



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: Degree

Course/ Subject Code: BE106401

Course/Subject Name: Civil Engineering - Societal & Global Impact

w.e.f. Academic Year:	2023-24
Semester:	4th Semester/ 2 nd Year
Category of the Course:	Humanities and Social Science

Prerequisite:	NIL
Rationale:	NIL

Teaching and Examination Scheme:

Teaching Scheme(in Hours)			Total Credits L+T+(PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial/Practical		
				(E)	(M)	(I)	(V)	
2	0	0	2	60	40	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weight age
1.	Introduction to Course and Overview; Understanding the past to look into the future: Pre-industrial revolution days, Agricultural revolution, first and second industrial revolutions, IT revolution; Recent major Civil Engineering breakthroughs and innovations; Present day world and future projections, Ecosystems in Society and in Nature; the steady erosion in Sustainability; Global warming, its impact and possible causes; Evaluating future requirements for various resources; GIS and applications for monitoring systems; Human Development Index and Ecological Footprint of India Vs other countries and analysis	3	10
2.	Understanding the importance of Civil Engineering in shaping and impacting the world; The ancient and modern Marvels and Wonders in the field of Civil Engineering; Future Vision for Civil Engineering.	3	20
3.	Infrastructure-Habitats, Megacities, Smart Cities, futuristic visions; Transportation (Roads, Railways & Metros, Airports, Seaports, River ways, Sea canals, Tunnels (below ground, under water); Futuristic systems (ex, Hyper Loop)); Energy generation (Hydro, Solar (Photovoltaic, Solar Chimney), Wind, Wave, Tidal, Geothermal, Thermal	8	20



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	energy); Water provisioning; Telecommunication needs (towers, above-ground and underground cabling); Awareness of various Codes & Standards governing Infrastructure development; Innovations and methodologies for ensuring Sustainability		
4.	Environment- Traditional & futuristic methods; Solid waste management, Water purification, Wastewater treatment & Recycling, Hazardous waste treatment; Flood-control Multi-purpose water projects, Atmospheric pollution; Global warming phenomena and Pollution Mitigation measures, Stationarity, non-stationarity; Environmental Metrics. Monitoring, Other Sustainability measures; Innovations and methodologies for ensuring Sustainability	7	20
5.	Built environment – Facilities management, Climate control; Energy efficient built environments and LEED ratings, Recycling, Temperature/ Sound control in built environment, Security systems; Intelligent/ Smart Buildings; Aesthetics of built environment, Role of Urban Arts Commissions; Conservation, Repairs & Rehabilitation of Structures & Heritage structures; Innovations and methodologies for ensuring Sustainability	5	10
6.	Civil Engineering Projects – Environmental Impact Analysis procedures; Waste (materials, manpower, equipment) avoidance/ Efficiency increase; Advanced construction techniques for better sustainability; Techniques for reduction of Green House Gas emissions in various aspects of Civil Engineering Projects; New Project Management paradigms & Systems (Ex. Lean Construction), contribution of Civil Engineering to GDP, Contribution to employment(projects, facilities management), Quality of products, Health & Safety aspects for stakeholders; Innovations and methodologies for ensuring Sustainability during Project development	4	20
Total		30	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
-	-	-	-	-	-

Where R: Remember; U: Understanding; A: Application; N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)



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Course/ Subject Code: BE106401

Course/Subject Name: Civil Engineering - Societal & Global Impact

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT level
1	Outline the role of Civil engineering in evolution and revolution of mankind and globally present status of development in India.	Application
2	Estimate the level of resource utilization for present and future infrastructural projects using various tools/methods	Application
3	Infer the necessity of different conventional as well as futuristic infrastructural projects.	Application
4	Incorporate the goal of sustainable development to minimize the potential impacts on the global environment	Application
5	Associate various measures for enhancing the build environment, thereby improving quality of life of the occupants	Application
6	Evaluate the potential of Civil Engineering for employment creation and its contribution to the GDP.	Application

Course Outcome to Programme Outcome (CO-PO) Mapping

CO-PO Mapping						
PO \ CO	CO-1	CO-2	CO-3	CO-4	CO-5	
PO-1 Basic Engg Knowledge	3	3	3	3	3	
PO-2 Problem Analysis	3	2	2	2	2	
PO-3 Design/Development	2	3	3	3	3	
PO-4 Investigations	-	-	-	-	-	
PO-5 Modern Tool Usage	2	2	2	3	3	
PO-6 Engineer & Society	-	-	-	-	-	
PO-7 Environment & Sustainability	-	-	-	-	-	
PO-8 Ethics	-	-	-	-	-	
PO-9 Individual & Team Work	-	-	-	-	-	
PO-10 Communication	1	1	1	2	2	
PO-11 Project Management	-	-	-	-	-	



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Course/ Subject Code: BE106401

Course/Subject Name: Civil Engineering - Societal & Global Impact

PO-12 Lifelong Learning	2	2	2	2	2
CO-PSO Mapping					
PSO \ CO	CO-1	CO-2	CO-3	CO-4	CO-5
PSO-1 Programming Skills	3	3	3	3	3
PSO-2 Analytical Ability	2	3	3	2	2
PSO-3 Software Tools Use	2	2	2	3	3

References/Suggested Learning Resources:

(a) Books:

- 1 Brito, Ciampi, Vasconcelos, Amarol, Barros (2013) Engineering impacting Social, Economical and Working Environment, 120th ASEE Annual Conference and Exposition
- 2 NAE Grand Challenges for Engineering (2006), Engineering for the Developing World, The Bridge, Vol 34, No.2, Summer 2004.
- 3 Allen M. (2008) Cleansing the city. Ohio University Press. Athens Ohio.
- 4 Ashley R., Stovin V., Moore S., Hurley L., Lewis L., Saul A. (2010). London Tideway Tunnels Programme – Thames Tunnel Project Needs Report – Potential source control and SUDS applications: Land use and retrofit options
- 5 Ashley R M., Nowell R., Gersonius B., Walker L. (2011). Surface Water Management and Urban Green Infrastructure. Review of Current Knowledge. Foundation for Water Research FR/R0014
- 6 Barry M. (2003) Corporate social responsibility – unworkable paradox or sustainable paradigm? Proc ICE Engineering Sustainability 156. Sept Issue ES3 paper 13550.
- 7 Centre for Water Sensitive Cities (2012) Blueprint for a water sensitive city. Monash University.

Open source software and website:

<https://nptel.ac.in/courses/112104121/>



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: Degree

Course/ Subject Code: BE106403

Course/Subject Name: Structural Analysis-I

w.e.f. Academic Year:	2023-24
Semester:	4th Semester/ 2 nd Year
Category of the Course:	PCC

Prerequisite:	NIL
Rationale:	This subject is conceptual applications of principles of mechanics of rigid and deformable bodies in Engineering. This subject helps in determining statics response of statically determinate and indeterminate framed structures. In addition to this, the topics related to stability checks for structure subjected to lateral loads, buckling behaviour will also helps the students in developing the basic concepts of structural analysis. Use of professional software in structural analysis is a need of the day. Though it's use will be limited to small problem in this course, but students starts to use professional software will help them much in the later course.

Teaching and Examination Scheme:

Teaching Scheme(in Hours)			Total Credits L+T+(PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial/Practical		
				(E)	(M)	(I)	(V)	
4	0	2	5	60	40	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weight age
1.	Fundamentals of Statically Determinate Structures: Basics: Types of statically determinate & indeterminate structures, static and kinematic indeterminacy, stability of structures, principle of superposition, Maxwell's reciprocal theorems. Framed structure: Computation of internal forces in statically determinate framed structures such as plane truss, plane frame, grids, Arches and Cables: Calculation internal forces in three hinge arches with circular and parabolic shapes subjected to various types of loading. Forces and end actions in cables due to various types of loading. Thin cylinder: Analysis of thin cylinder and spherical vessels under pressure.	12	20



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Level: Degree

Course/ Subject Code: BE106403

Course/Subject Name: Structural Analysis-I

2.	Strain energy & Displacement of Statically Determinate structures: Strain Energy : Resilience, strain energy due to axial loads & flexure, proof resilience, modulus of resilience, impact loads, and sudden loads Displacement : Differential equation of elastic curve, relation between moment, slope and deflection, Displacement of beam by Macaulay's method, Moment Area Method, Conjugate Beam Method and by strain energy using first principle.	12	20
3.	Direct and Bending stresses -Column & Struts: Direct and Bending stresses Basics: Members subjected to eccentric loads, middle third rule, kernel of section, stress distribution Applications of Direct & Bending stresses : (1) chimney subjected to wind pressure, (2) Retaining walls subjected to earth pressure and (3) Dams subjected to hydraulic pressure. Columns and Struts Basics: Buckling of columns, different end conditions, effective length, least radius of gyration Applications: Euler's and Rankine's formulae, columns with initial curvature, eccentrically loaded columns, columns with lateral loading.	12	30
4.	Statically Indeterminate beams: Basic:Types of statically indeterminate beams, Consistent Deformation method, Basic principles for fixed beam, basics of moment distribution method. Propped Cantilever beam: Analysis of propped cantilever beams & beams of varying moment of inertia using Consistent Deformation Method Fixed beam: Computation of fixed-end actions for various types of loads and secondary effects using basic principles, beams of varying moment of inertia. Continuous beams: continuous beam up to 3 spans by Moment Distribution Method.	12	20
5.	Computer Applications in Structural Engineering. (for Laboratory only): Use of professional software such as STAAD-Pro, SAP, ETABS etc. for determining response of frames structure of the topics related to this course	4	10
Total		52	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
-	-	-	-	-	-

Where R:Remember;U:Understanding;A:Application,N:Analyze and E:Evaluate C:Create(as per Revised



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: Degree

Course/ Subject Code: BE106403

Course/Subject Name: Structural Analysis-I

Bloom's Taxonomy)

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT level
1	Apply Principles Of Statics For Statically Determinate Structures.	Application
2	Find Displacement Of Statically Determinate Structures. Using Various Methods.	Application
3	Identify Influence Line Diagram For Determinate Beams	Analyze
4	Analyse Arches And Cables, Fixed Beam, Columns And Struts.	Application
5	Compute Strain Energy Stored In Member And Stresses In Dam, Chimney And Retaining Wall	Application

Course Outcome to Programme Outcome (CO-PO) Mapping

CO-PO Mapping						
PO \ CO	CO-1	CO-2	CO-3	CO-4	CO-5	
PO-1 Basic Engg Knowledge	3	3	3	3	3	
PO-2 Problem Analysis	3	2	2	2	2	
PO-3 Design/Development	2	3	3	3	3	
PO-4 Investigations	-	-	-	-	-	
PO-5 Modern Tool Usage	2	2	2	3	3	
PO-6 Engineer & Society	-	-	-	-	-	
PO-7 Environment & Sustainability	-	-	-	-	-	
PO-8 Ethics	-	-	-	-	-	
PO-9 Individual & Team Work	-	-	-	-	-	
PO-10 Communication	1	1	1	2	2	
PO-11 Project Management	-	-	-	-	-	
PO-12 Lifelong Learning	2	2	2	2	2	
CO-PSO Mapping						
PSO \ CO	CO-1	CO-2	CO-3	CO-4	CO-5	



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Level: Degree

Course/ Subject Code: BE106403

Course/Subject Name: Structural Analysis-I

PSO-1 Programming Skills	3	3	3	3	3
PSO-2 Analytical Ability	2	3	3	2	2
PSO-3 Software Tools Use	2	2	2	3	3

References/Suggested Learning Resources:

(a) Books:

- 1 Engineering Mechanics By S S Bhavikatti ,New Age International Publishers
- 2 Structural Analysis – I By S. S. Bhavikatti ,Vikash Publishing House Pvt. Ltd.
- 3 Theory of Structures, Volume I & II By Gupta S P and Pandit ,McGraw Hill Education
- 4 Structural Analysis By Hibbeler R C , Pearson Education
- 5 Elementary Structural Analysis By Utku, S, Norris C H and Wilbur , McGraw-Hill College

Open source software and website:

www.nptel.iitm.ac.in/courses/

Suggested Course Practical List:

- 1 To compare the calculate value and observed value of bending moment at a cross-section of the beam supported at its ends.
- 2 To verify clerk Maxwell's reciprocal theorem by means of a mild steel beam.
- 3 To determine the deflection of a simply supported beam.
- 4 To determine the deflection of a pin connected truss analytically and graphically and verify the same with experimentally.
- 5 To verify the shear force at a cross-section of the beam.
- 6 To study the behavior of a portal frame under different load conditions.
- 7 To determine the horizontal thrust in a three hinged arch for a given system by experimentally and verify the same with calculated values.
- 8 To study the behavior of different types of columns and to calculate the Euler's buckling load for each case.
- 9 To compare of experimental and theoretical results of forces in the members and the component displacement of the loaded joint

List of Laboratory/Learning Resources Required:

Any professional software of Structural analysis



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: Degree

Course/ Subject Code: BE106404

Course/Subject Name: Engineering Surveying

w.e.f. Academic Year:	2023-24
Semester:	4th Semester/ 2 nd Year
Category of the Course:	PCC

Prerequisite:	NIL
Rationale:	To develop concepts of various types of land surveying and prepare and interpret maps and drawing.

Teaching and Examination Scheme:

Teaching Scheme(in Hours)			Total Credits L+T+(PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial/Practical		
				(E)	(M)	(I)	(V)	
4	0	2	5	60	40	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weight age
1.	Plane Table Survey: Introduction, principle, instruments, setting up the plane table, methods of plane tabling, advantages, sources of Errors.	4	10
2.	Theodolite Traversing: Introduction, definitions, the Vernier transit theodolite, temporary and permanent adjustment of theodolite, measuring horizontal and vertical angles, methods of traversing, closing error, computation of latitudes and departure, check in closed and open traverse, balancing of traverse, Gale's table.	8	20
3.	Trigonometric leveling: Indirect leveling, heights and distances, methods, direct leveling on steep ground.	5	10
4.	Curves: Introduction, classification of curves, Elements of a simple circular, designation of curve, methods of setting out a simple circular curve, elements of a compound and reverse curves, transition curve, types of transition curves, combined curve, types of vertical curves.	6	10



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: Degree

Course/ Subject Code: BE106404

Course/Subject Name: Engineering Surveying

5.	Areas and Volumes: Introduction, computation of area, computation of area from field notes and plotted plans, boundary area, area of traverse, Use of Planimeter, computations of volumes, Volume from cross sections, Trapezoidal and Prismoidal formulae, Prismoidal correction, Curvature correction, capacity of reservoir, volume from borrow pits.	6	10
6.	Tachometric Surveying: Introduction, purpose, principle, instruments, Methods of tacheometry, stadia constants, anallatic lens, Subtense bar, field work in tacheometry, reduction of readings, errors and precisions.	6	10
7.	Geodetic Surveying: Introduction, triangulation, principle and uses of triangulation, triangulation systems and its classification, well-conditioned triangles, strength of figure, selection of triangulation stations and their inter-visibility, stations marks, signals, towers and scaffolds, base line, site selection and base line measurement, tape corrections, the base net, extension of base line, satellite station and reduction to centre.	6	10
8.	Theory of Errors : Introduction, types of errors, definitions, laws of accidental errors, laws of weights, theory of least squares, rules for giving weights and distribution of errors to the field observations, determination of the most probable values of quantities.	6	10
9.	Modern Surveying Instruments: Introduction, electromagnetic spectrum, electromagnetic distance measurement, types of EDM instruments, electronic digital theodolites, total station, digital levels, scanners for topographical survey, global positioning system.	5	10
Total		52	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
-	-	-	-	-	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)



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Program Name: Engineering

Level: Degree

Course/ Subject Code: BE106404

Course/Subject Name: Engineering Surveying

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT level
1	Conduct plane table and theodolite traverse surveys at identified Site.	Application
2	Conduct trigonometrically leveling	Application
3	Set out simple circular and transition curves at given location	Analyze
4	Compute areas and volumes using standard rules and equipment's such as planimeter	Application
5	Conduct hydrographical survey	Application
6	Give layout of foundations for buildings, culverts, bridges and tunnels as per plan/drawing	Application

Course Outcome to Programme Outcome (CO-PO) Mapping

CO-PO Mapping						
PO \ CO	CO-1	CO-2	CO-3	CO-4	CO-5	
PO-1 Basic Engg Knowledge	3	3	3	3	3	
PO-2 Problem Analysis	3	2	2	2	2	
PO-3 Design/Development	2	3	3	3	3	
PO-4 Investigations	-	-	-	-	-	
PO-5 Modern Tool Usage	2	2	2	3	3	
PO-6 Engineer & Society	-	-	-	-	-	
PO-7 Environment & Sustainability	-	-	-	-	-	
PO-8 Ethics	-	-	-	-	-	
PO-9 Individual & Team Work	-	-	-	-	-	
PO-10 Communication	1	1	1	2	2	
PO-11 Project Management	-	-	-	-	-	
PO-12 Lifelong Learning	2	2	2	2	2	
CO-PSO Mapping						
PSO \ CO	CO-1	CO-2	CO-3	CO-4	CO-5	
PSO-1 Programming Skills	3	3	3	3	3	



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Course/ Subject Code: BE106404

Course/Subject Name: Engineering Surveying

PSO-2 Analytical Ability	2	3	3	2	2
PSO-3 Software Tools Use	2	2	2	3	3

References/Suggested Learning Resources:

(a) Books:

- 1 Surveying Vol. I, II and III by Dr. B.C. Punamia
- 2 Surveying Vol. I, II and III by Dr. K.R. Arora
- 3 Surveying Vol. I and II by S. K. Duggal
- 4 Surveying and Leveling by N.N. Basak
- 5 Surveying and Leveling by R. Agor
- 6 Advanced Surveying by R. Agor.
- 7 Roy, S.K., Fundamentals of Surveying, Prentice Hall India, New Delhi
- 8 Subramanian, R., Surveying and Leveling, Oxford University Press, New Delhi
- 9 Surveying by Dr. R. B. Khasiya
- 10 Surveying by Dr. R. P. RethaliyaRaman and Sharma, Technical Communications, OUP, New Delhi, 2017

Open source software and website:

<http://nptel.ac.in/courses/105107122/>

Suggested Course Practical List:

- 1 Plane table traversing by intersection and radiation methods
- 2 Tachometry Survey Project.
- 3 Theodolite traversing and plotting of traverse by applying corrections in Gale's traverse table
- 4 Setting out simple circular curve by different methods
- 5 Setting out combined curve (Transition - Circular – Transition)
- 6 Computation of area of submergence and storage volume from contour maps for reservoir projects.
- 7 Introduction to modern surveying Instruments. Role Play

List of Laboratory/Learning Resources Required:

- 1 Plane table
- 2 Theodolite



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: Degree

Course/ Subject Code: BE106405

Course/Subject Name: Engineering Fluid mechanics

w.e.f. Academic Year:	2023-24
Semester:	4th Semester/ 2 nd Year
Category of the Course:	PCC

Prerequisite:	NIL
Rationale:	1.To develop a basic understanding about the properties of fluids, their behavior under static and dynamic conditions. 2.To enable the students to apply the basic principles of Fluid Mechanics to solve real life problems

Teaching and Examination Scheme:

Teaching Scheme(in Hours)			Total Credits L+T+(PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial/Practical		
				(E)	(M)	(I)	(V)	
4	0	2	5	60	40	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weight age
1.	Properties of Fluids: Mass density, specific weight, specific gravity, specific volume, vapour pressure, compressibility, elasticity, surface tension, capillarity; Newton's law of viscosity, Types of fluids, dynamic viscosity, kinematic viscosity, variation of viscosity with temperature; Basic applications of fluid mechanics	4	10
2.	Fluid Statics Measurement of Pressure: Pressure variation in static fluid, Pascal's law, Units and scale of pressure measurement- Atmospheric pressure, Absolute pressure, Gauge pressure, and Vacuum pressure, Hydrostatic paradox, Piezometer, U-Tube manometer, Single column manometer, U-tube differential manometer, Inverted U-tube differential manometer, micromanometers. Hydrostatic force on plane and curved surface: Total pressure and center of pressure, pressure diagram, Total pressure on plane surfaces and curved surfaces depth of center of pressure, Practical applications of Total pressure and Center of pressure. Buoyancy and Flotation: Buoyant force, Buoyancy and Center of Buoyancy, Archimedes Principle, Metacentre and Metacentric height, Equilibrium of	8	20



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: Degree

Course/ Subject Code: BE106405

Course/Subject Name: Engineering Fluid mechanics

	floating and submerged bodies, Metacentric height evaluation – theoretical and experimental method.		
3.	Fluid Kinematics & Dynamics: Fluid flow methods of analysis of fluid motion, Streamlines, Path lines, Streak lines and Stream tubes. Types of fluid flow-Steady and unsteady flow, Uniform and non-uniform flow, Laminar and turbulent flow, Reynolds number, Reynolds experiment, Rotational and Irrotational flow, Subcritical, critical and Supercritical flow, Compressible and Incompressible flow, One, Two and three dimensional flow velocity potential and stream function, flow net, Euler's equation, Bernoulli's equation and its applications.	8	20
4.	Flow Measuring Devices: Measurement of discharge- Venturimeter, Orificemeter, Nozzlemeter, Rotometer. Measurement of velocity-Pitot tube. Orifice- classification hydraulic coefficients, Experimental determination of hydraulic coefficients, Small and large orifice,. Mouthpiece- classification, External cylindrical mouthpiece, Convergent –divergent mouthpiece, Borda's mouthpiece. Notches and weirs-discharge over rectangular notch and triangular notch. Velocity of approach	8	10
5.	Flow Through Pipes: Introduction, Continuity equation-Energy equation-Momentum equation Major and minor energy losses, hydraulic gradient and total energy line, pipes in series and parallel, pipe networks by Hardy Cross method, Viscous flow-Couette flow, Hagen-Poiseuille equation-flow between parallel plates. Turbulent flow in pipes-Prandtl's mixing length theory Smooth and rough boundaries- water hammer phenomenon.	8	10
6.	Open Channel Flow: Basic concept of open channel flow- Steady uniform flow-Velocity distribution-Optimum shape of cross section for uniform flow- Energy equation-specific energy-specific energy diagram-discharge diagram-Application of specific energy and discharge diagrams. Non- Uniform steady flow-equations for gradually varied flow-Direct Step method, Rapidly varied flow- Hydraulic jump.	10	20
7.	Dimensional Analysis and Similitude: Fundamental dimensions Physical Quantity and Dimensions Dimensional Homogeneity-Non Dimensional parameters, Theorem dimensional analysis, Choice of variables, Determination of Dimensionless parameters. Model Similitude-Physical models- geometric-kinematic and dynamic similarity	6	10
	Total	52	100



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Program Name: Engineering

Level: Degree

Course/ Subject Code: BE106405

Course/Subject Name: Engineering Fluid mechanics

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
-	-	-	-	-	-

Where R: Remember; U: Understanding; A: Application; N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT level
1	Use The Properties Of Fluid For Various Practical Purposes.	Application
2	Apply Fluid Static Principles To Determine Forces On Planar And Curved Surfaces Submerged In A Static Fluid.	Application
3	Implement The Concept Of Fluid Kinematics And Dynamics	Analyze
4	Analyse Fluid Flow Through Pipes	Application
5	Determine Discharge Through Open Channel	Application

Course Outcome to Programme Outcome (CO-PO) Mapping

CO-PO Mapping					
PO \ CO	CO-1	CO-2	CO-3	CO-4	CO-5
PO-1 Basic Engg Knowledge	3	3	3	3	3
PO-2 Problem Analysis	3	2	2	2	2
PO-3 Design/Development	2	3	3	3	3
PO-4 Investigations	-	-	-	-	-
PO-5 Modern Tool Usage	2	2	2	3	3
PO-6 Engineer & Society	-	-	-	-	-



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Course/Subject Name: Engineering Fluid mechanics

PO-7 Environment & Sustainability	-	-	-	-	-
PO-8 Ethics	-	-	-	-	-
PO-9 Individual & Team Work	-	-	-	-	-
PO-10 Communication	1	1	1	2	2
PO-11 Project Management	-	-	-	-	-
PO-12 Lifelong Learning	2	2	2	2	2
CO-PSO Mapping					
PSO \ CO	CO-1	CO-2	CO-3	CO-4	CO-5
PSO-1 Programming Skills	3	3	3	3	3
PSO-2 Analytical Ability	2	3	3	2	2
PSO-3 Software Tools Use	2	2	2	3	3

References/Suggested Learning Resources:

(a) Books:

- 1 Engineering Fluid mechanics By K.L. Kumar , S. Chand & Company Ltd. ,8th Edition
- 2 Theory and Applications of Fluid Mechanics By K. Subramanya , Tata McGraw Hill
- 3 Fluid Mechanics By A.K. Jain ,Khanna Publishers,4th edition
- 4 Hydraulics and Fluid Mechanics By P.M. Modi and S.M. Seth , Standard Book House
- 5 Fluid Mechanics by Victor L. Streeter, E. B. Wylie by, McGraw Hill Publication
- 6 Fluid Mechanics by Frank M White , McGraw Hill Publication

Open source software and website:

<http://www.nptel.iitm.ac.in/courses/>

Suggested Course Practical List:

- 1 To validate Bernoulli's Theorem as applied to the flow of water in a tapering circular duct
- 2 To study and measure velocity of flow using Pitot tube
- 3 To calibrate the given Rectangular, Triangular and Trapezoidal Notches
- 4 To determine the Metacentric height of a given floating body
- 5 To calibrate and study Venturimeter
- 6 To calibrate and study Orifice meter



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: Degree

Course/ Subject Code: BE106405

Course/Subject Name: Engineering Fluid mechanics

- 7 To determine the fluid friction factor for the different pipes
- 8 To study pressure and pressure measurement devices
- 9 To study Laminar and Turbulent flow and its visualization on Reynolds's apparatus
- 10 To determine Hydraulic Co-efficient using Orifice and Mouthpiece

List of Laboratory/Learning Resources Required:

- 1 Viscometer
- 2 Piezometers, Manometers, pressure gauges
- 3 Floating body
- 4 Reynolds experimental setup
- 5 Hydraulic bench with modular attachments for various experiments
- 6 Pipe friction apparatus
- 7 Open channel with necessary attachments for Uniform flow and Hydraulic Jump experiment