum.	5.	Bar Pendulum	CO2, CO4
LSO 6.1. Find the moment of inertia of a given flywheel	6	Fly wheel	CO2
LSO 7.1. Determine the coefficient of linear expansion of material of a given rod.	7	Pullingger's apparatus	CO3
LSO 8.1. Use Searle's apparatus to determine the Young's modulus of a given wire.	8	Searle's apparatus	CO3
LSO 9.1. Apply Stokes law to determine the coefficient of viscosity of a given viscous liquid.	9	Stokes law	CO3
LSO 10.1. Determine the inverse square law relation between the distance of photocell and light source v/s intensity of light source.	10	Photo-electric cell experiment	CO5
LSO 11.1. Determine the Numerical Aperture (NA) of a given step index optical fiber.	11	Numerical Aperture of an optical fiber	CO5
LSO 12.1 Measure wavelength of a He-Ne/diode laser by using a plane diffraction grating.	12	He-Ne/diode laser	CO5
LSO 13.1 Plot the graph between KE of Photo electron v/s frequency of incident light	13	Photo electric effect (virtual lab experiment)	CO5

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
LSO 13.2 Determine the value of Plank's Constant (*h*) from the graph between KE v/s frequency of incident light. LSO 13.3 Determine the variation of stopping potential w.r.t frequency of incident photon			
LSO 14.1 Determine the wave length of different spectral lines of Hydrogen spectra	14	Emission Spectra of Hydrogen (virtual lab experiment)	CO5

L) **Suggested Term Work and Self Learning: S2400102A** Some sample suggested assignments, micro project and other activities are mentioned here for reference.

a. **Assignments**: Questions/Problems/Numerical/Exercises to be provided by the course teacher in line with the targeted COs such as.
1. Convert the units of given physical quantity from one system of units to another.
2. Find the different terms related to SHM/ wave from given equation of SHM/ wave.
3. Determine the change in the parameters related to rotational motion, when a regular shaped body rolls down on an inclined plane and give comparison for different bodies/ parameters.
4. Measure room temperature of hot bath/ bodies by using mercury thermometer and convert it into different temperature scales (lab- based).
5. Use online tool to determine S/V ratio of a given shape and size. (online assignment)

b. **Micro Projects:**

1. Make prototype Vernier calipers and screw gauge of desired Least Count,
2. Collect wires of different materials and find the fracture point for required applications
3. Design prototype model to find thermal conductivity of different metals.
4. Prepare model for determining moment of inertia of bodies with different shapes
5. Fiber optics: Demonstrate the phenomenon of total internal reflection.
6. LASER: Prepare model to demonstrate the properties and applications of LASER.
7. Viscosity: Collect 3 to 5 liquids and prepare a working model to differentiate liquids based on viscosity and demonstrate their applications.
8. Motion: Prepare model of ball rolling down on inclined plane to demonstrate the conservation of energy and motion of an object in inclined plane.
9. Waves in string: standing waves in string using woofer loudspeaker
10. Use smartphone to measure the different physical quantity with the sensor applications

c. **Other Activities:**

1. Seminar Topics:
   - Needs of measurements in engineering and science.
   - Applications of circular motions in daily life.
   - LASER: Production & applications in science, industry, medical and defense, holography.
   - Optical fibers: Construction and application in communication systems.
   - Synthesis and applications of nanomaterials.
   - CNT, Graphene and fullerene(C_{60})
   - Application of modes of different heat transmission in daily life.

2. Visits:

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J) **Theory Session Outcomes (TSOs) and Units: T2418103**

Major Theory Session Outcomes (TSOs)	**Units**	**Relevant COs Number(s)**
TSO 1a. Differentiate between Procedure Oriented P and Object Oriented Programming approach with example. *TSO 1b.* Use the concept of Lvalue and Rvalue *TSO 1c.* Write python program using various data types and operators	**Unit-1.0 Basics of Python Programming syntax** 1.1 Python character set, Python tokens, variables, concept of Lvalue and Rvalue, use of comments. 1.2 Data types: number (integer, floating point, complex), Boolean, sequence (string, list, tuple), none, mapping (dictionary), mutable and immutable data types 1.3 Operators: arithmetic operators, relational operators, logical operators, assignment operator, augmented assignment operators. Expressions, statement, type conversion & input/output: precedence of operators, expression, evaluation of expression.	**CO-1**
TSO 2a. Write Python program using decision making statements *TSO 2b.* Write Python program using loop structure to solve iterative problems	**Unit-2.0 Conditional and Iterative statements** 2.1 Conditional statements: simple if statement, if- else statemen, if-elif-else statement 2.2 Iterative statements: while loop, for loop, range function, break and continue statements, nested loops	**CO-2**
TSO 3a. Perform various operations on string using string operators and methods *TSO 3b.* Perform various operations on List using list operators and methods *TSO 3c.* Perform various operations on tuples using tuples operators and methods *TSO 3d.* Perform various operations on set using set methods *TSO 3e.* Perform various operations on dictionary using dictionary methods	**Unit-3.0 String, List, Tuples, set and Dictionary** 3.1 String: indexing, string operations (concatenation, repetition, membership & slicing), traversing a string using loops, built-in functions. 3.2 Lists: introduction, indexing, list operations: concatenation, repetition, membership & slicing, traversing a list, built- in list functions, linear search on list of numbers and counting the frequency of elements in a list 3.3 Tuples: Creating, initializing, accessing elements, tuple assignment, performing operations on tuples, tuple methods and built-in functions, nested tuples 3.4 Set: Creating set, traversing, adding, removing data in set, performing set operations like join, Union intersection, difference	**CO-3**

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
	3.5 Dictionary: accessing items in a dictionary using keys, mutability of dictionary: adding a new item, modifying an existing item, built-in dictionary functions.	
TSO 4a. Create and use user defined functions to implement modular programming approach *TSO 4b.* Differentiate variable scope with example. *TSO 4c.* Import and use Python modules, libraries	**Unit-4.0 Python Functions, Modules and packages** 4.1 Functions: types of function (built- in functions, functions defined in module, user defined functions), creating user defined function, arguments and parameters, default parameters, positional parameters, Lambda functions, returning value, scope of a variable: global scope, local scope 4.2 Modules and Packages: Importing module using 'import' Regular Expressions, Exception Handling, PyPI Python Package Index, Pip Python package manager, Importing Libraries and Functions	**CO-4**
TSO 5a. Write simple Python programs with object oriented approach *TSO 5b.* Use constructors and destructors appropriately in python program *TSO 5c.* Explain different type of inheritance based on its characteristic *TSO 5d.* Implement given type of inheritance in Python. *TSO 5e.* Implement the concept of Polymorphism in Python	**Unit-5.0 Object Oriented Programming (OOP)** 5.1 OOPs Object oriented programming concepts and approach, Abstraction, encapsulation, class, object, class method vs static method in Python, class and static variable, constructor and destructors in python 5.2 Inheritance: types of inheritance: single, multiple, multilevel, hierarchical 5.3 Polymorphism: Polymorphism with class method, polymorphism with inheritance, method overriding, overloading	**CO-5**
TSO 6a. Explain different types of Exceptions in python *TSO 6b.* Write Python programs for exception handling in Python *TSO 6c.* Differentiate different modes of file opening. *TSO 6d.* Perform read, Write, Append operations in files	**Unit 6: Exception and File Handling in Python** 6.1 Exception Handling: syntax errors, exceptions, need of exception handling, user-defined exceptions, raising exceptions, handling exceptions, catching exceptions, Try - except - else clause, Try - finally clause, recovering and continuing with finally, built-in exception classes. 6.2 File Handling: text file and binary file, file types, open and close files, reading and writing text files, reading and writing binary files, file access modes	**CO-6**

Note: One major TSO may require more than one Theory session/Period.

K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: P2418103

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
LSO 1.1. Write, execute and debug simple Python program using Integrated Development and Learning Environment (IDLE)	1.	a) Download and Install IDLE. Write and execute Python program to- b) Calculate the Area of a Triangle where its three sides a, b, c are given. s=(a+b+c)/2,	CO-1

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
LSO 1.2. Write and execute simple 'C' program using variables, arithmetic expressions.		Area=square root of s(s-a)(s-b)(s-c) (write program without using function) c) Swap Two Variables d) Solve quadratic equation for real numbers.	
LSO 2.1. Write and execute python programs using conditional statements. *LSO 2.2.* Write and execute python programs using various types of Loop statements	2.	Write and execute Python program to- a) Check if a Number is Positive, Negative or zero. b) Check whether the given year is a Leap Year. c) Print all Prime Numbers in an Interval. d) Display the multiplication Table based on the given input. e) Print the Fibonacci sequence. f) Find the Factorial of a Number.	CO-2
LSO 3.1. Write and execute Python program to perform various operations on string using string operators and methods	3.	Write and execute Python program to- a) Check whether the string is Palindrome b) Reverse words in a given String in Python c) identify in a strings the name, position and counting of vowels. d) Count the Number of matching characters in a pair of string (set) e) Python program for removing i-th character from a string	CO-2, CO-3
LSO 4.1. Write and execute Python program to perform various operations on List using List operators and methods	4.	Write and execute Python program to- a) find largest number in a given list without using max(). b) find the common numbers from two lists. c) create a list of even numbers and another list of odd numbers from a given list. d) To find number of occurrences of given number without using built-in methods.	CO-2, CO-3
LSO 5.1. Write and execute Python program to perform various operations on Tuple using Tuple operators and methods.	5.	Write and execute Python program to- a) find the index of an item of a tuple. b) find the length of a tuple. c) to reverse a tuple. d) Write a Python program to sort a list of tuple by its float element. Sample data: [('item1', '12.20'), ('item2', '15.10'), ('item3', '24.5')] Expected Output: [('item3', '24.5'), ('item2', '15.10'), ('item1', '12.20')]	CO-2, CO-3
LSO 6.1. Write and execute Python program to perform various operations on sets using set methods.	6.	Write and execute Python program to- a) create an intersection of sets. b) create a union of sets. c) create set difference. d) check if two given sets have no elements in common.	CO-2, CO-3
LSO 7.1. Write and execute Python program to perform various operations on Dictionary using Dictionary methods	7.	Write and execute Python program to- a) Write a Python script to concatenate two dictionaries to create a new one b) Write a Python script to merge two Python dictionaries. Write a Python program to combine two dictionary adding values for common Keys. d1 = {'a': 100, 'b': 200, 'c':300}	CO-2, CO-3

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
		d2 = {'a': 300, 'b': 200, 'd':400} Sample output: d({'a': 400, 'b': 400, 'd': 400, 'c': 300})	
LSO 8.1. Write and execute Python program to create user defined functions and call them.	8.	Write and execute Python program to- a) Write a Python function for reversing a string and call it. b) Write a Python function for calculating compound interest and call it. c) Write a Python function for calculating the factorial of a number and call it to calculate !n/(!r)*!(n-r)) where symbol "**!** " stands for factorial.	CO-2, CO-4

LSO 9.1. Write and execute Object Oriented Python program to define a class and its instances.
 	
LSO 9.2. Develop and execute Python program Using various types of inheritances.
 	
LSO 9.3. Develop and execute Python program Using various types of inheritances.
 	
LSO 9.4. Develop and execute Python program Using various types of Polymorphism.
	9.	Write program using OOP approach to –
		a) create an instance of a specified class and display the namespace of the said instance
		b) create a Python class named Student with two attributes: student_id, student_name. Add a new attribute: student_class. Create a function to display all attributes and their values in the Student class.
		c) Create a Python class named Student with two instances student1, student2 and assign values to the instances' attributes. Print all the attributes of the student1, student2 instances
		d) Write programs to demonstrate use of following types of inheritance:
		   i. Single inheritance
		   ii. Multiple inheritance
		   iii. Multilevel inheritance
		e) Demonstrate use of polymorphism with following situations:
		   i. Polymorphism in operator
		   ii. Polymorphism in user defined method
		   iii. Polymorphism in built-in function
		   iv. Polymorphism with class method
		   v. Polymorphism with method overriding
			CO-2, CO-5

LSO 10.1. Develop and execute Python program to handle various type of exceptions.
 	
LSO 10.2. Develop and execute Python program to perform file operations.
	10.	a) Using exception handling feature such as try…except, try finally- write minimum three programs to handle following types of exceptions.
		   i. Type Error
		   ii. Name Error
		   iii. Index Error
		   iv. Key Error
		   v. Value Error
		   vi. IO Error
		   vii. Zero Division Error
		b) Write Python program to demonstrate file operations.
			CO-6, CO-1, CO-2,

Note: in addition to above listed practical, students are suggested to practice all the examples covered by the teacher during theory sessions.

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J) **Theory Session Outcomes (TSOs) and Units: T2425104**

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
TSO 1a. Explain concepts of the given terms. TSO 1b. Use relevant units of various quantities in the given situations. TSO 1c. Explain effects of a force on the given object. TSO 1d. Resolve the given single force. TSO 1e. Calculate the resultant of the given force system. TSO 1f. Find the resultant of the given force system using law of parallelogram TSO 1g. Determine graphically the resultant of the given force system by triangle law and polygon law.	**Unit-1.0 Mechanics and Force System** 1.1 Significance and relevance: Mechanics, applied mechanics, statics and dynamics. 1.2 Space, time, mass, particle, body, rigid body. 1.3 Scalar and vector quantity, Units of measurement (SI units) Fundamental units and derived units. 1.4 Force - unit, representation as a vector and by Bow's notation, characteristics and effects of a force, Principle of transmissibility of force. Force system and its classification. 1.5 Resolution of a force - Orthogonal and Non-Orthogonal components of a force, moment of a force, Avignon's Theorem. 1.6 Composition of forces - Resultant, analytical method of determination of resultant for concurrent, non-concurrent and parallel co-planar force systems -Law of triangle, Law of parallelogram and law of polygon of forces. 1.7 Graphic statics, graphical representation of force, Space diagram, force diagram, polar diagram and funicular polygon, Graphical method of determination of resultant for concurrent and parallel co-planar force systems.	CO1, CO2
TSO 2a. Draw the free body diagram for the given condition. TSO 2b. Determine unknown force in the given situation using Lami's theorem. TSO 2c. Identify the types of beams required for the given situation. TSO 2d. Determine reactions in the given type of beam analytically. TSO 2e. Solve problems using free body diagram and Lami"s theorem.	**Unit-2.0 Static Equilibrium** 2.1 Equilibrium and Equilibrant, Free body and Free body diagram, Analytical and graphical conditions of equilibrium. 2.2 Equilibrium of force systems analytically 2.3 Lami's Theorem. 2.4 Types of beam (determinate and indeterminate), supports (simple, hinged, roller and fixed) and loads acting on beam (vertical and inclined point load, distributed load, load, couple), span of beam. 2.5 Beam reaction for cantilever, simply supported beam with or without overhang - subjected to combination of Point load and LTD load or Vertical Point load and couple. 2.6 Beam reaction for simply supported beam subjected to vertical loads only.	CO1, CO2

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
TSO 3a. Calculate force of friction and coefficient of friction for the given condition or situation *TSO 3b.* Describe the conditions for friction for the given situation. *TSO 3c.* Identify the various forces acting on a ladder for the given conditions using free body diagram. *TSO 3d.* Compare the value of coefficient of friction between different surfaces. *TSO 3e.* Interpret the effect of change of masses, change of angle of inclination or both on the coefficient of friction *TSO 3f.* Calculate forces acting on a body that is moving on a horizontal rough surface *TSO 3g.* Determine the forces acting on a body that is moving on an inclined plane	**Unit 3.0 Friction** 3.1 Friction and its relevance in engineering, types and laws of friction, limiting equilibrium, limiting friction, co-efficient of friction, angle of friction, angle of repose, relation between co-efficient of friction and angle of friction. 3.2 Equilibrium of bodies on level surface subjected to force parallel and 3.3 inclined to plane. 3.4 Equilibrium of bodies on inclined plane subjected to force parallel to the plane only. FBD of ladder in friction	CO3, CO4
TSO 4a Distinguish between centroid and center of gravity TSO 4b Calculate the centroid of geometrical plane figures. TSO 4c Calculate centroid of the given composite plane lamina TSO 4d Determine centre of gravity of the given simple solid. TSO 4e Determine centre of gravity of the given composite solid. TSO 4f Calculate Moment of Inertia of different geometric shapes.	**Unit 4.0 Centroid, Centre of Gravity and Moment of Inertia** 4.1 Introduction to Centroid, Centre of Gravity and Areas 4.2 Centroid of geometrical plane figures (square, rectangle, triangle, circle, semi-circle, quarter circle). 4.3 Centroid of composite figures composed of not more than three geometrical figures and centroid of perforated section, axis of symmetry 4.4 Centre of Gravity of simple solids (Cube, cuboid, cone, cylinder, sphere, hemisphere). 4.5 Centre of Gravity of composite solids composed of not more than two simple solids. 4.6 Moment of inertia - Introduction, calculation of moment of inertia by integration method, theorem of perpendicular axis, theorem of parallel axis, moment of inertia of a rectangular section, hollow rectangular section, circular section, hollow circular section, triangular section	CO4
TSO.5a Describe the components of the given lifting machine. TSO.5b Differentiate the working principle of the given two types of lifting machines. TSO.5c Determine velocity ratio, efficiency of the given lifting machine. TSO.5d Calculate effort required and load lifted by the given lifting machine. TSO.5e Draw the graph with the given data TSO.5f Interpret the given graphs TSO.5g Select the relevant lifting machine for the given purpose with justification	**Unit-5.0 Simple Lifting Machine** 5.1 Simple lifting machine, load, effort, mechanical advantage, Applications and advantages. Velocity ratio, efficiency of machines, Law of machine. 5.2 Ideal machine, friction in machine, maximum Mechanical advantage and efficiency, reversible and non-reversible machines, condition for reversibility 5.3 Velocity ratios of Simple axle and wheel, Differential axle and wheel, Worm and worm wheel, Single purchase and double purchase crab winch, Screw jack, Weston's differential pulley block, geared pulley block.	CO2, CO5

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
	5.4 Graphs of Load verses Effort, Load verses ideal Effort, Load verses Effort lost in friction, Load verses MA, Load verses Efficiency.	

Note: One major TSO may require more than one Theory session/Period.

K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: P2425104

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
LSO 1.1. Use force polygon table to determine the resultant of concurrent forces	1.	Determine resultant of concurrent coplanar force system using force polygon table.	CO1, CO2
LSO 2.1 Apply Lami's theorem LSO 2.2 Use simply supported beams to find reactions	2.	Determine unknown force in a concurrent balance force system using Lami's Theorem.	CO1, CO2
	3	Find reactions at the supports of a simply supported beam and compare the results with analytical values.	
	4	Determine the support reactions for simply supported beam by • Beam reaction apparatus • Circular dial type weight	
LSO 3.1. Apply law of friction on horizontal plane and inclined plane LSO 3.2. Coefficient of friction between different materials LSO 3.3. Coefficient of friction between belt and pulley.	5	Determine coefficient of friction on horizontal and inclined plane.	CO2, CO3
	6	Determine the co efficient of friction between two surfaces by • angle of repose methods • friction plane method	
	7	Find the coefficient of friction between belt and pulley in a belt friction set up.	
LSO 4.1. Determine the centroid of different geometrical figures. LSO 4.2. Find moment of inertia	8	Determine the centroid of geometrical plane figures (squares, rectangle, triangle)	CO4
	9	Determine the moment of inertia of a fly wheel	
LSO 5.1 Use simple screw jack LSO 5.2 Use differential axle and wheel LSO 5.3 Use single and double purchase crab winch LSO 5.4 Use jib crane LSO 5.5 Use worm and worm wheel apparatus	10	Find M.A, V.R and efficiency of screw jack.	CO5
	11	Find M.A, V.R and efficiency of differential wheel and axle	
	12	Calculate the efficiency of single purchase crab winch and double purchase crab winch	
	13	Determine forces in jib crane.	
	14	Determine the efficiency of worm and worm wheel.	

I)   **Course Curriculum Detailing:** This course curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Classroom Instruction (CI), Laboratory Instruction (LI), Term Work (TW), and Self Learning (SL). Students are expected to demonstrate the attainment of Theory Session Outcomes (TSOs) and Lab Session Outcomes (LSOs) leading to the attainment of Course Outcomes (COs) upon the completion of the course. While curriculum detailing, NEP 2020-related reforms like Green skills, Sustainability, Multidisciplinary aspects, Society connect, Indian Knowledge System (IKS), and others must be integrated appropriately.

J)   **Theory Session Outcomes (TSOs) and Units: T2400105A**

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
TSO 1a. Use standard forms of integration to find the integral of given simple functions. *TSO 1b.* Apply suitable Trigonometric transformation to solve a given Integration problem. *TSO 1c.* Solve given problems using the properties of the definite integral. *TSO 1d.* Invoke the concept of Integration to solve problems based on area and volume of irregular shapes.	**Unit-1.0 Integral Calculus and its Applications** 1.1 Concept and Definition of Integration. 1.2 Working rules and Integral of standard Functions. 1.3 Method of Substitution, Trigonometric transformation, Integration by parts, and Partial fraction. 1.4 Applications: Area and volume	**CO1**
TSO 2a. Find the order and degree of given differential equations. *TSO 2b.* Solve differential equations using the variable separable method. *TSO 2c.* Obtain the solution of a given homogeneous differential equation. *TSO 2d.* Solve the given linear differential equation based on engineering application. *TSO 2e.* Solve the given Bernoulli differential equation. *TSO 2f.* Solve the homogeneous linear differential equations of second order with constant coefficient.	**Unit-2.0 Differential Equations** 2.1 Concept and Definition, Order, and Degree of Differential Equation. 2.2 Differential equation of first order and first degree, variable separable Method. 2.3 Homogeneous, linear Differential equation and Bernoulli equation. 2.4 Homogeneous linear differential equations of second order with constant coefficient.	**CO2**
TSO 3a. Find the root(s) of the given equation using Iterative methods up to the desired accuracy. *TSO 3b.* Calculate the root(s) of given equations using the Newton-Raphson Method. *TSO 3c.* Apply the Newton-Raphson Method for engineering applications. *TSO 3d.* Solve problems using the Bakhshali iterative method for finding approximate square roots. (IKS)	**Unit-3.0 Numerical Solution of Nonlinear Equations** 3.1 Algebraic and Transcendental equations. 3.2 Iteration Methods. 3.3 Newton-Raphson Method. 3.4 Bakhshali iterative method for finding the approximate square root. (IKS)	**CO3**
TSO 4a. Apply the concept of Numerical integration to find the area from given data by the Trapezoidal rule, also use any open source software to find the same. *TSO 4b.* Apply the concept of Numerical integration to find the area from given data by Simpson's one-third rule, also use any open	**Unit-4.0 Numerical Integration** 4.1 Trapezoidal rule 4.2 Simpson's one third rule 4.3 Simpson's three eighth rule	**CO4**

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
source software to find the same by comparing the findings.		
TSO 4c. Apply the concept of Numerical integration to find the area from given data by Simpson's three eight rules, and compare the obtained result with the result found by the analytical method.		
TSO 5a. Select discrete and continuous probability distribution for given data.	**Unit-5.0 Probability Distribution**	**CO5**
TSO 5b. Solve given problems based on repeated trials using binomial distribution.	5.1 Discrete and continuous probability distribution.	
TSO 5c. Use suitable distribution to solve the given problems when the number of trials is large and the probability is very small.	5.2 Binomial distribution.	
TSO 5d. Utilize the concept of normal distribution to solve broad-based engineering-related problems.	5.3 Poisson's distribution. 5.4 Normal distribution.	

Note: One major TSO may require more than one Theory session/Period.

K) Suggested Tutorials and Outcomes:

Outcomes	S. No.	Tutorials Titles	Relevant COs Number(s)
1.1 Calculate the area of the hexagon using integration. 1.2 Calculate the average temperature of a city over a certain period. 1.3 Calculate the total force on the bottom of the tank due to the water. 1.4 Estimate the amount of force required to move a component. 1.5 Apply the concept of definite integration to find the volume.	1.	• Area of irregular shape using integration. • Average value of a function using integration. • Calculation of force using integration. • Volume of an irregular shape using integration.	CO1
1.1 Solve population dynamics using first-order ODEs. 1.2 Calculate the vibration of a Mechanical system using differential equations. 1.3 Calculate the concentration of a reactant in a chemical reaction over time. 1.4 Calculate mechanical vibrations using second-order ODEs.	2.	• Analysis of a population model through differential equations. • Response of vibration of Mechanical system through differential equations. • Analysis of chemical system using ODEs • Vibrations of a mass-spring system.	CO2
3.1 Use Newton's method to find the roots of a non-linear equation in one variable. 3.2 Use the concept of Newton's method to solve financial modeling-related problems based on the Black-Scholes model. 3.3 Calculate the electric field (that satisfies Maxwell's equations) around a wire with a	3.	• Applications of iterative techniques. • Application of Newton Raphson's method. • Iterative scheme using Newton's method. • Bakhshali iterative methods for finding the approximate value of square root. (IKS)	CO3

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J)   **Theory Session Outcomes (TSOs) and Units: T2400006**

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
TSO 1a. Differentiate aquatic & terrestrial ecosystem *TSO 1b.* Explain structure of ecosystem *TSO 1c.* Compare food chain & web chain *TSO 1d.* Describe carbon, nitrogen, Sulphur & phosphorus cycle *TSO 1e.* Explain causes & effect of global warming	**Unit-1.0 Ecosystem** 1.1 Aquatic & Terrestrial ecosystem 1.2 Structure of ecosystem 1.3 Food chain & Food web 1.4 Carbon, Nitrogen, Sulphur & Phosphorous Cycle 1.5 Global warming – Causes & Effects	**CO1**

TSO 2a. Explain environmental pollution & its sources.
TSO 2b. Assess the causes of water & air pollution in a given area
TSO 2c. Explain the effects of water & air pollution on human, plant & animal
TSO 2d. Take appropriate measures to prevent the pollution problems at city /municipal areas
TSO 2e. Determine the pollution level in the environment at different seasons.
	Unit-2.0 Air & Water Pollution
	
	2.1 Traditional pollution issues- Air, Water, Noise
	2.2 Water pollution
	    2.2.1 Sources of water pollution
	    2.2.2 Effects of water pollution
	    2.2.3 Control of water pollution
	    2.2.4 Physical & chemical standard of domestic water as per Indian Standard
	2.3 Air pollution
	    2.3.1 Sources of air pollution
	    2.3.2 Air pollutants
	    2.3.3 Effects of air pollution on human, plant & animal
	    2.3.4 Air monitoring system
	    2.3.5 Air pollution control
		CO2

TSO 3a. Describe various types renewable sources of energy
TSO 3b. Explain solar energy & methods of harnessing
TSO 3c. Explain wind energy and its impact on environment
TSO 3d. Explain characteristics of biomass & its digestion process
TSO 3e. Describe new energy sources & their application
	Unit-3.0 Sustainability & Renewable Sources of Energy
	
	3.1 Concept of sustainable development
	3.2 Renewable sources of energy for sustainable development
	3.3 Solar Energy
	    3.3.1 Features of solar thermal & PV system
	    3.3.2 Solar pond, Solar water heater, Solar dryer and Solar stills
	3.4 Wind Energy
		CO3

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
	3.4.1 Current status & future prospects of wind energy	
	3.4.2 Wind energy in India- Advantages and challenges of harnessing wind energy	
	3.4.3 Environmental benefits & limitations	
	3.5 Biomass	
	3.5.1 Types of Biomass energy sources	
	3.5.2 Energy content in Biomass of different types	
	3.5.3 Biogas production	
	3.6 Concept and advantages of hydroponics or aquaponics system to demonstrate soil less cultivation and integration of fish and plant cultivation.	
	3.7 Water conservation and sustainable development	
	3.8 New Energy Sources: Hydrogen energy, Ocean energy & Tidal energy	
TSO 4a. Describe impact of climate change on human life TSO 4b. Identify the factors contributing to climate change TSO 4c. Explain sustainable development goals to transform the world TSO 4d. Develop implementation strategies for action plan on climate change	**Unit-4.0 Climate Change and Sustainable Development** 4.1 Impact of Climate change 4.2 Factor contributing to climate change 4.3 Sustainable development Goals (SDGs) 4.4 Action Plan on Climate Change- India	CO4
TSO 5a. Identify the elements of a successful management system TSO 5b. Explain green building concept & its benefits TSO 5c. Apply 5R concept in a given building construction project TSO 5d. Explain various environment protection laws TSO 5e. Explain carbon foot-print & carbon credit	**Unit-5.0 Environmental legislation and Sustainable Building Practices** 5.1 Environment management system and Planning 5.2 Green Building concept 5.3 Green and sustainable building materials - 5R concept 5.4 Environment protection acts, legislation and Laws 5.5 Zero carbon foot-print building for sustainable constriction.	CO5

Note: One major TSO may require more than one Theory session/Period.

K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: P2400006

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
LSO 1.1. Use of Air pollutant analyzer to determine the air pollution level *LSO 1.2.* Collect air samples for pollution level detection	1.	Determination of air pollutants harming local environment	CO2
LSO 2.1 Use of Water pollutant analyzer to determine the water pollution LSO 2.2 Collect water samples for pollution level detection	2	Determine the water pollutants harming local environment	CO2
LSO 3.1 Prepare report on EIA of a given context and area. LSO 3.2 Collection of stakeholders view on effect on environment about a particular project/activity.	3.	Carry out the Environmental Impact Assessment (EIA) for a given project /activity of development	CO1 CO3
LSO 4.1 Predict of possible factors causing effects of climate change LSO 4.2 Effect of Ice melting on sea water	4.	Assessment of the impact of climate change on local environment	CO1 CO4
LSO 5.1 Elaborate the uses of sustainable building materials, the considering 3R LSO 5.2 Trace of Carbon foot print due to construction of a small building	5.	Demonstration of sustainable building materials in lab/workshop	CO2 CO5
LSO 6.1 Set up sample recycling bins in the laboratory LSO 6.2 Appreciate the importance of recycling and environmental benefits LSO 6.3 Explain the importance of 3 R	6.	Demonstration of the recycling process for the different materials such as paper, plastic etc. for waste management	CO3
LSO 7.1 Explain the process of composting LSO 7.2 disseminate the use of composting process to near and dear for soil health and fertility for generating organic food	7	Setting up composting bins in the laboratory to demonstrate the process of composting organic waste	CO3
LSO 8.1 Calculate own water footprint for daily activities LSO 8.2 Explain the importance of reducing water consumption and conserve water resources.	8	Calculation of personal water footprint for daily water usage for activities like bathing, cooking and laundry.	CO3
LSO 9.1 Explore the alternative / renewable sources of energy in day to day life	9.	Develop bio mass energy in the laboratory	CO3 CO4
LSO 10.1 Explore the alternative / renewable sources of energy in day to day life	10.	Develop solar model in the laboratory	CO3
LSO 11.1 Explore the alternative / renewable sources of energy in day to day life	11.	Develop wind turbine model in the laboratory	CO4

L) Suggested Term Work and Self Learning: S2400006 Some sample suggested assignments, micro project and other activities are mentioned here for reference.

    a. Assignments: Questions/Problems- Real life problem /Numerical/Exercises to be provided by the course teacher in line with the targeted COs.

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J)   Theory Session Outcomes (TSOs) and Units: T2400207

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
TSO 1a. Explain the meaning of preamble of the constitution. TSO 1b. List the salient features of constitution. TSO 1c. List the characteristics of constitution.	**Unit-1.0 Constitution and Preamble** 1.1 Meaning of the constitution of India. 1.2 Historical perspective of the Constitution of India. 1.3 Salient features and characteristics of the Constitution of India. 1.4 Preamble to the Constitution of India.	CO1
TSO 2a. Enlist the fundamental rights. *TSO 2b.* Identify fundamental duties in general and in particular with engineering field. *TSO 2c.* identify situations where directive principles prevail over fundamental rights.	**Unit-2.0 Fundamental Rights and Directive Principles** 2.1 Fundamental Rights under Part-III. 2.2 Fundamental duties and their significance. 2.3 Relevance of Directive Principles of State Policy under part-IV.	CO2
TSO 3a. Enlist the constitutional amendments. *TSO 3b.* Analyze the purposes of various amendments.	**Unit-3.0 Governance and Amendments** 3.1 Amendment of the Constitutional Powers and Procedure 3.2 Major Constitutional Amendment procedure - 42nd, 44th, 74th, 76th, 86th and 91st	CO3

Note: One major TSO may require more than one Theory session/Period.

K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: (Not Applicable)

L)   Suggested Term Work and Self Learning: S2400207 Some sample suggested assignments, micro project and other activities are mentioned here for reference.

a. Assignments: Questions/Problems/Numerical/Exercises to be provided by the course teacher in line with the targeted COs.

b. Micro Projects:

1. Role of Media in Spreading Awareness regarding Fundamental Rights
2. Analysis of Situations where directive principle of State policy has prevailed over Fundamental rights
3. Analyze 42nd and 97th Amendment of Indian Constitution

J)   Theory Session Outcomes (TSOs) and Units: T2418107

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
_	**Unit-1.0** **Word Processing** **1.0 Word Processing:** Overview of Word processor Basics of Font type, size, colour, Effects like Bold, italic, underline, Subscript and superscript, Case changing options, previewing a document, saving a document, closing a document and exiting application. **1.1 Editing a Document:** Navigate through a document, Scroll through text, Insert and delete text, Select text, Undo and redo commands, Use drag and drop to move text, Copy, cut and paste, Use the clipboard, Clear formatting, Format and align text, Formatting Paragraphs, Line and paragraph spacing, using FIND and REPLACE, Setting line spacing, add bullet and numbers in lists, add borders and shading, document views, Page settings and margins, Spelling and Grammatical checks **1.2 Changing the Layout of a Document:** Adjust page margins, change page orientation, Create headers and footers, Set and change indentations, Insert and clear tabs. **1.3 Inserting Elements to Word Documents**: Insert and delete a page break, Insert page numbers, Insert the date and time, Insert special characters (symbols), Insert a picture from a file, Resize and reposition a picture **1.4 Working with Tables:** Insert a table, Convert a table to text, Navigate and select text in a table, Resize table cells, Align text in a table, Format a table, Insert and delete columns and rows, Borders and shading, Repeat table headings on subsequent pages, Merge and split cells. **1.5 Working with Columned Layouts and Section Breaks:** a Columns, Section breaks, Creating columns, Newsletter style columns, Changing part of a document layout or formatting, Remove section break, Add columns to remainder of a document, Column widths, Adjust column spacing, Insert manual column breaks.	**CO-1**
_	**Unit-2.0 Spreadsheets** **2.1 Working with Spreadsheets:** Overview of workbook and worksheet, Create Worksheet Entering data, Save, Copy Worksheet, Delete Worksheet, Close and open Workbook. **2.2 Editing Worksheet:** Insert data, adjust row height and column width, delete, move data, insert new rows and columns, Copy and Paste content, Find and Replace, Spell Check, sheet view Zoom In-Out, insert Special Symbols, Insert Comments, Add Text Box, Undo-redo Changes, - Freeze Panes, hiding/unhiding rows and columns. **2.3 Formatting Cells and sheet:** Setting Cell Type, Setting Fonts, Text options, Rotate Cells, Setting Colors, Text Alignments, Merge and Wrap, apply Borders and Shades, Sheet Options, Adjust Margins, Page Orientation, insert Header and Footer, Insert Page Breaks, Set Background. **2.4 Working with Formula:** Creating Formula, absolute and relative cell references, Copying and pasting Formula, Common spreadsheet Functions such as sum, average, min, max, date, In, And, or, mathematical	**CO-2**

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
	functions such as sqrt, power, statistical functions, applying conditions using IF. **2.5 Working with Charts:** Introduction to charts, overview of different types of charts, Bar, Pie, Line charts, creating and editing charts. Using different chart options: chart title, axis title, legend, data labels, Axes, grid lines, moving chart in a separate sheet. **2.6 Advanced Operations:** Applying Conditional Formatting, Data Filtering, Data Sorting, Using Ranges, Data Validation, Adding Graphics, Printing Worksheets, print area, margins, header, footer and other page setup options.	
–	**Unit-3.0 Presentation Tool** **3.1 Creating a Presentation:** Outline of an effective presentation, Identify the elements of the User Interface, Starting a New Presentation Files, Creating a Basic Presentation, Working with textboxes, Apply Character Formats, Format Paragraphs, View a Presentation, Saving work, creating new Slides, Changing a slide Layout, Applying a theme, Changing Colours, fonts and effects, apply custom Colour and font theme, changing the background, Arrange Slide sequence, **3.2 Inserting Media elements:** Adding and Modifying Graphical Objects to a Presentation - Insert Images into a Presentation, insert audio clips, video/animation, Add Shapes, Add Visual Styles to Text in a Presentation, Edit Graphical Objects on a Slide, Format Graphical Objects on a Slide, Group Graphical Objects on a Slide, Apply an Animation Effect to a Graphical Object, Add Transitions, Add Speaker Notes, Print a Presentation. **3.3 Working with Tables:** Insert a Table in a Slide, Format Tables, and Import Tables from Other Office Applications. **3.4 Working with Charts:** Insert Charts in a Slide, modify a Chart, Import Charts from Other Office Applications.	**CO-3**
–	**Unit-4.0 Basics of Internet** **4.1 World Wide Web**: Introduction, Internet, Intranet, URL, web servers, basic settings of web browsers- history, extension, default page, default search engine, privacy and security, creating and retrieving bookmarks, use search engines effectively for searching the content. **4.2 Web Services**: Cloud- software as service (SAS), Google docs, slides, sheets, Form, Web Sites, web pages, e-Mail, Chat, Video Conferencing, e-learning, e-shopping, e-Reservation, e-Groups, Social Networking	**CO-4**

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K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: P2418107

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant Cos Number(s)
LSO 1.1. Perform fundamental word processing operations to create a document	1.	a) Create, edit and save document: apply formatting features on the text – line, paragraph b) Use bullets, numbering, page formatting, header, footer, margin, layout	CO-1
LSO 2.1. Work with images/shapes in a document	2.	Insert and edit images and shapes, resizing, cropping, colour, background, group/ungroup	CO-1
LSO 3.1. Organize data in tabular form in a document	3.	Insert table and apply various table formatting features on it.	CO-1
LSO 4.1. Perform Document proofing operations in a document	4.	Review features such as Spelling, grammar, Thesaurus, translate, language, word count, comments	CO-1

LSO 5.1. Organize and print Document	5.	Apply page layout features
		  i. Print layout, web layout, show ruler, gridline, page zoom, split
		  ii. Themes, page background, paragraph, page setup
		  iii. Create multicolumn page
		  iv. Use different options to print the documents
			CO-1

LSO 6.1. Create batch of documents with tailored variable information using mail merge	6.	Use mail merge operation with options.	CO-1
Spreadsheets			

LSO 7.1. Create a worksheet
LSO 7.2. Format sheet/cell
	7.	Create, open and edit worksheet
		  i. Enter data and format it, adjust row height and column width
		  ii. Insert and delete cells, rows and columns.
		  iii. Apply Format cell, wrap text, number format, orientation feature on cell.
			CO-2

LSO 8.1. Perform fundamental calculation operations in a worksheet	8.	Insert formulas, absolute and relative cell reference, "IF" conditions, built-in functions and named ranges in worksheet.	CO-2
LSO 9.1. Filter the given data set *LSO 9.2.* Validate data based on criteria *LSO 9.3.* Sort the data in given order	9.	Apply conditional formatting, data Sorting, Data Filter and Data Validation features.	CO-2
LSO 10.1. Create various types of charts to represent data in graphical form	10.	Create different charts, apply various chart options.	CO-2
LSO 11.1. Print worksheet as per given layout	11.	Apply Page setup and print options on worksheet to print the worksheet.	CO-2
Presentation Tools			

LSO 12.1. Create electronic slide show containing text, image, shape, table, charts objects	12.	Create slide presentation
		  i. Apply design themes to the given presentation
		  ii. Add new slides and insert text, pictures/images, shapes
		  iii. Add tables and charts in the slides
			CO-3

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant Cos Number(s)
LSO 13.1. Run slide presentation in different modes *LSO 13.2.* Print slide presentation	13.	i. Run slide presentation in customize form/modes ii. Print slide presentation as sheet, handouts using various print options	CO-3
LSO 14.1. Apply given animation effects to the text and slides.	14.	Apply different animation effects to the text and slides with given options.	CO-3
LSO 15.1. Add audio and video files in the presentation	15.	Add some sample audio and video files in the presentation and format the same with various options available.	CO-3
Internet Basics			
LSO 16.1. Configure internet and browser setting	16.	a) Configure Internet connection b) Configure browser settings and use browsers	CO-4
LSO 17.1. Use different internet services	17.	a) Use internet for different web services, such as, chat, email, video conferencing, etc.	CO-4
LSO 18.1. Work with Google Doc	18.	Work with Google Doc for creating collaborative documents on cloud	CO-4
LSO 19.1. Work with google sheet	19.	Work with google sheet for creating collaborative spreadsheets on cloud	CO-4
LSO 20.1. Work with google slides	20.	Work with google slides for creating collaborative slide presentation on cloud	CO-4
LSO 21.1. Create google form	21.	a) Create google form for a sample survey b) Through google forms collect user's response, download it in csv format, analyze it and represent data/trend through graphs and present it.	CO-4, CO3

L)   **Suggested Term Work and Self Learning: S2418107** Some sample suggested assignments, micro project and other activities are mentioned here for reference.

    a. **Assignments**: Questions/Problems/Numerical/Exercises to be provided by the course teacher in line with the targeted COs.

    b. Micro Projects:

    i.   **Word documents**: prepare documents such as Time Table, Application, Notes, Reports. (Subject teacher shall assign a document to be prepared by each student)

    ii.   **Slide Presentations:** Prepare slides with all Presentation features such as: content presentation, presentation about department, presentation of reports. (Subject teacher shall assign a presentation to be prepared by each student).

    iii.   **Spreadsheets:** Prepare statements such as Pay bills, tax statement, student's assessment record using spreadsheet- perform statistical analysis, sorting and filtering operations, represent data through various types of charts. (Teacher shall assign a spreadsheet to be prepared by each student).

J)   **Theory Session Outcomes (TSOs) and Units: T2400108**

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
TSO 1a. Explain the architecture of the Ancient Indian Knowledge Systems. *TSO 1b.* List the salient features of IKS. *TSO 1c.* Comprehend the given IKS model. *TSO 1d.* Identify the role and relevance of the given IKS model in contemporary society.	**Unit-1.0 Introduction to Indian Knowledge Systems** 1.1 Overview of IKS 1.2 Organization of IKS – चतुर्दश-विद्यास्थानं 1.3 Conception and Constitution of Knowledge in Indian Tradition 1.4 The Oral Tradition 1.5 Models and Strategies of IKS	**CO1**
TSO 2a. Enlist the importance of Veda, Vedanga, Visaya, Siksaka. *TSO 2b.* Describe the given IKS domain. *TSO 2c.* Identify elements of mentioned IKS domains that are relevant to Technical Education System. *TSO 2d.* Correlate the elements of mentioned IKS domains with given engineering domain.	**Unit-2.0 Overview of IKS Domains and Relevance in Current Technical Education System.** 2.1 The Vedas as the basis of IKS 2.2 Overview of all the six Vedāṅgas 2.3 Relevance of following IKS domains in present Technical Education System: • Arthashastra (Indian economics and political systems) • Ganita and Jyamiti (Indian Mathematics, Astronomy and Geometry • Rasayana (Indian Chemical Sciences) • Ayurveda (Indian Biological Sciences / Diet & Nutrition) • Jyotish Vidya (Observational astronomy and calendar systems) • Prakriti Vidya (Indian system of Terrestrial/ Material Sciences/ Ecology and Atmospheric Sciences) • Vastu Vidya (Indian system of Aesthetics-Iconography and built-environment /Architecture) • Nyaya Shastra (Indian systems of Social Ethics, Logic and Law) • Shilpa and Natya Shastra (Indian Classical Arts: Performing and Fine Arts) • Sankhya and Yoga Darshna (Indian psychology, Yoga and consciousness studies) • Vrikshayurveda (Plant Science / Sustainable agriculture/food preservation methods)	**CO1, CO2**

Note: One major TSO may require more than one Theory session/Period.

K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: (Not Applicable)

L)   **Suggested Term Work and Self Learning:** Some sample suggested assignments, micro project and other activities are mentioned here for reference.

H) Course Curriculum Detailing: This course curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Classroom Instruction (CI), Laboratory Instruction (LI), Term Work (TW) and Self Learning (SL). Students are expected to demonstrate the attainment of Theory Session Outcomes (TSOs) and Lab Session Outcomes (LSOs) leading to attainment of Course Outcomes (COs) upon the completion of the course. While curriculum detailing, NEP 2020 related reforms like Green skills, Sustainability, Multidisciplinary aspects, Society connect, Indian Knowledge System (IKS) and others must be integrated appropriately.

I)   **Theory Session Outcomes (TSOs) and Units: T2400111**

Major Theory Session Outcomes (TSOs)	**Units**	**Relevant COs Number(s)**
TSO 1a. Explain the nature of management *TSO 1b.* List the steps of evolution of management. *TSO 1c.* Differentiate between different plans. *TSO 1d.* Design Strategic plan for the given world of work situation. *TSO 1e.* Take decisions in the given situation with justification.	**Unit-1.0 Introduction to Management and Planning** 1.1 Nature and Purpose. 1.2 Evolution of Management Thoughts. 1.3 System approach to Management Process. 1.4 Types of Plans: Missions or Purpose, Objective or Goals, Strategies, Policies, Procedures. 1.5 Decision Making.	**CO1, CO2**
TSO 2a. Differentiate formal and informal organizations. *TSO 2b.* Identify the levels of hierarchy in the given organization. *TSO 2c.* List the staffing principles.	**Unit-2.0 Organizing and Staffing** 2.1 Nature of Organizing 2.2 Formal and Informal Organization 2.3 Principles of Organizing, Organizational Hierarchy, Authority, and Power. 2.4 Staffing, Recruitment, Selection, Performance Appraisal.	**CO3**
TSO 3a. Explain the theories of motivation *TSO 3b.* Differentiate between leadership styles	**Unit-3.0 Motivation and Leadership** 3.1 Motivation 3.2 McGregor Theory of X and Y 3.3 Maslow Hierarchy of Needs Theory 3.4 Herzberg's Motivation- Hygiene Theory 3.5 Leadership: Definition, Ingredients, Styles, theories	**CO4**

Note: One major TSO may require more than one Theory session/Period.

J)   **Suggested Term Work and Self Learning:** Some sample suggested assignments, micro project and other activities are mentioned here for reference.

     a. Assignments: Questions/Problems/Numerical/Exercises to be provided by the course teacher in line with the targeted COs.
- Describe about adopting the systems approach in any organization.
- Write in brief about grapevine communication.
- Compare the traits Theory of X and Y as proposed by McGregor

     b. **Micro** Projects:
- Apply Maslow's need hierarchy theory in workplace.