Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

Course Contents (Syllabus) for

Second Year B. Tech.
(Civil Engineering)
Sem - III to IV

AY 2020-21

Title of the Course: Fluid Mechanics (5CV202)	L	T	P	Cr
	2	1	0	3

Pre-Requisite Courses: Engineering Physics , Engineering Mechanics and Mathematics

Textbooks:

1. Bansal R.K., "A textbook of Fluid mechanics and hydraulic machines", Laxmi Publications (P) Ltd., New Delhi, 9th Edition, 2010.
2. Garde- Mirajgaonkar, "Engineering Fluid Mechanics", SCITECH Publication,1st Edition, 2010.
3. ModiP.M. and Seth S.M., "Hydraulics and Fluid Mechanics", Standard Book HouseStandard Book House Since; 21St Edition , 2018.

References:

1. Kumar D.S., "Fluid Mechanics and Fluid Power Engineering", KatariaS K and Sons, 2th Edition, 2010.
2. Jain A.K., "Fluid Mechanics Including Hydraulic Machines", Khanna Publishers, New Delhi, 8th Edition, 2003.
3. Streeter, V.L. and Wylie E.B. "Fluid Mechanics", McGraw Hill, New York, 8th Edition,1985.

Course Objectives :

1. To provide the student fundamentals of fluid mechanics.
2. To provide the student necessary knowledge and concept in the field of fluid mechanics. The students shell be provided with necessary skills for flow and losses of water distribution pipe flow system.
3. To prepare the students for higher studies and research in the field of fluid mechanics.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	**Bloom's Cognitive**	
		Level	**Descriptor**
CO1	*explain* the fundamentals of fluid mechanics	1,2	remembering, understanding
CO2	*apply* the knowledge of fundamental of fluid mechanics to solve and analysis of fluid at rest and in motion	3,4	applying ,analyzing
CO3	*estimate* the different losses and flow in pipe flow system .	5	Evaluate

CO-PO Mapping : (Use 1, 2, 3 as Correlation Strengths)

PO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**PSO1**	**PSO2**
CO1	**2**												**1**	**1**
CO2		**3**											**2**	**2**
CO3			**3**										**3**	**2**

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	**Marks**
ISE 1	10

MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with60-70% weightage for course content (normally last three modules) covered after MSE.

Course Contents:

Module 1: Fluid Properties and Statics	**Hrs.**
Scope and importance of Fluid Mechanics, Physical Properties: density, specific weight, specific volume, specific gravity, dynamic and kinematic viscosity, compressibility, surface tension and capillarity and Vapor pressure. The basic equation of hydrostatics,Pascal's law, Concept of pressure head, datum, absolute and gauge pressure, Measurement of pressure, Application of the basic equation of hydrostatics. Principle of floatation and Buoyancy, Equilibrium of floating bodies, Stability of floating bodies.	**5**
Module 2: Fluid Kinematics	**Hrs.**
Introduction of basic terms: Path line, streak line, stream line and stream tube, Velocity and acceleration of fluid particle. Types of flow: steady and unsteady, uniform and non-uniform, Laminar and Turbulent, one, two, three-dimensional flow, rotational and irrotaional flow. Flow net: Equation of stream line and equipotential line, methods of developing the flow net and its uses.	**3**
Module 3:Fluid Dynamics	**Hrs.**
Forces acting on fluid mass in motion, Euler's equation of the motion along a streamline, Bernoulli's equation: assumptions, applications and its limitations. Momentum equation and its application in fluid mechanics. Applications of Bernoulli's Equation**:** Analysis of the hydraulic coefficients for the discharge measuring devices: orifices, mouthpieces, venturimeter, pitot tube, notches and weirs. Analysis of losses in closed and open channel flow.	**6**
Module 4: Flow in Pipes	**Hrs.**
Laminar Flow: Reynolds's Experiment, laminar flow through fixed parallel plate ,Coutte's flow and Hazen Poiselle's equation for circular pipes. Turbulent Flow: Velocity distribution and shear stresses in turbulent flow, Nikuradse'sexperiments, Elementary concepts of turbulent flow in smooth and rough pipes. Losses in Pipes**:** Losses in Pipes: Darcy Weisbach equation and minor losses in flow through pipe, Concept of equivalent length of pipe and diameter of pipe. Analysis of losses in pipe for the pipes connected in series, parallel and Siphon. Solving the two reservoir problem, three-reservoir problem and Pipe Network analysis.	**5**
Module 5: Boundary Layer Theory	**Hrs.**
Concept of boundary layer, Development of boundary layer on a flat plate, different thickness. Drag and lift of submerged bodies, Hydro dynamically smooth and rough boundaries, Boundary layer	**3**

Title of the Course: **Building Materials and Construction (5CV203)**	L	T	P	Cr
	3	-	-	3

Pre-Requisite Courses: Nil

Textbooks:

1. R. K. Rajput, "Engineering Materials", S. Chand Publications, New Delhi, 2014.
2. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, "Building Construction" Laxmi Publications, 5th Edition, 2005.
3. Bindra and Arora, "Building Construction", Dhanpat Rai and Sons, 1997.

References:

1. P. C. Varghese, „Building Materials" PHI Learning, Eastern Economy Edition, 2nd Edition, 2015.
2. S. K. Duggal „Building Materials" New Age International, 3rd Edition, 2008,
3. Birdie and Ahuja, "Building Construction and Construction Materials", Dhanpat Rai and Sons, 4th Edition, 2012

Course Objectives : To impart to the class,

1. in-depth knowledge of the various construction materials and techniques in Building Construction.
2. the role played by various building components and their interactions for an integrated behavior of the building as a whole.
3. the representation of building components in terms of sketches and drawings.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	**Bloom's Cognitive**	
		Level	**Descriptor**
CO1	*Distinguish* the strengths and weaknesses of various building materials by assessing and comparing the quality parameters as per standards, and *interpret* their applications in building components in context to strength, durability and energy efficiency.	2, 3	Understand Apply
CO2	*Classify* the various components and their relationships in buildings of different structural systems and identify the materials and construction techniques to be adopted for different building components and systems to integrate design of cost-effective and energy efficient buildings.	2, 3, 4	Understand Apply Analyze
CO3	*Illustrate* the various building components in terms	3	Apply

CO-PO Mapping :

PO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**PSO 1**	**PSO 2**
CO1		3					1						2	2
CO2			3				1						2	1
CO3			2										2	1

CO1: *is mapped to PO 2 (strongly) as the candidate will have to attain this outcome by understanding through literature search, the various civil engineering materials (historical devp., types based on*

Title of the Course:	L	T	P	Cr
Engineering Geology (5CV204)	2	-	-	2

Pre-Requisite Courses: Nil

Textbooks:

1. K. M. Bangar.,"Principles of Engineering Geology", Standard Publishers Distributors 1705-B Nai Sarak, Delhi
2. N. Chenna Kesavulu, "Textbook of Engineering Geology",Macmillian India Ltd. 2/10 Ansari Road Daryanganj, New Delhi.
3. Parbin Singh, "Engineering and General Geology", S. K. Katariya and Sons, Delhi.,1984, 1st Edition.

References:

1. Subinoy Gangopadhy, "Engineering Geology", Oxford University Press, New Delhi, 2017, 5th Edition.
2. A. Holmes, "Principles of Physical Geology", ELBS Chapman and Hall, London.
3. Dr. D. V. Reddy "Engineering Geology for Civil Engineering", Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 1995, 1st Edition.

Course Objectives :

1. Introduce students the necessary knowledge and concepts in the field of geology and to develop the sense of Engineering Geology among civil engineering students.
2. Introduce the technique of recognizing, classifying and describing various geological event and phenomena.
3. Enable students to understand geological problem before undertaking any civil engineering Project.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		Level	Descriptor
CO1	*Describe* the geological phenomena especially in the field of physical geology, mineralogy, petrology, structural Geology.	2	Understanding
CO2	*Describe* and *explain* the surface and subsurface methods of preliminary geological investigations.	2	Understanding
CO3	Use the knowledge of geology to *recognize* and *identify* geological phenomena and *apply* in civil engineering.	3	Applying

CO-PO Mapping :

PO	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
CO1	2												1	2
CO2	2				2				1	2			2	2
CO3	2		1	1					1	2			2	2

Assessments : Teacher

Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10

Title of the Course: **Engineering Surveying (5CV205)**	L	T	P	Cr
	3	-	-	3

Pre-Requisite Courses: Nil

Textbooks:

1. B. C. Punmia and Jain, "Surveying", Vol. 1, 2 & 3, Laxmi Publications, 17th edition, 2015, New Delhi.
2. N. N. Basak, "Surveying and Levelling", Tata Mcgraw Hill Education Pvt. Ltd, 2nd Edition, 2017, New Delhi.
3. K. R. Arora "Surveying", Vol. 1 & 2, Standard Book House, 16th edition, 2018, Kota.

References:

1. Duggal S. K, "Surveying", Tata Mcgraw Hill Education Pvt Ltd, 4th edition, 2017, Delhi.
2. Bannister and Raymond, "Surveying", ELBS, Longman Group Ltd., England.
3. R. E. Davis, F. Foote and J. Kelly, "Surveying; Theory and Practice", McGraw Hill Book Company, New York.

Course Objectives :

1. To impart basic principles of conventional surveying through class instructions.
2. To develop a basic understanding of computations made in topographic mapping, and land Surveys.
3. To develop an ability to analyze land profiles in logical manner and will be able to apply well understood principles in planning and design of engineering structures on the Earth's surface.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	**Bloom's Cognitive**	
		Level	**Descriptor**
CO1	***Apply*** their knowledge to evaluate alternate surveying techniques suitable for scope of the project and site situation.	3	Applying
CO2	***Identify*** Surveying equipment, work in team, collect and ***analyze*** the topographical data with due consideration to systematic errors, random errors and blunders.	4	Analyzing
CO3	***Perceive*** modern surveying equipment and techniques	2	Understanding

CO-PO Mapping :

PO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**PSO1**	**PSO2**
CO1	3												1	1
CO2		2			1				2				1	1
CO3					3									1

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	**Marks**
ISE 1	10
MSE	30
ISE 2	10
ESE	50

Title of the Course:	L	T	P	Cr
Solid Mechanics (5CV206)	2	1	--	3

Pre-Requisite Courses: Engineering Mechanics

Textbooks:

1. Hibbeler R. C., "Mechanics of Materials", Pearson Education, 10th Edition, 2016.
2. Popov E. B., "Mechanics of Materials", Pearson Education, 2nd Edition, 2015.
3. Gere and Timoshenko, "Mechanics of Materials", CBS publishers, 2nd Edition, 2004.

References:

1. Beer and Johnston, "Mechanics of Material", Tata McGraw Hill publication, 7th Edition, 2014.
2. Andrew Pytel and Jaan Kiusalaas, "Mechanics of Materials", Cengage Learning, USA, 2nd Edition, 2011.
3. Timoshenko. S. & Young. D. H, "Strength of Material", McGraw Hill Book Company Publication, 4th Edition, 2006.

Course Objectives :

1. To impart the basic concepts of stress and strain in elastic body.
2. To illustrate internal effects and deformations caused by the various applied loads.
3. To provide the knowledge of stability analysis, shear and bending stress distribution for the analysis and design aspects of structural engineering.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		Level	Descriptor
CO1	**Explain** state of stress-strain and internal forces in elastic bodies.	2	Understanding
CO2	**Solve** problems on structures to find internal forces.	3	Applying
CO3	**Analyze** different stresses in structural members.	4	Analyzing

CO-PO Mapping :

PO	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
CO1	2													2
CO2	3	3												2
CO3	2	3												2

Assessments : Teacher

Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30

Title of the Course: **Fluid Mechanics Laboratory (5CV252)**	L	T	P	Cr
	0	0	2	1

Pre-Requisite Courses:

Engineering Physics , Fluid Mechanics

Textbooks:

1. RangarajuK.G., "Flow in Open Channels", Tata McGraw Hill Publication Co. Ltd., New Delhi,1st Edition,1993.
2. Aswa G.L., "Experimental Fluid Mechanics", Vol. I & II, Nem Chand & Bros., Roorkee,1st Edition,1983.
3. Likhi, S.K., "Hydraulics: Laboratory Manual", New Age International Publishers, 1stEdition, 1995.

References:

1. Modi P.M. and Seth S.M., "Hydraulics and Fluid Mechanics", Standard Book House, 9th Edition,2013.
2. Subramanya K.,"Theory and Applications of Fluid Mechanics" Tata McGraw Hill Publishing Co., Ltd., 7thEdition2000.
3. VenTe Chow,"Open channel Hydraulics", Tata McGraw Hill Publishing, 1st Edition,2000.

Course Objectives :

1. To provide students hands-on practice for measurement of viscosity, pressure and discharge by using measuring devices.
2. To develop the skill required for applying knowledge to analysis of flow in pipe.
3. To develop the skill required for applying knowledge to estimate the losses in pipe flow.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		Level	Descriptor
CO1	***Determine a viscosity*** of oil and metacentric height of ship model, ***measure*** the pressure using measuring devices ofthe pipe flow.	2	Understanding
CO2	***develop*** the flow pattern by using electrical analogy method	3	Applying
CO3	***Demonstratethe*** different type of flow through Reynolds number, discharge and losses in pipe flow.	4	Analyzing

CO-PO Mapping : (Use 1, 2, 3 as Correlation Strengths)

PO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**PSO1**	**PSO2**
CO1				1									**1**	**1**
CO2				**2**									**2**	**2**
CO3				2									**2**	**2**

Title of the Course: **Building Materials and Construction Laboratory (5CV253)**	L	T	P	Cr
	-	-	2	1

Pre-Requisite Courses: Exposure to theory course in Building Materials and Construction

Textbooks:

1. M L Gambhir; Neha Jamwal, Building and Construction Materials: Testing and Quality Control, Tata McGraw-Hill Education, 2014
2. Mantri Institute"s „The A to Z of Practical Building Construction and its Management" Mantri Institute of Devp. and Research. Pune, Published by Satya Prakashan, 2011

References:

1. Shetty M. S., "Concrete Technology", S. Chand & Company Ltd. New Delhi, 7th Edition, 2013.
2. IS 3495, IS 1077, IS 2386, IS 383, Bureau of Indian Standards, New Delhi.
3. Material Testing-lab-manual.pdf: http://site.iugaza.edu.ps/mymousa/files/Material_-Testing-lab-manual.pdf

Course Objectives :

1. To involve students in hands on laboratory activities to evaluate the properties of basic construction materials.
2. To engage students in visits to ongoing construction sites to appreciate/relate the classroom learning"s and also get an exposure to new developments in the construction industry.
3. To update students about the perennial changing costs and quality of building materials through market surveys.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		Level	Descriptor
CO1	Evaluate and compare the quality parameters, the strengths and weaknesses of basic building materials by demonstration of experiments to justify acceptance or rejection for application.	5	Evaluate
CO2	Perceive by physical observation the complexities and skills involved in actual construction process so that they can demonstrate the various building components in terms of building drawings and can apply in similar situations in future.	3	Apply
CO3	Differentiate and compare the quality of various building materials of different brands and reproduce unit cost through market surveys.	2	Understand

CO-PO Mapping :

PO	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
CO1	1			2	3								2	1
CO2				2									2	1
CO3				2									2	

Title of the Course:	L	T	P	Cr
Engineering Geology Laboratory (5CV254)	-	-	2	1

Pre-Requisite Courses:

Textbooks:

1. K. M. Bangar.,"Principles of Engineering Geology", Standard Publishers Distributors 1705-B Nai Sarak, Delhi
2. N. Chenna Kesavulu, "Textbook of Engineering Geology", Macmillian India Ltd. 2/10 Ansari Road Daryanganj, New Delhi.
3. Parbin Singh, "Engineering and General Geology", S. K. Katariya and Sons, Delhi, 1984, 1st Edition.

References:

1. M. S. Krishnan, "Geology of India and Burma", CBS Publishers & Distributors
2. A. Holmes, "Principles of Physical Geology", ELBS Chapman and Hall, London.
3. Dr. D. V. Reddy "Engineering Geology for Civil Engineering", Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 1995, 1st Edition.

Course Objectives :

1. Introduce students the properties of Minerals and Rocks and enable them to identify them.
2. Introduce them technique of drawing the cross sections from given geological outcrop maps of various types, solving structural geology problems.
3. Enable students to understand geological problem with the help of subsurface investigation data.
4. Introduce students the stratigraphic formations of India with more emphasis on Maharashtra with the geological maps.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		Level	Descriptor
CO1	*Identify* and *describe* the given mineral and rock specimen.	2	Understanding
CO2	*Construct* cross section from given geological outcrop map and *solve* any structural geology problem and *interpret* the same for civil engineering decision making	3	Applying
CO3	*Summarize* the core logging from the recovered core data and *Interpret* the subsurface conditions by correlating the same.	3	Applying

CO-PO Mapping :

PO	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
CO1	1								1	1			1	2
CO2	1	2		1					1	1			1	1
CO3	1	2		1					1	1			1	1

Title of the Course:	L	T	P	Cr
Surveying Laboratory (5CV255)	-	-	2	1

Pre-Requisite Courses: Engineering Surveying

Textbooks:

1. B. C. Punmia and Jain "Surveying", Vol.1, 2 & 3, Laxmi Publications, 17th edition, 2015, New Delhi.
2. N. N. Basak, "Surveying and Levelling", Tata Mcgraw Hill Education Pvt Ltd, 2nd edition , 2017, New Delhi.
3. K. R. Arora "Surveying", Vol.1 & 2, Standard Book House, 16th edition, 2018, Kota.

References:

1. Duggal S. K, "*Surveying"*, Tata Mcgraw Hill Education Pvt Ltd, 4th edition, 2017, Delhi.
2. Bannister and Raymond, "*Surveying"*, ELBS, Longman Group Ltd., England.
3. R.E. Davis, F. Foote and J. Kelly, "*Surveying; Theory and Practice"*, McGraw Hill Book Company, New York.

Course Objectives :

1. To study basic surveying techniques through field exercises.
2. To develop and retain a basic understanding of site selection, locational survey, horizontal and vertical control establishment in the field with computations made in land Surveys.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		Level	Descriptor
CO1	***Implement*** appropriate surveying methodology	3	Applying
CO2	***Study*** topographic feature	4	Analyzing
CO3	***Verify*** suitability of site condition for major engineering project	5	Evaluating

CO-PO Mapping :

PO	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
CO1	1								2				1	
CO2				2					2				1	
CO3				2					2				1	

Assessments :

Lab Assessment:

There are four components of lab assessment, LA1, LA2, LA3 and Lab ESE.
IMP: Lab ESE is a separate head of passing.

Assessment	Based on	Conducted by	Conduction and Marks Submission	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 4 Submission at the end of Week 5	25
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 5 to Week 8 Submission at the end of Week 9	25
LA3	Lab activities, attendance, journal	Lab Course Faculty	During Week 10 to Week 14 Submission at the end of Week 14	25
Lab ESE	Lab Performance and related documentation	Lab Course faculty	During Week 15 to Week 18 Submission at the end of Week 18	25

Week 1 indicates starting week of Semester.
Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course.
The experimental lab shall have typically 8-10 experiments.

Title of the Course: Environmental Science (5IC201)	L	T	P	Cr
	2	-	-	0

Textbooks:

1. Mrinalini Pande, "Disaster Management", Wiley Publications New Delhi, First edition, 2014
2. N.K Uberoi, "Environmental Studies", Excel Books Publications New Delhi, first edition, 2005.
3. R.Rajagopalan, "Environmental Studies from crisis to cure" Oxford university press, second edition, 2011

References:

1. William. Cunningham and Barbara Woodworth Saigo, "Environmental Science: A Global Concern", WCB/McGraw Hill publication, 5th Edition, 1999.
2. Peter. H. Raven, Linda. R. Berg, George. B. Johnson, "Environment", McGraw Hill publication, 2nd -Edition, 1998.
3. Catherine Allan & George H. Stanley (Editors), "Adaptive Environmental Management", Springer Publications. 2009.

Course Objectives :

1. Infuse an understanding of the various environmental concepts on scientific basis in the functional area of Engineering and technology.
2. Provide a foundation to critically assess the approaches to pollution control, environmental and resource management, sustainable development, cleaner technologies, Environmental Legislation based on an understanding of the fundamental, environmental dimensions.
3. Inculcate the modern concept of green industry and the impact of excess human population, globalization, and climate change on the environment.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	**Bloom's Cognitive**	
		Level	**Descriptor**
CO1	Describe key concepts of Environmental science and their relationship to engineering.	II	Understanding
CO2	Explain ethical and legal responsibility of an engineer and his role in effective implementation of sustainable activities through EIA and EMS in the corporate sector.	II	Understanding
CO3	Predict impact of contemporary issues (Population Explosion, Climate change, Environmental pollution) on the environment.	II	Understanding

CO-PO Mapping :

PO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**PSO1**	**PSO2**
CO1						**2**	**2**							
CO2							**3**	**2**						
CO3							**2**							

Proposed Syllabus for S.Y.B.Tech (All branches)

Course: Probability and Statistics (5MA201)

Year: 2020-21

Module 1: Random Variable: **(4)**

Discrete random variable, Continuous random variable, probability mass function, cumulative distribution function, bivariate discrete random variable, joint probability distribution, joint distribution function of two dimensional discrete random variable.

Module 2: Probability Distribution: **(4)**

Gaussian distribution, Exponential distribution, Uniform distribution.

Module 3: Statistical Methods: **(5)**

Measure of Central tendency, Measure of dispersion, Range, Quartile deviation, Mean deviation, variance, Standard deviation, Coefficient of variance, moments, Symmetry, Skewness, Kurtosis, and Types of Kurtosis.

Module 4: Population and Sample: **(3)**

Introduction, Types of Characteristics: Attributes and variables, Collection and Organization of data, Population and sample, Methods of sampling.

Module 5: Exact Sampling Distribution: **(4)**

Chi- square distribution: definition and its properties, Student t- distribution: definition and its properties.

Module 6: Test of Hypothesis: **(7)**

Random samples, parameter, statistic, standard error of statistic, null and alternative hypothesis, critical region, level of significance, Types of error, large sample test, Small sample test.

References Book:

(1)Probability and Statistics for Engineers and Scientists by S.Ross.

Text books:

(1) Fundamental of Mathematical Statistics by Gupta and Kapoor.

(2) An Introduction to probability and statistics by Vijay Rohatgi.

Title of the Course: Applied Mathematics (5MA202)	L	T	P	Cr
	2	-	-	2

Pre-Requisite Courses: Engineering Mathematics I and Engineering Mathematics II

Textbooks:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley Eastern Limited Publication, 1978, 1st Edition.
2. P. N. and J. N. Wartikar, "A Text Book of Applied Mathematics, Vol I and II", Vidyarthi Griha Prakashan, Pune, 2006.
3. B .S. Grewal, "Higher Engineering Maths", Khanna Publication, 2005, 39th Edition

References:

1. Wylie C.R., "Advanced Engineering Mathematics", Tata McGraw Hill Publication, 1999, 8th Edition.
2. H. K. Dass, "Advanced Engineering Mathematics", S. Chand & Company Ltd., 1988, 1st Edition

Course Objectives :

1. To develop mathematical skills and enhance thinking power of students.
2. To introduce fundamental concepts of mathematics and their applications in engineering fields

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom"s Cognitive	
		Level	Descriptor
CO1	Explain mathematical concepts in engineering field.	2	Understanding
CO2	Use mathematical and computational methods to solve the problems in science and engineering field.	3	Applying

CO-PO Mapping :

PO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**PSO1**	**PSO2**
CO1	2													
CO2	2													

Assessments : Teacher

Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	**Marks**
ISE 1	10
MSE	30
ISE 2	10
ESE	50

Title of the Course: **Hydraulics and Hydraulics Machinery (5CV221)**	L	T	P	Cr
	3	0	0	3

Pre-Requisite Courses: Fluid Mechanics

Textbooks:

1. RangarajuK.G., "Flow in Open Channels", Tata McGraw Hill Publication Co. Ltd.,New Delhi, 1st Edition, 1993.
2. Modi P.M. and Seth S.M., "Hydraulics and Fluid Mechanics", Standard Book House, 9th Edition, 2013.
3. VenTe Chow, "Open channel Hydraulics", Tata McGraw Hill Publishing, 1st Edition, 2000.

References:

1. SubramanyaK. , "Flow in Open Channels" Tata McGraw-Hill Education, 7th Edition, 2009
2. Chanson "The Hydraulics of Open Channel Flow an Introduction", Wiley, 1st Edition, 2004.
3. A.K. Jain, "Fluid Mechanics", Khanna Publishers, 11th Edition,2013 .

Course Objectives :

1. To provide studentknowledgeon basic concepts of open channel flow.
2. To develop students skillsand applythe knowledge foranalysis of hydraulic jumps, uniform and gradually-varying flows.
3. To providestudent the knowledge of centrifugal pump and Pelton wheel turbine for its selection.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	**Bloom's Cognitive**	
		Level	**Descriptor**
CO1	*explain and distinguish* basic concept of open channel flow	1,2	*Remembering, Understanding*
CO2	*apply and analyze* the basic equations of open channel flow for surface profiles and energy dissipation system.	3,4	*Applying, Analyzing*
CO3	*analyze* the performance and working of pump and turbine	5	creating

CO-PO Mapping : (Use 1, 2, 3 as Correlation Strengths)

PO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**PSO1**	**PSO2**
CO1	**2**												**1**	**1**
CO2		**2**											**2**	**2**
CO3			**3**										**3**	**3**

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	**Marks**
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with60-70% weightage for course content (normally last

Title of the Course:	L	T	P	Cr
Building Planning and Design (5CV222)	2	0	0	2

Pre-Requisite Courses: Exposure to Building Materials and Construction

Textbooks:

1. Kumarswamy and Kameshwar Rao., "Building Planning and Design," Charotar Publications, 8th Edition, 2010
2. V. B. Sikka, Civil Engineering Drawing, S. K. Kataria and Sons, 7th Edition, 2015

References:

1. Pierce S Rowland, Planning: The Architect's Handbook „E. & OE", Iliffe Books Ltd. London, 1963, 8th Edition.
2. John Hancock Callender, Joseph De Chiara, "Time Saver Standards for Building Types", McGraw- Hill, New York, 1983.
3. National Building Code of India 2016 (NBC 2016) Volume 1 and 2, Bureau of Indian Standards, New Delhi, 2016.

Course Objectives : To make the class knowledgeable by sharing

1. Concepts in Building Planning and functional design.
2. Integration of aesthetical concepts and influence of climate in building design.
3. The art of expressing buildings in terms of drawings.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	**Bloom's Cognitive**	
		Level	**Descriptor**
CO1	*Perceive* the requirements of residential/public building in terms of structural, functional aspects and *apply* the principles of planning, bye Laws/regulations during planning process of buildings.	2, 3	Understand Apply
CO2	*Practice* the planning ideologies in buildings, in relevance to building services, climatology, acoustics and fire resistance.	3	Apply
CO3	*Design* buildings by composing functional and aesthetical aspects and *Illustrate* building graphically in terms of engineering drawings.	3, 6	Apply Create

CO-PO Mapping :

PO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**PSO1**	**PSO2**
CO1		3											1	
CO2			3				2						1	
CO3			3										2	

CO1: is mapped to PO 2 (strongly) as the candidate will have to attain this outcome by identifying and understanding the specific requirements, analyzing as per the clients requirements and applying his/her planning knowledge in formulating the building design.

CO2: is mapped only to PO 3 (strongly) as this outcome caters the candidate to exhibit his/her knowledge

Title of the Course: Water Resource Engineering (5CV223)	L	T	P	Cr
	2	1	0	3

Pre-Requisite Courses:

Textbooks:

1. S.K. Garg, "Water resources Engg. Vol. I, Hydrology & water resources Engg.", Khanna publisher, Delhi,15th edition (2010)
2. M.J. Deodhar, " Elementary Engineering Hydrology", Pearson Education, 1st Edition(2009)
3. S.K. Garg, "Water resources Engg. Vol. II, Irrigation Engineering & hydraulic Structures",Khanna publisher, Delhi,24th edition (2011)

References:

1. H.M. Raghunath,"Hydrology: principles, analysis, design", New Ace International (P) Limited, Publishers, 2nd edition.
2. B. C. Punmia, PandeBrijBasiLal, Arun Kumar Jain, Ashok Kumar Jain, "Irrigation and Water Power Engineering",Laxmi Publications, 16th edition(2009).
3. Asawa G.L., "Irrigation and Water Resources Engineering", New Age International Publishers,1st edition (2005).

Course Objectives :

1. To impart basic knowledge of fundamental concepts of Engineering Hydrology.
2. To impart fundamentals of Irrigation Engineering and watershed management and their relevance to sustainability.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		Level	Descriptor
CO1	**Explain** basic concepts of hydrologic cycle, aquifers, irrigation systems, watershed management.	2	Understanding
CO2	**Describe** prevailing irrigation water management practices, types of minor irrigation, government laws and water policy.	2	Understanding
CO3	**Analyze** precipitation data and **solve** problems related to hydrograph, aquifers, irrigation, water requirement and crop yield.	3 4	Applying Analyzing
CO4	**Design** canal structures and rainwater harvesting system.	6	Creating

CO-PO Mapping :

PO	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
CO1	1													2
CO2	1													2
CO3			3										2	2
CO4			3										2	2

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Title of the Course:	L	T	P	Cr
Structural Analysis (5CV224)	2	1	--	3

Pre-Requisite Courses: Solid Mechanics.

Textbooks:

1. Devdas Menon, "Structural Analysis", Alpha Science Intl, Ltd., 2nd Edition, 2008.
2. Pandit & Gupta, "Structural Analysis - Matrix Approach", Tata McGraw-Hill Publishing Company Ltd., New Delhi, 4th Edition, 2004.
3. Bhavikatti S. S., "Matrix Methods of Structural Analysis", I. K. International Publishing house Pvt. Ltd., 1st Edition, 2003.

References:

1. Hibbeler R. C., "Mechanics of Materials", Pearson Education, 10th Edition, 2016.
2. Weaver and Gere J. M., "Matrix Analysis of Framed Structures", CBS Publications and Distributors, 2nd Edition, 2004.
3. Wang C. K., "Indeterminate Structural Analysis", Tata McGraw-Hill Publishing Company Ltd., New Delhi, 1st Edition, 1983.

Course Objectives :

1. To illustrate concept of static and kinematic indeterminacy of structures.
2. To provide the knowledge of various methods to evaluate deformations of various structures.
3. To impart the knowledge for analyzing determinate and indeterminate structures by using various methods.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		Level	**Descriptor**
CO1	**Perceive** behavior of statically determinate and Indeterminate structures.	2	Understanding
CO2	**Apply** various techniques of structural mechanics to Solve determinate and indeterminate structures.	3	Applying
CO3	**Analyze field** structures using various approaches in Structural mechanics.	4	Analyzing

CO-PO Mapping :

PO	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
CO1	2	1												2
CO2	3	3												3
CO3	3	3											1	2

Assessments : Teacher

Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10

Title of the Course: **Concrete Technology (5CV225)**	L	T	P	Cr
	2	-	-	2

Desirable Courses: Building Materials and Construction.

Textbooks:

1. Gambhir, M. L., "Concrete Technology", Tata Mc Graw Hill Publishers, 2012.
2. Nevelli, A.M., "Properties of Concrete", Prentice Hall Publishers, 5th Edition, 2012.
3. Shetty, M. S., "Concrete Technology", S. Chand and Company Ltd, New Delhi, 2014.

References:

1. Indian codes- IS: 456-2000, IS: 2250-1981, IS: 516-1959, IS: 5816 -1999, IS: 4031(Part 6) - 1988.
2. Bhavikatti .S.S "Concrete Technology",I.K. International Pvt.Ltd. Kindle Edition 1st Edition 2015
3. Santhakumar, A. R. "Concrete Technology", Oxford University Press, second edition, 2018.

Course Objectives:

1. To provide knowledge of quality assessment of concrete through laboratory and field tests.
2. To impart the knowledge of concrete mix design.
3. To illustrate various types of special concretes and its field applications.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	**Bloom's Cognitive**	
		Level	**Descriptor**
CO1	**Explain** the functional role of ingredients and admixtures in conventional and special concrete.	IV	Analyzing
CO2	**Discuss** various properties of fresh and hardened concrete.	V	Understanding
CO3	**Design** concrete mix for various grades of concrete.	VI	Creating

CO-PO Mapping :

PO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**PSO1**	**PSO2**
CO1	**3**													**2**
CO2	**2**													**2**
CO3			**3**										**2**	**3**

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	**Marks**
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with 60-70% weightage for course content (normally last three modules) covered after MSE.

Title of the Course:	L	T	P	Cr
Hydraulics Laboratory (5CV271)	0	0	2	1

Pre-Requisite Courses: Fluid Mechanics and Hydraulics

Textbooks:

1. RangarajuK.G., "Flow in Open Channels", Tata McGraw Hill Publication Co. Ltd., New Delhi, 1st Edition, 1993.
2. Aswa G.L. "Experimental Fluid Mechanics", Vol. I&II, Nem Chand & Bros., Roorkee,1stEdition,1983.
3. Likhi, S.K., "Hydraulics: Laboratory Manual", New Age International Publishers, 1st Edition, 1995.

References:

1. P.M. Modi and Seth S.M., "Hydraulics and Fluid Mechanics", Standard Book House, 9th Edition,2013.
2. SubramanyaK.,"Theory and Applications of Fluid Mechanics" Tata McGraw Hill Publishing Co., Ltd., 7th Edition2000.
3. VenTe Chow,"Open channel Hydraulics", Tata McGraw Hill Publishing, 1st Edition,2000.

Course Objectives :

1. Explore the fundamental principles of fluid mechanics through experimentation
2. Demonstrate and analyze key hydraulic phenomena using hands-on physical devices
3. To provide students' knowledge about the working of centrifugal pump and Pelton wheel turbine.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		Level	Descriptor
CO1	***Compute*** velocity and manning's constant forthe open channel flow and apply knowledge for analysis uniform and non-uniform flow.	2	Understanding
CO2	***demonstrate***the flow measuring devices for the open channel flow and apply the knowledge for analysis of uniform flow and non uniform flow	2,3	Applying
CO3	***analyze***the performance and working of centrifugal pump and Pelton wheel turbine.	4	Analyzing

CO-PO Mapping : (Use 1, 2, 3 as Correlation Strengths)

PO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**PSO1**	**PSO2**
CO1				1									**1**	**1**
CO2				**2**									**2**	**2**
CO3				3									**2**	**2**

Assessments :

Lab Assessment:

Title of the Course: **Mini Project 1 - Building Planning and Design- (5CV272)**	L	T	P	Cr
	-	-	2	1

Pre-Requisite Courses: Exposure to course in Basic Materials and Construction

Textbooks:

1. N. Kumarswamy and A. Kameshwar Rao., "Building Planning and Design," Chraotar Publishing House Pvy. Ltd., 8th edition, 2010.
2. V. B. Sikka, A Course in Civil Engineering Drawing, S. K. Kataria and Sons, 7th Edition, 2015.
3. National Building Code of India 2005 and SP- 7, Bureau of Indian Stds. 2nd Edition.

References:

1. Pierce S Rowland, Planning: The Architect's Handbook "E. & OE", Iliffe Books Ltd. London
2. Callender, Time saver's standard's of Architectural design data, Tata Mc Graw Hill Pub.
3. Shah, Kale & Patki, "Building drawing with Integrated approach", Tata Mc Graw Hill Pub.
4. S. C. Agarwal, "Architecture and Town Planning".

Course Objectives : To impart the class

1. the approach to functionally plan and design a typical building by applying concepts of principal of planning and implementation of byelaws.
2. necessary knowledge to apply the various building services viz. plumbing, electrification and furniture within the buildings.
3. awareness of aesthetics and architectural ornamentation in buildings through engineering drawings.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	**Bloom's Cognitive**	
		Level	**Descriptor**
CO1	***Comprehend*** the requirements of residential/public building in terms of structural, functional, architectural aspects and apply the principles of planning, bye laws during planning process and designing buildings.	2, 3, 6	Understand, Apply,
CO2	***Perceive and apply*** different building services namely, water supply, drainage facilities and electrification services.	2, 3	Understand Apply
CO3	Communicate and interact as a team to ***apply*** the drawing techniques and ***compose*** buildings using conventional and modern tools.	3, 6	Apply, Design

CO-PO Mapping : (Use 1, 2, 3 as Correlation Strengths)

PO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**PSO 1**	**PSO2**
CO1		2	3										2	
CO2			2				3						2	
CO3	2				2				1	1			2	

CO1: *is mapped to PO's 2 moderately as the candidate will have to attain this outcome by* identifying *a specific building type, formulate its requirements by visiting existing buildings of such types and is further expected to apply the planning concepts using principles of engineering sciences* in *consideration for the*

Title of the Course:	L	T	P	Cr
Advanced Surveying Laboratory (5CV274)	-	-	2	1

Pre-Requisite Courses:

Engineering Surveying (4CV205) and Engineering surveying Laboratory (4CV253)

Text Books:

1. B. C. Punmia and Jain "Surveying", Vol.1, 2 & 3, Laxmi Publications, 17th edition, 2015, New Delhi.
2. N. N. Basak, "Surveying and Levelling", Tata Mcgraw Hill Education Pvt Ltd, 2nd edition , 2017, New Delhi.
3. K.R. Arora "Surveying", Vol.1 & 2, Standard Book House, 16th edition, 2018, Kota.

References:

1. Duggal S. K, "Surveying", Tata Mcgraw Hill Education Pvt Ltd, 4th edition, 2017, Delhi.
2. Bannister and Raymond, "Surveying", ELBS, Longman Group Ltd., England.
3. R.E. Davis, F. Foote and J. Kelly, "Surveying; Theory and Practice", McGraw Hill Book Company, New York.

Course Objectives:

1. To study advanced surveying techniques through field exercises.
2. To develop and retain a basic understanding of employing special functions of advanced survey instruments for land Surveys.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		Level	Descriptor
CO1	***Implement*** appropriate surveying functions available with digital level, digital theodolite, auto reduction tacheometer and total station	3	Applying
CO2	***Study*** topographic feature	4	Analyzing
CO3	***Verify*** suitability of special functions for major engineering project	5	Evaluating

CO-PO Mapping :

PO	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
CO1	**1**				**3**				**2**				**1**	
CO2				**2**					**2**				**1**	
CO3				**2**					**2**				**1**	

Assessments

Teacher Assessment:

There are four components of lab assessment, LA1, LA2, LA3 and Lab ESE.
IMP: Lab ESE is a separate head of passing.

Assessment	Based on	Conducted by	Conduction and Marks Submission	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 4 Submission at the end of Week 5	25
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 5 to Week 8 Submission at the end of Week 9	25
LA3	Lab activities, attendance, journal	Lab Course Faculty	During Week 10 to Week 14 Submission at the end of Week 14	25

Title of the Course: **Material Testing Lab (5CV275)**	L	T	P	Cr
	-	-	02	01

Pre-Requisite Courses: Solid Mechanics

Textbooks:

1. Hibbeler R. C., "Mechanics of Materials", Pearson Education, 10th Edition, 2016.
2. Popov E. B., "Mechanics of Materials", Pearson Education, 2nd Edition, 2015.
3. Gere and Timoshenko, "Mechanics of Materials", CBS publishers, 2nd Edition, 2004.

References:

1. Beer and Johnston, "Mechanics of Material", Tata McGraw Hill publication, 7th Edition, 2014.
2. Andrew Pytel and Jaan Kiusalaas, "Mechanics of Materials", Cengage Learning, USA, 2nd Edition, 2011.
3. Timoshenko. S. & Young. D. H, "Strength of Material", McGraw Hill Book Company Publication, 4th Edition, 2006.

Course Objectives :

1. To demonstrate laboratory experiments for testing of various building materials.
2. To conduct experiments to evaluate various properties of materials for quality control.
3. To provide the knowledge of permissible values of material properties as per codal requirements.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	**Bloom's Cognitive**	
		Level	**Descriptor**
CO1	**Explain** the methodology of conducting experiments on construction materials as per codal provisions.	2	Understanding
CO2	**Evaluate** the properties of construction materials by conducting Laboratory tests.	5	Evaluating
CO3	**Analyze** and **interpret** properties of construction materials for acceptance criteria.	4	Analyzing

CO-PO Mapping :

PO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**PSO1**	**PSO2**
CO1				1										1
CO2				2					2				1	2
CO3				3		1			3				1	2

Assessments :

Lab Assessment:

There are four components of lab assessment, LA1, LA2, LA3 and Lab ESE.
IMP: Lab ESE is a separate head of passing.

Assessment	Based on	Conducted by	Conduction and Marks Submission	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 4 Submission at the end of Week 5	25
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 5 to Week 8 Submission at the end of Week 9	25
LA3	Lab activities, attendance, journal	Lab Course Faculty	During Week 10 to Week 14 Submission at the end of Week 14	25
Lab ESE	Lab Performance and related documentation	Lab Course faculty	During Week 15 to Week 18 Submission at the end of Week 18	25

separation and its control.	
Module 6: Dimensional Analysis and model testing:	**Hrs.**
Dimensional analysis, Buckingham's theorem, Dimensionless numbers and their significance. Model similitude, Model laws, Theory and applications.	**4**
Moodle wise Outcomes: At end of each module students will be able to 1. Explain the properties of fluid, pressure measuring devices and computethe hydrostatic forces acting on different plane. 2. Explain fluid Kinematics and apply the knowledge forsolving problem ofthe pipe flow system. 3. Explain thefluid dynamics and applythe knowledge for solving the pipe flow system. 4. Explain the laminar and turbulent flow and apply the knowledge for solving the problem of water distribution pipe network system. 5. Explain the boundary layer formation theory and its applications. 6. Explain thedimensionless numbersand apply for model simulation.	
Tutorials: Problems on following topics will be covered in tutorial hours; 1. The properties of fluid, pressure measuring devices and computethe hydrostatic forces acting on different plane. 2. Fluid Kinematics and apply the knowledge for solving problem of the pipe flow system. 3. The fluid dynamics and apply the knowledge for solving the pipe flow system. 4. The laminar and turbulent flow and apply the knowledge for solving the problem of water distribution pipe network system. 5. The boundary layer formation theory and its applications. 6. The dimensionless numbers and apply for model simulation.	