



||Jai Sri Gurudev ||

Sri Adichunchanagiri Shikshana Trust@



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No. 67, BGS Health & Education City, Dr.Vishnuvardhana Road, Kengeri, Bangalore-560060.



## Department of Civil Engineering

### Course Outcomes and CO-PO-PSO Articulation Matrix - Batch 2016-20

#### Semester-I/II

Subject: Elements of Civil Engineering and Engineering Mechanics										Subject Code: 15CIV13/23					
Course Outcomes															
CO1	Outline the various fields in Civil Engineering and its importance on Infrastructure.														
CO2	Analyse the force system applied to the structural members under static condition.														
CO3	Analyse effect of forces on system														
CO4	Evaluate the effect of center of gravity and moment of inertia for given structure.														
CO5	Analyse the force system and dynamic condition														
CO-PO-PSO Mapping															
Cos	Pos												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2														
CO2	3	3													
CO3	3	3													
CO4	3	3													
CO5	2	2													
Average	2.6	2.75													

#### Semester-III

Subject: Engineering Mathematics-III										Subject Code: 15MAT31						
Course Outcomes																
CO1	Know the use of periodic signals and Fourier series to analyze circuits and systems communication.															
CO2	Explain the general linear system theory for continuous - time signals and digital signal processing using the Fourier transform and z-transform.															
CO3	Employ appropriate numerical methods to solve algebraic and transcendental equations.															
CO4	Apply Green's theorem, Divergence theorem and Stokes theorem in various applications in the field of electro-magnetic and gravitational fields and fluid flow problems.															
CO5	Determine the external of functional and solve the simple problems for calculus of variations. Utilize the concepts of functional and their variations in the applications of communication systems, decision theory, synthesis and optimization of digital circuits.															
CO-PO-PSO Mapping																
COs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	3	2														
CO2	3	2														
CO3	3	2														
CO4	3	2														
CO5	3	2														
Average	3	2														

Subject: Strength of Materials										Subject Code: 15CV32						
Course Outcomes																
CO1	To evaluate the strength of various structural elements internal forces such as compression, tension, shear, bending and torsion															
CO2	To suggest suitable material from among the available in the field of construction and manufacturing.															
CO3	To evaluate the behavior and strength of structural elements under the action of compound stresses and thus understand failure concepts.															
CO4	To understand the basic concept of analysis and design of members subjected to torsion.															
CO5	To understand the basic concept of analysis and design of structural elements such as columns and struts.															
CO-PO-PSO Mapping																
COs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	3	3	2	3		1			1			2	3			
CO2	3	1	1	2		1	1	1				2	3			
CO3	3	3	2	3		1							3			
CO4	3	3	3	1		1	1	1				1	3			
CO5	3	3	3	2								1	3			
Average	3	2.6	2.2	2.2		1	1	1	1			1.5	3			

Subject: Fluid Mechanics										Subject Code: 15CV33						
Course Outcomes																
CO1	Possess a sound knowledge of fundamental properties of fluids and fluid continuum.															
CO2	Compute and solve problems on hydrostatics, including practical applications.															
CO3	Apply principles of mathematics to represent kinematic concepts related to fluid flow															
CO4	Apply fundamental laws of fluid mechanics and the Bernoulli's principle for practical applications.															
CO5	Compute the discharge through pipes and over notches and weirs															
CO-PO-PSO Mapping																
COs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2		
CO1	2	2				2	2		3			2		2		
CO2	2	3	2			2	2		2	2		2		1		
CO3	2	3	2	3		1	1	1	1	1		2		1		
CO4	3	3	3	3		1	1		1	1		2		3		
CO5	3	3	3	3		1	1	1	1	1		2		3		
Average	2.4	2.8	2.5	3		1.1	1.1	1	1.6	1.25		2		2		

Subject: Basic Surveying										Subject Code: 15CV34					
Course Outcomes															
CO1	Possess a sound knowledge of fundamental principles Geodetics														
CO2	Measurement of vertical and horizontal plane, linear and angular dimensions to arrive at solutions to basic surveying problems														
CO3	Capture geodetic data to process and perform analysis for survey problems														
CO4	Analyze the obtained spatial data and compute areas and volumes. Represent 3D data on plane figures as contours														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3

CO1	2					2	2					2		1	
CO2	2	1	1			2	2					1		2	
CO3	2	2	2			2	2					1		2	
CO4	2	2						2				1		3	
Average	2	1.67	1.5			2	2	2				1.25		2	


Subject: Engineering Geology										Subject Code: 15CV35					
Course Outcomes															
CO1	Students will able to apply the knowledge of geology and in Civil Engineering														
CO2	Students will effectively utilize earth's materials such as mineral, rocks and water in civil engineering practices														
CO3	Analyze the natural disasters and their mitigation														
CO4	Assess various structural features and geological tools in ground water exploration, Natural resource estimation and solving civil engineering problems														
CO5	Apply and asses use of building materials in construction and asses their properties														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	3		2			2	2					2		1	
CO2	2				2	2	2					2		2	
CO3	2		2		2		2					2		1	
CO4	2				2		3					3		2	
CO5	1		2		2		2					2	1	1	
Average	2		2		2	2	2					2.2	1	1.4	

Subject: Building Materials and Construction										Subject Code: 15CV36					
Course Outcomes															
CO1	Select suitable materials for buildings and adopt suitable construction techniques.														
CO2	Adopt suitable repair and maintenance work to enhance durability of buildings.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	2					2	2					2	2		
CO2	2					2	2					2	2		
Average	2					2	2					2	2		

Subject: Building Materials Testing Laboratory										Subject Code: 15CVL37					
Course Outcomes															
CO1	Reproduce the basic knowledge of mathematics and engineering in finding the strength in tension, compression, shear and torsion.														
CO2	Identify, formulate and solve engineering problems of structural elements subjected to flexure.														
CO3	Evaluate the impact of engineering solutions on the society and also will be aware of contemporary issues regarding failure of structures due to unsuitable materials.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	1				1						1	2		
CO2	2	2	1									1	2		

<b>CO3</b>	2	1				2	2	2				1	2	2	
<b>Average</b>	2	1.33	1			1.5	2	2				1	2	2	

Subject: Basic Surveying Practice										Subject Code: 15CVL38						
Course Outcomes																
CO1	Apply the basic principles of engineering surveying and for linear and angular measurements.															
CO2	Comprehend effectively field procedures required for a professional surveyor.															
CO3	Use techniques, skills and conventional surveying instruments necessary for engineering practice.															
CO-PO-PSO Mapping																
COs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	2	2										1	1			
CO2	2									2	2	1	2			
CO3	2											1	1			
Average	2	2								2	2	1	1.33			

  
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**Semester-IV**

Subject: Engineering Mathematics-IV										Subject Code: 15EE41					
Course Outcomes															
CO1	Solve first and second ordinary differential equations arising in flow problems using single step and multistep numerical methods.														
CO2	Solve problems of quantum mechanics employing Bessel's function relating to cylindrical polar coordinate systems and Legendre's polynomials relating to spherical polar coordinate systems														
CO3	Understand the analyticity, potential fields, residues and poles of complex potentials in field theory and electromagnetic theory Describe conformal and bilinear transformation arising in aero foil theory fluid flow visualization and image processing														
CO4	Solve problems on probability distributions relating to digital signal processing, determine joint probability distributions and stochastic matrix connected with multivariate correlation problems for feasible random events														
CO5	Draw the validity of the hypothesis proposed for the given sampling distribution in accepting or rejecting the hypothesis, define transition probability matrix of a Markov chain and solve problems related to discrete parameter random process.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2													
CO2	3	2													
CO3	3	2													
CO4	3	2													
CO5	3	2													
Average	3	2													

Subject: Analysis of Determinate Structures										Subject Code: 15CV42					
Course Outcomes															
CO1	Evaluate the forces in determinate trusses by method of joints and sections.														
CO2	Evaluate the deflection of cantilever, simply supported and overhanging beams by different methods.														
CO3	Understand the energy principles and energy theorems and its applications to determine the deflections of trusses and bent frames.														
CO4	Determine the stress resultants in arches and cables.														
CO5	Understand the concept of influence lines and construct the ILD diagram for the moving loads.														
CO-PO-PSO Mapping															
Cos	Pos												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	1	2				1				1	3		
CO2	3	3	1	2				1				1	3		
CO3	3	3	1	2				1				1	3		
CO4	3	3	1	2				1				1	3		
CO5	3	3	2	2				1				1	3		
Average	3	3	1.2	2				1				1	3		

Subject: Applied Hydraulics		Subject Code: 15CV43
Course Outcomes		
CO1	Apply dimensional analysis to develop mathematical modeling and compute the parametric values in prototype by analyzing the corresponding model parameters.	
CO2	Design the open channels of various cross sections including economical channel sections.	

CO3	Apply Energy concepts to flow in open channel sections, Calculate Energy dissipation, Compute water surface profiles at different conditions.														
CO4	Design turbines for the given data, and to know their operation characteristics under different operating conditions.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3		2	3	2	2			2		2	
CO2	3	3	3	3		2	2		2			2		1	
CO3	2	3	2	1		2	2		1			2		1	
CO4	2	3	2	2		2	2		1			2		2	
Average	2.5	3	2.5	2.25		2	2.25	2	1.5			2		1.5	

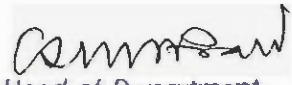
Subject: Concrete Technology										Subject Code: 15CV44					
Course Outcomes															
CO1	Relate material characteristics and their influence on microstructure of concrete.														
CO2	Distinguish concrete behavior based on its fresh and hardened properties.														
CO3	Illustrate proportioning of different types of concrete mixes for required fresh and hardened properties using professional codes														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	1		2	2	1	1					1	2		
CO2	1	1		2		1	1				1	2	3		
CO3	1	2	2	1	2	1	1			1		1	3		
Average	1	1.33	2	1.67	2	1	1			1	1	1.33	2.67		

Subject: Basic Geotechnical Engineering										Subject Code: 15CV45					
Course Outcomes															
CO1	Acquire an understanding of the procedures to determine index properties of any type of soil, classify the soil based on its index properties														
CO2	Determine compaction characteristics of soil and apply that knowledge to assess field compaction procedures														
CO3	Determine permeability property of soils and acquires conceptual knowledge about stresses due to seepage and effective stress; Also acquire ability to estimate seepage losses across hydraulic structure														
CO4	Estimate shear strength parameters of different types of soils using the data of different shear tests and comprehend Mohr-Coulomb failure theory														
CO5	Solve practical problems related to estimation of consolidation settlement of soil deposits also time required for the same														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	2		1				1				2	1	
CO2	3	1	2										2	1	
CO3	3	1	2				1						2	1	
CO4	2	2	1										1		
CO5	2	1	1										1		
Average	2.4	1.4	1.6		1		1		1				1.6	1	

Subject: Advanced Surveying										Subject Code: 15CV46						
Course Outcomes																
CO1	Apply the knowledge of geometric principles to arrive at surveying problems															
CO2	Use modern instruments to obtain geo-spatial data and analyze the same to appropriate engineering problems.															
CO3	Capture geodetic data to process and perform analysis for survey problems with the use of electronic instruments;															
CO4	Design and implement the different types of curves for deviating type of alignments.															
CO-PO-PSO Mapping																
COs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	2	2				1	1	1	1			1	2			
CO2	2	2				1							2			
CO3	2	1					2	2	2			1	2			
CO4	2	1					2	2				1	2			
Average	2	1.5				1	1.66	1.66	1.5			1	2			

Subject: Fluid Mechanics Laboratory										Subject Code: 15CVL47					
Course Outcomes															
CO1	Properties of fluids and the use of various instruments for fluid flow measurement.														
CO2	Working of hydraulic machines under various conditions of working and their characteristics.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	2	1		1	1		2			3		2	
CO2	3	3	2	1		2	2		2			3		2	
Average	2.5	2.5	2	1		1.5	1.5		2			3		2	

Subject: Engineering Geology Laboratory										Subject Code: 15CVL48					
Course Outcomes															
CO1	Identifying the minerals and rocks and utilize them effectively in civil engineering practices.														
CO2	Understanding and interpreting the geological conditions of the area for the implementation of civil engineering projects														
CO3	Interpreting subsurface information such as thickness of soil, weathered zone, depth of hard rock and saturated zone by using geophysical methods.														
CO4	The techniques of drawing the curves of electrical resistivity data and its interpretation for geotechnical and aquifer boundaries														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2					3	2					2	2	1	
CO2	2				2		2					2	2		
CO3	2		2	2			2					2	1		
CO4	2		2	2		2							2		
Average	2		2	2	2	2.5	2					2	1.75	1	

  
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Semester-V

Subject: Design of RC Structural Elements										Subject Code: 15CV51					
Course Outcomes															
CO1	Understand the design philosophy and principles														
CO2	Solve engineering problems of RC elements subjected to flexure, shear and torsion														
CO3	Demonstrate the procedural knowledge in designs of RC structural elements such as slabs, columns and footings														
CO4	Owns professional and ethical responsibility														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	1	1		3		2		1		2	3		
CO2	3	3	2	1	1	3		2				1	3		
CO3	3	2	3	1	1	3		3		2		2	2		
CO4						2		3				3	2		
Average	2.67	2.33	2	1	1	2.75		2.5		1.5		2	2.5		

Subject: Analysis of Indeterminate Structures										Subject Code: 15CV52					
Course Outcomes															
CO1	Determine the moment in indeterminate beams and frames having variable moment of inertia and subsidence using slope deflection method														
CO2	Determine the moment in indeterminate beams and frames of no sway and sway using moment distribution method														
CO3	Construct the bending moment diagram for beams and frames by Kani's method														
CO4	construct the bending moment diagram for beams and frames using flexibility method														
CO5	Analyze the beams and indeterminate frames by system stiffness method														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	1	1	1	1						1	3		
CO2	3	3	1	1	1	1						1	3		
CO3	3	3	1	1	1	2						1	3		
CO4	3	3	1	1	1	1						1	3		
CO5	3	3	1	1	1	1						1	3		
Average	3	3	1	1	1	1.2						1	3		

Subject: Applied Geotechnical Engineering										Subject Code: 15CV53						
Course Outcomes																
CO1	Ability to plan and execute geotechnical site investigation program for different civil engineering projects															
CO2	Understanding of stress distribution and resulting settlement beneath the loaded footings on sand and clayey soils															
CO3	Ability to estimate factor of safety against failure of slopes and to compute lateral pressure distribution behind earth retaining structures															
CO4	Ability to determine bearing capacity of soil and achieve proficiency in proportioning shallow isolated and combined footings for uniform bearing pressure															
CO5	Capable of estimating load carrying capacity of single and group of piles															
CO-PO-PSO Mapping																
COs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	

CO1	3	2	1	1								1	2	2	
CO2	2	2	1	1									1	1	
CO3	2	3	1		1								1		
CO4	3	2		1									1		
CO5	3	1	1	1									1		
Average	2.6	2	1	1	1							1	1.2	1.5	

Subject: Computer Aided Building Planning and Drawing										Subject Code: 15CV54					
Course Outcomes															
CO1	Gain a broad understanding of planning and designing of buildings														
CO2	Prepare, read and interpret the drawings in a professional set up														
CO3	Know the procedures of submission of drawings and Develop working and submission drawings for building														
CO4	Plan and design a residential or public building as per the given requirements														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	1	1		2	1		2				2	2		
CO2	2	2	1		2	1		2	2	1		2	2		
CO3	1				2	1		1	2	2		2	2		
CO4	2	1			2	2		2	2	2		2	2		
Average	1.75	1.33	1		2	1.25		1.75	2	1.67		2	2		

Subject: Air pollution and Control										Subject Code: 15CV551					
Course Outcomes															
CO1	Identify the major sources of air pollution and understand their effects on health and environment														
CO2	Evaluate the dispersion of air pollutants in the atmosphere and to develop air quality models														
CO3	Ascertain and evaluate sampling techniques for atmospheric and stack pollutants														
CO4	Choose and design control techniques for particulate and gaseous emissions.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1		1				2	2	2				1		2	
CO2				2		2	2	2				1		1	
CO3		2		2		1	2	2				1		2	
CO4	2	2				2	2					1		1	
Average	2	1.67		2		1.75	2	2				1		1.5	

Subject: Railways, Harbours, tunneling and Airports											Subject Code: 15CV552					
Course Outcomes																
CO1	Acquires capability of choosing alignment and also design geometric aspects of railway system, runway, taxiway															
CO2	Suggest and estimate the material quantity required for laying a railway track and also will be able to determine the hauling Capacity of a locomotive															
CO3	Develop layout plan of airport, harbor, dock and will be able relate the gained knowledge to identify required type of visual and/or navigational aids for the same															
CO4	Apply the knowledge gained to conduct surveying, understand the tunneling activities															
CO-PO-PSO Mapping																
COs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	

CO1	3	3	3	1		1		1				1		2	
CO2	2	2									2	2		2	
CO3	3			1		1		1				2		2	
CO4	3			1								1		2	
Average	2.75	2.5	3	1		1		1			2	1.5		2	

Subject: Traffic Engineering										Subject Code: 15CV561					
Course Outcomes															
CO1	Understand the human factors and vehicular factors in traffic engineering design														
CO2	Conduct different types of traffic surveys and analysis of collected data using statistical concepts.														
CO3	Use an appropriate traffic flow theory and to comprehend the capacity & signalized intersection analysis														
CO4	Understand the basic knowledge of Intelligent Transportation System														
CO-PO-PSO Mapping															
Cos	Pos												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2										1		2	
CO2	3	2						1	2			1		2	
CO3	3	3			1							1		2	
CO4	2	3	3			2		1		1		1		2	
Average	2.8	2.6	3		1	2		1	2	1		1		2	

Subject: Occupational Health and Safety										Subject Code: 15CV564					
Course Outcomes															
CO1	Identify hazards in the workplace that pose a danger or threat to their safety or health, or that of others														
CO2	Control unsafe or unhealthy hazards and propose methods to eliminate the hazard														
CO3	Present a coherent analysis of a potential safety or health hazard both verbally and in writing, citing the occupational Health and Safety Regulations as well as supported legislation														
CO4	Discuss the role of health and safety in the workplace pertaining to the responsibilities of workers, managers, supervisors														
CO5	Identify the decisions required to maintain protection of the environment, workplace as well as personal health and safety														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2					3	3	2				2		2	
CO2	1					3	3	2				2		2	
CO3	1					2	2	2				1		3	
CO4	1					3	2	2				1		2	
CO5	1					3	2	2				2		3	
Average	1.2					2.8	2.4	2				1.6		2.4	

<b>Subject: Geotechnical Engineering Laboratory</b>		<b>Subject Code: 15CVL57</b>
<b>Course Outcomes</b>		
<b>CO1</b>	Physical and index properties of the soil	
<b>CO2</b>	Classify based on index properties and field identification	
<b>CO3</b>	To determine OMC and MDD, plan and assess field compaction program	
<b>CO4</b>	Shear strength and consolidation parameters to assess strength and deformation characteristics	
<b>CO5</b>	In-situ shear strength characteristics (SPT- Demonstration)	

CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3			2	1	3	3	1		2	3		
CO2	3	2	2			1	1	3	3	1		2	3		
CO3	3	2	3					3	3			2	3		
CO4	3	2	3					3	3			3	2		
CO5	3	2	3					2	2			3	2		
Average	3	2.2	2.8			1.5	1	2.8	2.8	1		2.4	2.6		

Subject: Concrete and Highway Materials Laboratory										Subject Code: 15CVL58						
Course Outcomes																
CO1	Conduct appropriate laboratory experiments and interpret the results															
CO2	Determine the quality and suitability of cement															
CO3	Design appropriate concrete mix															
CO4	Determine strength and quality of concrete															
CO5	Test the road aggregates and bitumen for their suitability as road material															
CO6	Test the soil for its suitability as sub grade soil for pavements															
CO-PO-PSO Mapping																
Cos	Pos												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	2			1		1	1	2	1	2		2	2	1		
CO2	2					2	2	2		1		1	3	1		
CO3	2		2			1	1	1	1			1	3	1		
CO4	2		2	1		1	1	1	1			1	3	1		
CO5	2	1				2	2	1				1	2	1		
CO6	2	1				2	2	1				1	2	1		
Average	2	1	2	1		1.5	1.5	1.33	1	1.5		1.67	2	1		

  
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**Semester-VI**

Subject: Construction Management and Entrepreneurship										Subject Code: 15CV61						
Course Outcomes																
CO1	Understand the construction management process															
CO2	Understand and solve variety of issues that are encountered by every professional in discharging professional duties															
CO3	Fulfill the professional obligations effectively with global outlook															
CO-PO-PSO Mapping																
COs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	2	1	1		1	1	1	1	1	1		1		2		
CO2	1	1	2	1	1	2	2	3	1	1	1	1		2		
CO3	1	2			1	2	2	1	2	2	1	1		2		
Average	1.33	1.33	1.5	1	1	1.67	1.67	1.67	1.33	1.33	1	1		2		

Subject: Design of Steel Structural Elements										Subject Code: 15CV62					
Course Outcomes															
CO1	Possess a knowledge of Steel Structures Advantages and Disadvantages of Steel structures, steel code provisions and plastic behavior of structural steel														
CO2	Understand the Concept of Bolted and Welded connections														
CO3	Understand the Concept of Design of compression members, built-up columns and columns splices														
CO4	Understand the Concept of Design of tension members, simple slab base and gusseted base														
CO5	Understand the Concept of Design of laterally supported and un-supported steel beams														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2					1	2	3				2	3		
CO2	3	3	3					3				2	3		
CO3	3	3	3					3				2	3		
CO4	3	3	3					3				2	3		
CO5	3	3	3					3				2	3		
Average	2.8	3	3			1	2	3				2	3		

Subject: Highway Engineering										Subject Code: 15CV63					
Course Outcomes															
CO1	Acquire the capability of proposing a new alignment or re-alignment of existing roads, conduct necessary field investigation for generation of required data														
CO2	Evaluate the engineering properties of the materials and suggest the suitability of the same for pavement construction														
CO3	Design road geometrics, structural components of pavement and drainage														
CO4	Evaluate the highway economics by few select methods and also will have a basic knowledge of various highway financing concepts														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2				2	1				1	1		2	
CO2	2	1					1					1		2	
CO3	3	3	3					2				1		2	

CO4	3	3									2	1		2	
Average	2.5	2.25	3			2	1	2			1.5	1		2	

Subject: Water Supply and Treatment Engineering										Subject Code: 15CV64					
Course Outcomes															
CO1	Estimate average and peak water demand for a community														
CO2	Evaluate available sources of water, quantitatively and qualitatively and make appropriate choice for a community														
CO3	Evaluate water quality and environmental significance of various parameters and plan suitable treatment system														
CO4	Design a comprehensive water treatment and distribution system to purify and distribute water to the required quality standards														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	2			2	2	1						2	
CO2	2	2				2	2	1						2	
CO3	2	2	1			2	2	1						2	
CO4	2	2	2			2	2	1						2	
Average	2	2	1.67			2	2	1						2	

Subject: Solid Waste Management										Subject Code: 15CV651					
Course Outcomes															
CO1	Analyze existing solid waste management system and to identify their drawbacks														
CO2	Evaluate different elements of solid waste management system														
CO3	Suggest suitable scientific methods for solid waste management elements														
CO4	Design suitable processing system and evaluate disposal sites														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2				2	2		2			2		2	
CO2	2	2				2	3	2	2			2		2	
CO3	2	2				2	3	2	2			2		2	
CO4	2	2				2	2	2	2			2		2	
Average	2	2				2	2.5	2	2			2		2	

Subject: Matrix Method of Structural Analysis										Subject Code: 15CV652					
Course Outcomes															
CO1	Evaluate the structural systems to application of concepts of flexibility and stiffness matrices for simple problems														
CO2	Identify, formulate and solve engineering problems with respect to flexibility and stiffness matrices as applied to continuous beams, rigid frames and trusses														
CO3	Identify, formulate and solve engineering problems by application of concepts of direct stiffness method as applied to continuous beams and trusses														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3		1	1	1						2	3		
CO2	3	3	1	2	1	2		1				1	3		
CO3	3	3		1	2	1						1	3		
Average	3	3	1	1.67	1.33	1.33		1				1.33	3		

Subject: Ground Improvement Technique										Subject Code: 15CV654					
Course Outcomes															
CO1	Give solutions to solve various problems associated with soil formations having less strength														
CO2	Use effectively the various methods of ground improvement techniques depending upon the requirements														
CO3	Utilize properly the locally available materials and techniques for ground improvement so that economy in the design of foundations of various civil engineering structures														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2			2								1		
CO2	3		2		2								1		
CO3	2	1			2								1		
Average	2.8	1.5	2		2								1		

Subject: Software Application Lab										Subject Code: 15CVL67					
Course Outcomes															
CO1	Utilize MATLAB platform to perform interpretation of sampling theorem in time and frequency domains.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	1			3	2		2	3	1		2	3	1	
Average	3	1			3	2		2	3	1		2	3	1	

Subject: Extensive Survey Project /Camp										Subject Code: 15CVL68					
Course Outcomes															
CO1	Apply Surveying knowledge and tools effectively for the projects														
CO2	Understanding Task environment, Goals, responsibilities, Task focus, working in Teams towards common goals, Organizational performance expectations, technical and behavioral competencies														
CO3	Application Of individual effectiveness skills in team and organizational context, goal setting, time management, communication and presentation skills														
CO4	Professional etiquettes at workplace, meeting and general														
CO5	Establishing trust-based relationships in teams & Organizational environment														
CO6	Orientation towards conflicts in team and organizational environment, Understanding sources of conflicts, Conflict resolution styles and techniques														
CO-PO-PSO Mapping															
Cos	Pos												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2				2	2	2					2	2	2	
CO2	2	2			2	2	2					2	2	2	
CO3	2				2	2	2			2	2	1	2	2	
CO4	2					2	2	2				2	2	2	
CO5	2					2	2	2				2	2	2	
CO6	2					2	2	2				2	2	2	
Average	2	2			2	2	2	2		2	2	1.9	2	2	

**Semester-VII**

Subject: Municipal and Industrial Waste Water Engineering										Subject Code: 15CV71					
Course Outcomes															
CO1	Design municipal and industrial sewage treatment plant.														
CO2	Estimate the degree and type of treatment for disposal, reuse and recycle														
CO3	Analyze waste water characteristics														
CO4	Recognize the common physical, chemical and biological unit operations encountered in treatment processes														
CO5	Communicate with the stake holders on sewage and industrial effluent issues														
CO-PO-PSO Mapping															
Cos	Pos												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	2												
CO2	2	2					2							2	
CO3	2	2				1								2	
CO4	2	2	2			1	1							2	
CO5										2		1			
Average	2	2	2			1	1.5			2		1		2	

Subject: Power System Protection										Subject Code: 15CV72					
Course Outcomes															
CO1	Analyze and Design RCC footing, retaining wall, water tanks and portal frame using relevant Indian standard codal provisions.														
CO2	Analyze and Design Steel roof truss, plate girder and gantry girder using IS 800:2007.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3					3				2	3		
CO2	3	3	3					3				2	3		
Average	3	3	3					3				2	3		

Subject: Hydrology and Irrigation Engineering										Subject Code: 15CV73					
Course Outcomes															
CO1	Apply the knowledge of hydrological cycle components and its importance														
CO2	Estimate the precipitation, its losses														
CO3	Assess runoff and develop unit hydrographs														
CO4	Apply the various methods of irrigation for different field conditions														
CO5	Estimate quantity of irrigation water and frequency of irrigation water for various crops														
CO6	Design the components canal systems														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	1				2	2					1		1	
CO2	2	1	1			1	1					2		2	
CO3	2	2				1	1					1		1	
CO4	2					2	2					2		2	
CO5	2	2	2			2	2					2		2	
CO6	2	2	2			2	2					2		2	
Average	1.83	1.6	1.67			1.67	1.67					1.67		1.67	

Subject: Design of Bridges												Subject Code: 15CV741			
Course Outcomes															
CO1	Apply IRC standards for load calculations on bridges														
CO2	Analyze & design the slab and T beam bridges														
CO3	Analyze & Design Box culvert, pipe culvert														
CO4	Design Piers and abutments and use bearings, hinges and expansion joints														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	1				1	3				2	3	1	
CO2	3	2	3	2			1	3				2	3	1	
CO3	3	2	3	2			1	3				2	3	1	
CO4	3	2	3	2			1	3				2	3	1	
Average	3	2	2.5	2			1	3				2	3	1	

Subject: Ground Water & Hydraulics												Subject Code: 15CV742			
Course Outcomes															
CO1	Identify the basic characteristics of aquifers														
CO2	Estimate the quantity of ground water by various methods														
CO3	Locate prospective zones of groundwater availability														
CO4	Analyze the suitable techniques for groundwater exploration														
CO5	Select particular type of well to augment the ground water recharge														
CO6	Recommend methods of water harvesting structures based on the terrain conditions														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	1	3	2						1	2	1	
CO2	2		3		2	2						2	2		
CO3	3	2	2	2	2	1						2	1		
CO4	2		1	1	3	3						2	2	2	
CO5	3	2	2		2	2						2	2		
CO6	2	2		2	1	2						2	1	1	
Average	2.5	2.25	2	1.5	2.16	2						1.83	1.67	1.33	

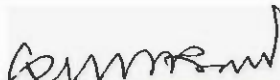
<b>Subject: Urban Transportation and Planning</b>												<b>Subject Code: 15CV751</b>			
<b>Course Outcomes</b>															
<b>CO1</b>	Analyse the data required for transportation planning														
<b>CO2</b>	Formulate transportation project planning and development														
<b>CO3</b>	Predict future trip distribution rate for the study area														
<b>CO4</b>	Develop modal split and trip assignment techniques for various travel patterns														
<b>CO5</b>	Validate the developed model for long term transportation plan														
<b>CO-PO-PSO Mapping</b>															
<b>COs</b>	<b>POs</b>												<b>PSOs</b>		
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>1</b>	<b>2</b>	<b>3</b>
<b>CO1</b>	2	2													
<b>CO2</b>		2												3	
<b>CO3</b>	2	3													
<b>CO4</b>			3											2	
<b>CO5</b>				3										2	
<b>Average</b>	2	2.33	3	3										2.33	

Subject: Urban Transportation and Planning										Subject Code: 15CV751					
Course Outcomes															
CO1	Analyse the data required for transportation planning														
CO2	Formulate transportation project planning and development														
CO3	Predict future trip distribution rate for the study area														
CO4	Develop modal split and trip assignment techniques for various travel patterns														
CO5	Validate the developed model for long term transportation plan														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2													
CO2		2												3	
CO3	2	3													
CO4			3											2	
CO5				3										2	
Average	2	2.33	3	3										2.33	

Subject: Environmental Engineering Laboratory												Subject Code: 15CVL76				
Course Outcomes																
CO1	Analyse & Estimate the various parameters present in water and waste water															
CO2	Compare the result with Codal provisions.															
CO3	Evaluate type of treatment, degree of treatment for water and waste water															
CO4	Conduct investigations on water, wastewater, air and noise using modern equipment.															
CO5	Formulate the problem statement and remedial solutions for their project work.															
CO-PO-PSO Mapping																
COs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1		2												2		
CO2								3						2		
CO3		2												2		
CO4				2										2		
CO5						2								2		
Average		2		2		2		3						2		

Subject: Computer Aided Detailing of Structures										Subject Code: 15CVL77					
Course Outcomes															
CO1	Analyse the data furnished for detailing														
CO2	Prepare the detailed structural drawings based on codal provisions														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2												2		
CO2	2							2					2		
Average	2							2					2		

Subject: Project Phase I +Project Seminar										Subject Code: 15CVP78					
Course Outcomes															
CO1	Identification of complex problems by comprehensive literature review and formulate the sustainable objectives.														
CO2	Design the methodology and selection of suitable materials for the experimental work or design the suitable methodology for the analysis														
CO3	Choose the appropriate approach for the condition of project														
CO4	Form a group to function effectively in a diverse teams and multidisciplinary settings														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2					1	1		2	1		1	2	2	
CO2	1	2					1	1	2	2		1	2	2	
CO3	2	1			1	1	2	2	2	2		2	2	2	
CO4	1							1		3		3	2	2	
Average	1.5	1.5			1	1	1.33	1.33	2	2		1.75	2	2	

  
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**Semester-VIII**

Subject: Quantity Surveying and Contracts Management										Subject Code: 15CV81					
Course Outcomes															
CO1	Develop detailed and abstract estimates for Buildings and roads														
CO2	Evaluate valuation reports of buildings														
CO3	Interpret contract documents of Domestic Construction works														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2							1	2		2	2	2	
CO2	2	1						1			1	1	2	2	
CO3	2							1	1	2	1	1	1	1	
Average	2	1.5						1	1	2	1	1.33	1.67	1.67	

Subject: Design of Pre-Stressed Concrete Elements										Subject Code: 15CV82					
Course Outcomes															
CO1	Apply the knowledge in understanding concept of PSC.														
CO2	Analyse the forces in the PSC members.														
CO3	Estimate the losses and deflection of PSC members.														
CO4	Design PSC members subjected to flexure.														
CO5	Evaluate the anchorage zone stresses and design of shear and end block.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	1				2						2	2		
CO2	3	3	2	1		2		1		1		2	3		
CO3	2	3	1	1		1		1				1	3		
CO4	3	3	1	2		2		1				2	3		
CO5	3	3	3	1		2		2		1		1	3		
Average	2.4	2.6	1.75	1.25		1.8		1.25		1		1.6	2.8		

Subject: Pavement Design										Subject Code: 15CV833					
Course Outcomes															
CO1	Analyse stresses, strains and deflections using various theories														
CO2	Design of pavements as per codal provisions														
CO3	Evaluate the performance of pavements under extreme environmental conditions														
CO4	Predict the failure behavior of flexible and rigid pavements														
CO5	Develop pavement maintenance solutions based on site specific requirements														
CO6	Analyse the field survey data for airfield pavements														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3												2	
CO2	3		3											2	
CO3		3			2			2						2	
CO4	2	2												2	
CO5	2													2	
CO6	2	2	1											2	
Average	2.16	2.5	2		2			2						2	

Subject: Internship/Professional Practice										Subject Code: 15CV84					
Course Outcomes															
CO1	Understand the importance of Industry Institute Interaction														
CO2	Apply the practical knowledge in various fields of Civil Engineering.														
CO3	Analyzing skills to solve the problems encountered in the field.														
CO4	Recognize the need for lifelong learning processes through critical reflection of internship experiences														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1						3	2	2	3	2	1	2		1	
CO2	2	2	1	1	2	1	1	1	1	2	1	2	2	2	
CO3	2	2	2		1				1	1	1	2	2	2	
CO4	2	2	2	1	1	2	1	2	2	2	2	3	2	2	
Average	2	2	1.67	1	1.33	2	1.33	1.67	1.75	1.75	1.33	2.25	2	1.75	

Subject: Project Phase II										Subject Code: 15CVP85						
Course Outcomes																
CO1	Identification of complex problems by comprehensive literature review and formulate the sustainable objectives.															
CO2	Design the methodology and selection of suitable materials for the experimental work or design the suitable methodology for the analysis															
CO3	Develop and demonstrate the project models to meet the needs of the society															
CO4	Apply appropriate techniques and tools to develop the solutions to the complex problems addressing society after understanding the limitations.															
CO5	Communicate effectively to address complex engineering problems with proper documentations, reports and presentations through ICT tools.															
CO-PO-PSO Mapping																
COs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	2	2											2	2		
CO2	2	2											2	2		
CO3			2				2					2	2	2		
CO4				3					2			2				
CO5					2					2						
Average	2	2	2	3	2		2		2	2		2	2	2		

Subject: Seminar										Subject Code: 15CVS86						
Course Outcomes																
CO1	Identification of seminar topic on recent developments in Civil and allied branches															
CO2	Prepare a comprehensive report based on the Literature review															
CO3	Communicate effectively to address the complex engineering problems with proper documentations and presentations through ICT tools															
CO-PO-PSO Mapping																
COs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	2					1	2		1			2	2	1		
CO2	2	1				1	1						2	1		
CO3										3		3		2		
Average	2	1				1	1.5		1	3		2.5	2	1.25		