NARAYANA ENGINEERING COLLEGE::NELLORE

AUTONOMOUS

B.Tech-Civil Engineering

Course Structure

&

SYLLABUS

(2021-22 academic year)

(NECR B.Tech 21)

(w.e.f AY: 2021-22)

NARAYANA

ENGINEERING COLLEGE

(AUTONOMOUS)

NARAYANA ENGINEERING COLLEGE::NELLORE

AUTONOMOUS

INSTITUTE VISION & MISSION

VISION

- To be one of the nation's premier Institutions for Technical and Management Education and a key contributor for Technological and Socio-economic Development of the Nation.

MISSION

- To produce technically competent Engineers and Managers by maintaining high academic standards, world class infrastructure and core instructions.
- To enhance innovative skills and multi disciplinary approach of students through well experienced faculty and industry interactions.
- To inculcate global perspective and attitude of students to face real world challenges by developing leadership qualities, lifelong learning abilities and ethical values.

DEPARTMENT OF CIVIL ENGINEERING

DEPARTMENT VISION & MISSION

VISION OF THE DEPARTMENT

To entrust civil engineers to society for creating a sustainable world and enhance the global quality of life.

MISSION OF THE DEPARTMENT

1. To adopt practical oriented teaching - learning practices for mastery of fundamentals, versatility of mind, motivation for learning among each student.

2. To impart leadership quality, professional ethics, environmental consciousness and social responsibilities through co-curricular and extra-curricular activities.

3. To have extensive interactions with industry for sharing knowledge and practices through collaborations and extension activities.

PEOs, POs, PSOs

POs

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PEOs

PEO 1: Apply knowledge in emerging areas of Civil Engineering to handle the realistic problems.

PEO 2: Relate engineering issues to broader social and human context, in which their engineering contributions will be utilized.

PEO 3: Graduates will exhibit managerial skills and social responsibility in their profession and adapt to current trends.

PSOs

PSO_1: Domain Specific Knowledge: Apply the relevant techniques to plan, analyze and design Civil Structures.

PSO_2: Product Development: Design and deployment of principles to create a new technology for the success of business.

NARAYANA ENGINEERING COLLEGE::NELLORE
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DEPARTMENT OF CIVIL ENGINEERING

R21- Course Structure for B.Tech CIVIL w.e.f AY:2021-22

SEMESTER I

Course Code	Category	Course Title	Contact Periods per week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
21MA1001	BS	Algebra and Calculus	3	1	0	4	4	40	60	100
21CH1002	BS	Chemistry for Civil Engineering	3	0	0	3	3	40	60	100
21ES1001	ES	Problem Solving and Programming	3	0	0	3	3	40	60	100
21EN1001	HS	English	2	0	0	2	2	40	60	100
21CH1502	BS	Chemistry for Civil Engineering Lab	0	0	3	3	1.5	40	60	100
21ES1503	ES	Engineering Graphics	0	1	4	5	3	40	60	100
21ES1501	ES	Problem Solving and Programming Lab	0	0	3	3	1.5	40	60	100
21EN1501	HS	English Language Lab	0	0	3	3	1.5	40	60	100
21MC8001	MC	Mandatory course I : Induction Program	Induction Program							
		Counseling/Mentoring	0	0	1	1	0	--	--	--
		Sports/Hobby Clubs/Activities	0	0	2	2	0	--	--	--
		Activity Point Programme	During the Semester					20 Points		
		Total	**11**	**2**	**16**	**29**	**19.5**	**320**	**480**	**800**

SEMESTER II

Course Code	Category	Course Title	Contact Periods per week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
21PH1002	BS	Physics for Civil Engineering	3	0	0	3	3	40	60	100
21MA1003	BS	Vector Calculus Complex Variables and Transforms	3	1	0	4	4	40	60	100
21ES1007	ES	Building Material Science	2	0	0	2	2	40	60	100
21ES1008	ES	Engineering Mechanics	3	1	0	4	4	40	60	100
21PH1502	BS	Physics for Civil Engineering lab	0	0	3	3	1.5	40	60	100
21ES1510	ES	Engineering workshop	0	0	3	3	1.5	40	60	100
21ES1511	ES	IT workshop	0	0	3	3	1.5	40	60	100
21ES1512	ES	Building Material Science lab	0	0	2	2	1	40	60	100
21EN1502	HS	Communication skills lab	0	0	2	2	1	40	60	100
21MC8002-13	MC	Mandatory course II	2	0	0	2	0	--	--	--
		Counseling/Mentoring	0	0	1	1	0	--	--	--
		Sports/Hobby Clubs/Activities	0	0	2	2	0	--	--	--
		Activity Point Programme	During the Semester					20 Points		
		Total	**13**	**2**	**16**	**31**	**19.5**	**360**	**540**	**900**

SEMESTER III

Course Code	Category	Course Title	Contact Periods per week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
21MA1006	BS	Probability Statistics and Numerical Methods	3	0	0	3	3	40	60	100
21ES1009	ES	Mechanics of Fluids	3	0	0	3	3	40	60	100
21CE2001	PC	Building Construction and Planning	3	0	0	3	3	40	60	100
21CE2002	PC	Mechanics of Solids	3	0	0	3	3	40	60	100
21CE2003	PC	Surveying - I	3	0	0	3	3	40	60	100
21EN1002	HS	Universal Human Values	3	0	0	3	3	40	60	100
21CE2501	PC	Building drawing	0	0	3	3	1.5	40	60	100
21CE2502	PC	Mechanics of Solids lab	0	0	3	3	1.5	40	60	100
21CE2503	PC	Surveying- I Lab	0	0	3	3	1.5	40	60	100
21CD6001	SC	Career competency Development - I	0	0	2	2	1	40	60	100
21CC6001	SC	Value added course/Certificate course- I	0	0	0	0	1	40	60	100
		Counseling/Mentoring	0	0	1	1	0	--	--	--
		Sports/ Hobby Clubs/ Activities	0	0	2	2	0	--	--	--
		Activity Point Programme	During the Semester					20 Points		
		Total	**18**	**0**	**14**	**32**	**24.5**	**440**	**660**	**1100**

SEMESTER IV

Course Code	Category	Course Title	Contact Periods per week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
21CE2004	PC	Concrete Technology	3	0	0	3	3	40	60	100
21CE2005	PC	Hydraulics & Hydraulic Machinery	3	0	0	3	3	40	60	100
21CE2006	PC	Structural Analysis	3	0	0	3	3	40	60	100
21CE2007	PC	Surveying - II	3	0	0	3	3	40	60	100
	OE	Open elective I	3	0	0	3	3	40	60	100
21CE2504	PC	Hydraulics& Hydraulic Machinery lab	0	0	3	3	1.5	40	60	100
21CE2505	PC	Structural Analysis practice	0	0	3	3	1.5	40	60	100
21CE2506	PC	Surveying –II Lab	0	0	3	3	1.5	40	60	100
21CD6002	SC	Career competency Development II	0	0	2	2	1	40	60	100
21IC6001	SC	Industry Oriented Course I	0	0	0	0	1	100	00	100
21MC8002-13	MC	Mandatory course III	2	0	0	2	0	--	--	--
		Counseling/Mentoring	0	0	1	1	0	--	--	--
		Sports/Hobby Clubs/Activities	0	0	2	2	0	--	--	--
		Activity PointProgramme	During the Semester					20 Points		
		Total	**17**	**0**	**14**	**31**	**21.5**	**460**	**540**	**1000**

SEMESTER V

Course Code	Category	Course Title	Contact Periods per week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
21CE2008	PC	Design of Reinforced Concrete Structures	3	0	0	3	3	40	60	100
21CE2009	PC	Soil Mechanics	3	0	0	3	3	40	60	100
21CE2010	PC	Highway Engineering	2	0	0	2	2	40	60	100
	OE	Open elective II	3	0	0	3	3	40	60	100
20CE4001-5	PE	Professional Elective I	3	0	0	3	3	40	60	100
21CE2507	PC	Computer Aided Drafting of Buildings	0	0	3	3	1.5	40	60	100
21CE2508	PC	Concrete Tech and Highway Engineering lab	0	0	3	3	1.5	40	60	100
21CE2509	PC	Design of Reinforced Concrete Structures Practice	0	0	2	2	1	40	60	100
21CD6003	SC	Career competency Development III	0	0	2	2	1	40	60	100
21CC6002	SC	Value added course/Certificate Course II	0	0	0	0	1	40	60	100
21CE7501	PR	Internship I/on job training/ Com SerProject	0	0	0	0	1.5	00	100	100
		Counseling/ Mentoring	0	0	1	1	0	--	--	--
		Sports/Hobby Clubs/Activities	0	0	2	2	0	--	--	--
		Activity PointProgramme	During the Semester					20 Points		
		Total	**14**	**0**	**13**	**27**	**21.5**	**400**	**700**	**1100**

SEMESTER VI

Course Code	Category	Course Title	Contact Periods per week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
21CE2011	PC	Water Resources Engineering	2	0	0	2	2	40	60	100
21CE2012	PC	Environmental Engineering	2	0	0	2	2	40	60	100
21CE2013	PC	Foundation Engineering	3	0	0	3	3	40	60	100
	OE	Open Elective III	3	0	0	3	3	40	60	100
21CE4006-10	PE	Professional Elective II	3	0	0	3	3	40	60	100
21CE4011 -15	PE	Professional electiveIII	3	0	0	3	3	40	60	100
21CE2510	PC	Soil Mechanics Lab	0	0	3	3	1.5	40	60	100
21CE2511	PC	Environmental Engineering Lab	0	0	2	2	1	40	60	100
21CE2512	PC	CAD Lab	0	0	2	2	1	40	60	100
21CD6004	SC	Career competency Development IV	0	0	2	2	1	40	60	100
21IC6002	SC	Industry Oriented Course II	0	0	0	0	1	100	00	100
21MC8002-13	MC	Mandatory course IV	2	0	0	2	0	00	00	00
		Counseling/ Mentoring	0	0	1	1	0	--	--	--
		Sports/Hobby Clubs/Activities	0	0	2	2	0	--	--	--
		Activity Point Programme	During the Semester					20Points		
		Total	**18**	**0**	**12**	**30**	**21.5**	**500**	**600**	**1100**

SEMESTER VII

Course Code	Category	Course Title	Contact Periods per week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
21HS5001-05	HS	Humanities and Social Science Elective	2	0	0	2	2	40	60	100
21CE2014	PC	Design of steel structures	3	0	0	3	3	40	60	100
21CE2015	PC	Estimation and quantity surveying	3	0	0	3	3	40	60	100
-	OE	Open Elective IV	3	0	0	3	3	40	60	100
21CE4016-20	PE	Professional electiveIV	3	0	0	3	3	40	60	100
21CE4021-25	PE	Professional elective V	3	0	0	3	3	40	60	100
21CE2513	PC	Design of steel Structures Practice	0	0	2	2	1	40	60	100
21CE2514	PC	Estimation and quantity surveying Practice	0	0	3	3	1.5	40	60	100
21CD6005	SC	Career competency Development V	0	0	2	2	1	40	60	100
21CC6501	SC	Skill development Training	0	0	2	2	1	40	60	100
21CE7502	PR	Internship II/on job training/Com Ser Project	0	0	0	0	1.5	00	100	100
		Counseling/ Mentoring	0	0	1	1	0	--	--	--
		Sports/Hobby Clubs/Activities	0	0	2	2	0	--	--	--
		Activity Point Programme	During the Semester					20 Points		
		Total	**17**	**0**	**12**	**29**	**23**	**400**	**700**	**1100**

SEMESTER VIII

Course Code	Category	Course Title	Contact Periods per week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
21CE7503	PR	Project work, seminar and internship	0	0	0	0	12	60	140	200
		Total	**0**	**0**	**0**	**0**	**12**	**60**	**140**	**200**

OPENELECTIVES (OE) Offered by CIVIL Department

Department	Course Code	Open Elective
Civil Engineering	21CE3001	Disaster Management And Mitigation
	21CE3002	Green Buildings
	21CE3003	Air And Noise Pollution
	21CE3004	Watershed Management
	21CE3005	Environmental Impact Assessment
	21CE3006	Solid Waste Management
	21CE3007	Waste Water Engineering
	21CE3008	Water Supply Engineering
	21CE3009	Cost Effective Housing Techniques

PROFESSIONAL ELECTIVES (PE)

Elective Track/Group	Professional Elective-1	Professional Elective-2	Professional Elective-3	Professional Elective-4	Professional Elective-5
Structural Engineering	Green Buildings (20CE4001)	Advanced Concrete Technology (20CE4006)	Pre Stressed Concrete (20CE4011)	Bridge Engineering (20CE4016)	Finite Element Methods In Civil Engineering (20CE4021)
Transportation Engineering	Pavement Materials (20CE4002)	Air Port And Harbor Engineering (20CE4007)	Railway Engineering (20CE4012)	Advanced Transportation Engineering (20CE4017)	Urban Transportation Planning (20CE4022)
Environmental Engineering	Ecological Engineering (20CE4003)	Air And Noise Pollution (20CE4008)	Solid Waste management (20CE4013)	Industrial Waste water Treatment (20CE4018)	Environmental Impact Assessment (20CE4023)
Water Resources Engineering	River Engineering (20CE4004)	Irrigation Engineering (20CE4009)	Hydraulic Structures (20CE4014)	Ground Water Engineering (20CE4019)	Water Shed Management (20CE4024)
Geotechnical Engineering	Geotechnical Explorations (20CE4005)	Earthquake Engineering (20CE4010)	Ground Improvement Techniques (20CE4015)	Advanced Foundation Engineering (20CE4020)	Instrumentation & Sensor Technologies For Civil Engineering Applications (20CE4025)

LIST OF HONOR SUBJECTS

S.NO.	COURSE NAME	Course Code	CREDIT
1	Prefabricated Structures	21CEH001	4
2	Structural Optimization	21CEH002	4
3	Analytical Methods for Environmental Monitoring	21CEH003	4
4	Forensic Engineering for Civil Engineers	21CEH004	4
5	Urban Planning Techniques and Practices	21CEH005	4

LIST OF MINOR SUBJECTS

S.NO.	Course Name	Course Code	Credits
1	Mechanics of Solids	21CEM001	4
2	Surveying	21CEM002	4
3	Hydraulics and Hydraulic Machinery	21CEM003	4
4	Transport Engineering	21CEM004	4

Humanities and Social Science Elective

S. NO	SUBJECT	CREDITS
1	Managerial Economics & Financial Analysis	3
2	Management Science	3
3	E-Business	3
4	Organizational Behavior	3
5	Enterprise Resource Planning	3

HUMANITIES AND SOCIAL SCIENCES (HS)

SEMESTER	SUBJ ECT	Course Code	CREDITS
I	English	21EN1001	2
	English Language Lab	21EN1501	1.5
II	Communication skills lab	21EN1502	1
III	Universal Human Values	21EN1002	3
VII	Humanities and social Science Elective	21HS5001-08	2
Total			**9.5**

PROFESSIONAL ELECTIVES (PE)

SEMESTER	SUBJECT	Subject Code	CREDITS
V Sem	Professional Elective I	21CE4001-05	3
VI Sem	Professional Elective II	21CE4006-10	3
	Professional Elective III	21CE4011-15	3
VII Sem	Professional Elective IV	21CE4016-20	3
	Professional Elective V	21CE4021-25	3
TOTAL			**15**

OPENEL ECTIVES (OE)

SEMESTER	SUBJECT	CREDITS
IV Sem	Open Elective I	3
V Sem	Open Elective II	3
VI Sem	Open Elective III	3
VII Sem	Open Elective IV	3
	TOTAL	**12**

SKILL ORIENTED COURSE (SC)

SEMESTER	SUBJECT	Subject Code	CREDITS
III Sem	Career Competency Development I	21CD6001	1
	Value Added Course/Certificate Course I	21CC6001	1
IV Sem	Career Competency Development II	21CD6002	1
	Industry Oriented Course I	21IC6001	1
V Sem	Career Competency Development III	21CD6003	1
	Value Added Course/Certificate Course II	21CC6002	1
VI Sem	Career Competency Development IV	21CD6004	1
	Industry Oriented Course II	21IC6002	1
VII Sem	Career Competency Development V	21CD6005	1
	Skill Development Training	21CC6501	1
	TOTAL		**10**

PROJECT (PR)

SEMESTER	SUBJECT	Subject Code	CREDITS
V Sem	Internship I/on job training/Com Ser Project	21CE7501	1.5
VII Sem	Internship II/on job training/Com Ser Project	21CE7502	1.5
VIII Sem	Project work, seminar and internship	21CE7503	12
TOTAL			15

BASIC SCIENCES (BS)

SEMESTER	SUBJECT	Course Code	CREDITS
I	Algebra and Calculus	21MA1001	4
	Chemistry for Civil Engineering	21CH1002	3
	Chemistry for Civil Engineering Lab	21CH1502	1.5
II	Physics for Civil Engineering	21PH1002	3
	Vector Calculus, Complex Variables and Transforms	21MA1003	4
	Physics for Civil Engineering lab	21PH1502	1.5
III	Probability Statistics and Numerical Methods	21MA1002	3
	TOTAL		20

ENGINEERING SCIENCES (ES)

SEMESTER	SUBJECT	Course Code	CREDITS
I	Programming for Problem Solving	21ES1001	3
	Engineering Graphics Lab	21ES1503	3
	Programming for Problem Solving Lab	21ES1501	1.5
II	Building Material Science	21ES1007	2
	Engineering Mechanics	21ES1008	4
	Engineering workshop	21ES1510	1.5
	IT workshop	21ES1511	1.5
	Building Material Science lab	21ES1512	1
III	Mechanics of Fluids	21ES1012	3
	Total		20.5

PROFESSIONAL CORE (PC)

SEMESTER	Subject code	SUBJECT	CREDITS
III	**21CE2001**	Building Construction and Planning	**3**
	21CE2002	Mechanics of Solids	3
	21CE2003	Surveying - I	3
	21CE2501	Building drawing	1.5
	21CE2502	Mechanics of Solids lab	1.5
	21CE2503	Surveying – I Lab	1.5
		13.5	
IV	21CE2004	Concrete Technology	3
	21CE2005	Hydraulics& Hydraulic Machinery	3
	21CE2006	Structural Analysis	3
	21CE2007	Surveying - II	3
	21CE2504	Hydraulics& Hydraulic Machinery lab	1.5
	21CE2505	Structural Analysis practice	1.5
	21CE2506	Surveying- II	1.5
		16.5	
V	21CE2008	Design of Reinforced Concrete Structures	3
	21CE2009	Soil Mechanics	3
	21CE2010	Highway Engineering	2
	21CE2507	Computer Aided Drafting of Buildings	1.5
	21CE2508	Soil Mechanics Lab	1.5
	21CE2509	Design of Reinforced Concrete Structures Practice	1
		12	
VI	21CE2011	Water Resources Engineering	2
	21CE2012	Environmental Engineering	2
	21CE2013	Foundation Engineering	3
	21CE2510	Concrete Tech and Highway Engineering lab	1.5
	21CE2511	Environmental Engineering Lab	1
	21CE2512	CAD Lab	1
		10.5	
VII	21CE2014	Design of steel structures	3
	21CE2015	Estimation and quantity surveying	3
	21CE2513	Design of Steel Structures Practice	1
	21CE2514	Estimation and quantity surveying Practice	1.5
		8.5	
TOTAL			**61**

CREDITS PER SEMESTER

SL NO	SUBJECT AREA	CREDITS PER SEMESTER								CREDITS
		I	II	III	IV	V	VI	VII	VIII	
1	HS	3.5	1	3				2		9.5
2	BS	8.5	8.5	3						20
3	ES	7.5	10	3						20.5
4	PC			13.5	16.5	12	10.5	8.5		61
5	PE					3	6	6		15
6	OE				3	3	3	3		12
7	SC			2	2	2	2	2		10
8	PR					1.5		1.5	12	15
	TOTAL	**19.5**	**19.5**	**24.5**	**21.5**	**21.5**	**21.5**	**23**	**12**	**163**

NARAYANA ENGINEERING COLLEGE::NELLORE

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DEPARTMENT OF CIVIL ENGINEERING

R21- Course Structure for B.Tech CIVIL w.e.f AY:2021-22

SEMESTER I

Course Code	Category	Course Title	Contact Periods per week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
21MA1001	BS	Algebra and Calculus	3	1	0	4	4	40	60	100
21CH1002	BS	Chemistry for Civil Engineering	3	0	0	3	3	40	60	100
21ES1001	ES	Problem Solving and Programming	3	0	0	3	3	40	60	100
21EN1001	HS	English	2	0	0	2	2	40	60	100
21CH1502	BS	Chemistry for Civil Engineering Lab	0	0	3	3	1.5	40	60	100
21ES1503	ES	Engineering Graphics	0	1	4	5	3	40	60	100
21ES1501	ES	Problem Solving and Programming Lab	0	0	3	3	1.5	40	60	100
21EN1501	HS	English Language Lab	0	0	3	3	1.5	40	60	100
21MC8001	MC	Mandatory course I : Induction Program	Induction Program							
		Counseling/Mentoring	0	0	1	1	0	--	--	--
		Sports/Hobby Clubs/Activities	0	0	2	2	0	--	--	--
		Activity Point Programme	During the Semester					20 Points		
		Total	**11**	**2**	**16**	**29**	**19.5**	**320**	**480**	**800**

NARAYANA ENGINEERING COLLEGE::NELLORE							
	CHEMISTRY FOR CIVIL ENGINEERING						R21
Semester	Hours / Week			Total hrs	Credit	Max Marks	
	L	T	P		C	CIE	SEE	TOTAL
I	3	0	0	48	3	40	60	100

Pre-requisite: Basic concepts in chemistry, Advanced engineering materials, chemistry in day to day life, awareness on environment,

Course Objectives:

1. To familiarize chemistry for civil engineering and its applications.
2. To impart the concept of soft and hard waters, softening methods of hard water
3. To make the students to get awareness on environment.
4. To train the students on the principles and applications of advanced engineering materials.
5. To train the students on the principles and applications of soil chemistry.

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

CO 1	**Illustrate** the concepts of **water technology and its applications (BL-3)**
CO 2	**Demonstrate the corrosion prevention methods and factors affecting corrosion(BL-3)**
CO 3	**Understand various causes of pollution ,global warming, ozone depletion, and acid rain.(BL-2)**
CO 4	**Explain the setting and hardening of cement and concrete phase (BL-2)**
CO 5	**Classify various soils physical and chemical properties and their impacts.(BL-3)**

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3													
CO2	3		3											
CO3	3		3											
CO4	3													
CO5	3													

1: Low, 2-Medium, 3- High

COURSE CONTENT		
MODULE – 1	**WATER TECHNOLOGY**	**11 Hrs**

Water technology : Definition of hard and soft water, Sources of water and classification of impurities, Hardness and its types, Units of hardness, Determination of hardness of water by EDTA method, problems on hardness, Determination of Dissolved oxygen, acidity and alkalinity in water. Water softening processes –Zeolite process, Ion- exchange resin process

At the end of the Module 1, student will be able to:

1. **List** the differences between temporary and permanent hardness of water **(BL-1)**
2. **Illustrate** problems associated with hard water - scale and sludge. **(BL-3)**
3. **Explain** the working principles of different Industrial water treatment processes **(BL-2)**

MODULE -2	CORROSION AND ITS CONTROL	10 Hrs

Corrosion and its control: Corrosion – types of corrosion, mechanism of chemical, electrochemical corrosion - galvanic corrosion - differential aeration corrosion, Pilling Bed worth rule, factors influencing rate of corrosion. Corrosion control methods: Cathodic protection – sacrificial anodic method. Electro plating (copper plating) and electro less plating (Nickel plating).

At the end of the Module 2, students will be able to:

1. **Identify** the reasons for corrosion. **(BL-1)**
2. **Apply** Pilling Bed worth rule for corrosion and corrosion prevention **.(BL-3)**

MODULE-3	ENVIRONMENT CHEMISTRY	10 Hrs

Environment chemistry: Environment and Ecology, Environmental segments, Structure and composition of atmosphere. Atmospheric pollution: Tropospheric Pollution-Gaseous air pollutants- (a) Oxides of Sulphur (b) Oxides of Nitrogen (c) Hydrocarbons, Global Warming and Greenhouse Effect, Acid rain,Stratospheric Pollution- Ozone hole, Effects of depletion of the Ozone Layer. Chemical and photochemical reactions of various species in atmosphere. Water pollution- Causes, effects and control of Water Pollution.

At the end of the Module 3, students will be able to:

1. **To know** about the various sources of pollution.**(BL-2)**
2. **To know** about the various sources of air pollution.**(BL-2)**
3. **Summarize** the concepts of global warming ozone depletion**.(BL-2)**

MODULE-4	ADVANCED ENGINEERING MATERIALS	09Hrs

Advanced engineering materials :

Cement: Portland cement, constituents, Manufacture of Portland Cement, chemistry of setting and hardening of cement (hydration, hydrolysis equations).

Refractories : Definition, Classification with examples, properties of Refractory Material, Causes for the failure of a Refractory Material.

Lubricants: Functions of' lubricant, Types of Lubrication, Mechanism of lubrication, Properties of lubricants and tests.

At the end of the Module 4, students will be able to:

1. **Identify** the constituents of Portland cement **(BL-1)**
2. **Enumerate** the reactions at setting and hardening of the cement **(BL-1)**
3. **Identify** the factors affecting the refractory material **(BL-1)**
4. **Enumerate** the reactions at setting and hardening of the cement **(BL-1)**

MODULE-5	**SOIL CHEMISTRY**	**08Hrs**

Soil Chemistry: Chemical (elemental) composition of the earth's crust and soils. Types of soils, soil components (inorganic and organic), chemical properties of soil. Chemistry of soil acidity; active and potential acidity; lime potential, sub-soil acidity. Saline and alkaline soils-introduction, sources of soluble salts, Chemistry and electrochemistry of water logged soils. Soil pollution-introduction, sources and effects of soil pollution.

At the end of the Module 5, students will be able to:

1 .**Acquire** knowledge on soil components**.(BL-3)**
2 **Understand** various soil problems & their control**.(BL-2)**
3. **Understand** various causes ,effects and their control**.(BL-2)**

Total hours:	**48 Hours**

Content beyond syllabus:

1.Reverse osmosis
2. Corrosion control by using corrosion inhibitors.

Self-Study:

Contents to promote self-Learning:

SNO	**Module**	**Reference**
1	Hardness by EDTA method, Boiler troubles.	https://youtu.be/ajuG_Z1JDmM https://youtu.be/FCQ26RQBZLg
2	Galvanic corrosion Electro less plating	https://youtu.be/4HCsBMI7nSg https://youtu.be/MhbjQFhZ1bE
3	Air pollution Global warming	https://youtu.be/Tds3k97aAzo **https://youtu.be/We2nYvdjpKk?t=35**
4	Manufacture of Portland cement Refractories Thick film lubrication	https://youtu.be/Q0VLQLOsNck **https://youtu.be/xb_xndPe4n0,**
5	Soil acidityalkalinity&salinity **Soil pollution**	https://youtu.be/uXg9k72mORc https://yhttps://youtu.be/Cy6W,, https://youtu.be/Cy6W5fHPBLg

Text Book(s):

1. P. C. Jain & Monika Jain, Engineering Chemistry, Dhanpat Rai Publishing Company(P) Ltd, New Delhi,16th edition, 2013.

2. K. N. Jayaveera, G. V. Subba Reddy and C. Rama chandriah, Engineering Chemistry, Mc.Graw Hill Publishers.New Delhi

3. Bolt GH & Bruggenweert MGM.1981.soil chemistry. Elsevier.

Reference Book(s):

1. Text book of Engineering chemistry by shashi chawla.
2. Text book of Engineering chemistry by A .jayashree ,Willey publications, New Delhi
3. A Text book of Environmental Chemistry by O.D. Tyagi and M .Mehra

Online Resources /Web References:

1.https://www.cgaspirants.com/2017/08/engineering-chemistry-by-jain-jain.html

2.https://www.scribd.com/doc/278434466/Shashi-Chawla-Engineering-Chemistry-PDF

3.file:///C:/Users/DELL/Downloads/Ch_2-EnvChemistry.pdf

4.https://nptel.ac.in/courses/105/106/105106119/

5.https://nptel.ac.in/courses/113/104/113104082/

6.https://www.youtube.com/watch?v=YH-00EOnfEE&vl=en

7. https://nptel.ac.in/courses/123/105/123105001/

8.https://nptel.ac.in/courses/113/105/113105028/

9. https://nptel.ac.in/courses/124/105/124105014/

NARAYANA ENGINEERING COLLEGE::NELLORE								
	PROBLEM SOLVING AND PROGRAMMING							R21
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
I	3	0	0	48	3	40	60	100

Pre-requisite: Mathematics Knowledge, Analytical and Logical skills

Course Objectives:

- To understand various steps in Program development.
- To understand the basic concepts in C Programming Language.
- To learn how to write modular and readable C Programs.
- To learn the syntax and semantics of a C Programming language.
- To learn structured programming approach for problem solving.

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

CO 1	Identify methods to solve a problem through computer programming. **(BL - 3)**
CO 2	Understand the use of operators and input/output. **(BL - 2)**
CO 3	Understand the difference and the usage of various control statements and Functions**(BL - 2)**
CO 4	Apply the Arrays and Pointers for solving problems. **(BL - 3)**
CO 5	Explain User-Defined Data Types and Files. **(BL - 2)**

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3											1	
CO2	1	2	1										1	
CO3	1	2	1		2								2	2
CO4	2	2	3	2	1							2	3	2
CO5	3	3	2	2								1	2	

1: Low, 2-Medium, 3- High

COURSE CONTENT

MODULE – 1	Fundamentals of Computers and Programming	10 HOURS

Introduction to Programming, Algorithms and Flowcharts: Programs and Programming, Programming languages, Compiler, Interpreter, Algorithms, Flowcharts, How to Develop a Program.

Basics of C: Introduction**,** Character Set, Structure of a C Program, A Simple C Program, Variables, Data Types and Sizes, Declaration, Identifiers, Keywords, Constants, Assignment, and Initialization.

At the end of the Module 1, students will be able to:

1. Solve problems using language independent notations. **(BL - 3)**
2. Understand the compilers and interpreters. **(BL - 2)**
3. Understand Basic Structured of Programming in C. **(BL - 2)**
4. Develop algorithms and flowcharts for problems.**(BL - 3)**
5. Understand various Tokens in C language.**(BL - 2)**

MODULE -2	Operators and Input and Output	9 HOURS

Operators and Expressions: Arithmetic Operators, Relational Operators, Logical Operators, Bitwise Operators, Conditional Operator, Comma operator, size of operator, Expressions, L values and R values, Expression Evaluation- Precedence and Associativity, Type Conversion.

Input and Output: Basic Screen and Keyboard I/O in C, Formatted Input and Output, Unformatted Input and Output Functions**.**

At the end of the Module 2, students will be able to:

1. Illustrate the working of expressions.**(BL - 2)**
2. Understand the precedence and Associativity rules of operators. **(BL - 2)**
3. Understand the rules of type conversion. **(BL - 2)**
4. Explain the Formatted and Unformatted I/O functions. **(BL - 2)**

MODULE-3	Control Statements and Functions	10 HOURS

Control Statements: Selection Statements - if, Nested if, if-else, Nested if-else, else-if ladder, switch Looping Statements - while, do-while, for, Nested loops, Unconditional Statements - goto, break, Continue, return.

Functions: Introduction, Using Functions, Passing Arguments to a Function, Working with Function, Scope and Extent, Recursion, The C Preprocessor, Storage classes

At the end of the Module 3, students will be able to:

1. Understand Selection Statements. **(BL - 2)**
2. Understand Looping and Unconditional Statements. **(BL - 2)**
3. Understand the basic concept of functions. **(BL - 2)**
4. Understand concepts of Recursion, Preprocessor and storage classes. **(BL - 2)**

MODULE-4	**Arrays and Pointers**	**10 HOURS**

Arrays and Strings: Introduction, One-Dimensional Array, Multidimensional Arrays, Passing Arrays to Function, Strings - Declaration, Initialization, Printing Strings, String Input, Character Manipulation, String Manipulation, Arrays of Strings.

Pointers: Fundamentals, Pointer Declarations, Operations on pointers, Passing Pointers to a Function, Pointers and Arrays, Arrays of Pointers, Pointer to Pointer, Pointer to Functions, Command line arguments, Dynamic Memory Management.

At the end of the Module 4, students will be able to:

1. Understand the concept of Arrays. **(BL - 2)**
2. Understand the concept of pointers. **(BL - 2)**
3. Explain Dynamic Memory Management. **(BL -2)**

MODULE-5	**User-Defined Data Types and Files**	**9 HOURS**

Structures and Unions: Basics of Structures, Nesting of Structures, Arrays of Structures, Structures and Pointers, Structures and Functions, Self-Referential Structures, Unions, Bit-fields, Enumerations, typedef.

Files: Introduction, Using Data Files in C, Working with Text Files, Random Accesses to Files.

At the end of the Module 5, students will be able to:

1. Explain user defined data types like structures and unions. **(BL - 2)**
2. Understand the concept of Self-Referential Structures. **(BL - 2)**
3. Understand the working of files. **(BL - 2)**

Total hours:	**48 HOURS**

Content Beyond Syllabus:

1. Analysis of Algorithms
2. Text Vs. Binary Files
3. Variable Length Argument Lists

Self-Study:

Contents to promote self-Learning:

S No.	Module	Reference
1	Fundamentals of Computers and Programming	https://nptel.ac.in/courses/106/106/106106127/ [Lec 1] https://nptel.ac.in/courses/106/105/106105214/ [Week 1 - Lec 1 To 2] https://nptel.ac.in/courses/106/105/106105171/ [Week 1 - Lec 1 To 4]
2	Operators and Input / Output	https://nptel.ac.in/courses/106/105/106105171/ [Week 1 - Lec 5] https://nptel.ac.in/courses/106/105/106105171/ [Week 2 - Lecture 7 To 10] https://nptel.ac.in/courses/106/105/106105171/ [Week 3 - Lec 11 To 14] https://nptel.ac.in/courses/106/106/106106127/ [Lec 4] https://nptel.ac.in/courses/106/106/106106127/ [Lec 5]
3	Control Statements and Functions	https://nptel.ac.in/courses/106/105/106105171/ [Week 3 - Lec 15] https://nptel.ac.in/courses/106/105/106105171/ Week 4 - Lec 16 To 20] [Week 5 - Lec 21 To 25] https://nptel.ac.in/courses/106/106/106106127/ [Lec 6 & 7] https://nptel.ac.in/courses/106/105/106105171/ [Week 7 - Lec 35] [Week 8 - Lecture 36 To 40]

		https://nptel.ac.in/courses/106/105/106105171/ [Week 11 - Lec 53 To 54]
4	Arrays and Pointers	https://nptel.ac.in/courses/106/106/106106127/ [Lec 20 To 27] https://nptel.ac.in/courses/106/105/106105171/ [Week 6 - Lec 26 To 30][Week 7 - Lec 32 To 34,48] [Week 12 - Lec 58, 59, 61] https://nptel.ac.in/courses/106/106/106106127/ [Lec 9 To 19]
5	User-Defined Data Types and Files	https://nptel.ac.in/courses/106/105/106105171/ [Week 11 - Lec 55, 56, 57, 60] https://nptel.ac.in/courses/106/106/106106127/ [Lec 36, 37, 38] https://nptel.ac.in/courses/106/106/106106127/ [Lec 60]

Text Book(s):

1. Pradip Dey, and Manas Ghosh, "Programming in C", 2018, Oxford University Press.
2. Byron Gottfried, Schaum's Outline of Programming with C, 4th Edition, 2018, McGraw-Hill

Reference Books :

1. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson.
2. Computer Fundamentals by Anita Goel, 2010, Pearson Publication
3. Brian W. Kernighan, and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, Pearson.
4. Programming in C, 3/e : A Practical Approach by Ajay Mittal, Pearson Publication
5. C: The Complete Reference by SCHILDT and HERBERT, McGraw Hill, 4th Edition, 2020
6. Problem Solving with C by SOMASHEKARA, M. T., GURU, D. S., MANJUNATHA, K. S., PHI Learning, 2nd Edition, 2018
7. C How to Program,Paul Deitel, Deitel & Harvey Deitel, 6th Edition, Pearson Education
8. Programming in C and Data Structures, Jeri R. Hanly, Elliot B. Koffman, Ashok Kamthane and A.Ananda Rao, Pearson Education, 1st Edition, 2010.
9. C for Engineers and Scientists, H.Cheng, Mc.Graw-Hill International Edition Education / PHI, 2009
10. Programming in C – Stephen G. Kochan, 4th Edition, PearsonEductaion, 2015
11. Programming in ANSI in C, E Balaguruswamy, Tata McGraw Hill, 8th Edition, 2019
12. Computer Concepts and Programming in C, R.S. Salaria, Khanna Publishing, 2017
13. Let us C, Yashavant P. Kanetkar, BBP Publications, Delhi, 16th Edition, 2017

Online Resources / Web Resources:

1. https://nptel.ac.in/courses/106/105/106105171/
2. https://nptel.ac.in/courses/106/106/106106127/
3. https://www.youtube.com/playlist?list=PLVlQHNRLflP8IGz6OXwlV_lgHgc72aXlh
4. https://www.youtube.com/watch?v=8PopR3x-VMY
5. https://www.youtube.com/watch?v=vl794HKeXug
6. https://books.goalkicker.com/CBook/
7. https://www.tutorialspoint.com/cprogramming/index.htm
8. https://www.programiz.com/c-programming
9. https://www.javatpoint.com/c-programming-language-tutorial
10. https://www.edureka.co/blog/c-programming-tutorial/
11. https://data-flair.training/blogs/c-tutorial/
12. https://www.programmingsimplified.com/c-program-examples
13. https://www.w3schools.in/category/c-tutorial/
14. C Programming Notes for Professionals book : https://books.goalkicker.com/CBook/

NARAYANA ENGINEERING COLLEGE:NELLORE								
	ENGINEERING GRAPHICS							R2021
Semester	Hours / Week			Total hrs	Credits	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
I	0	1	4	80	3	40	60	100

Pre-Requisite: Basic Mathematics (Geometry)

Course Objectives:

1. To impart skills on using drawing instruments
2. To convey exact and complete information of any physical object.
3. To Construct Engineering Curves.
4. To Learn and practice basic AutoCAD commands.
5. To Instruct the utility of drafting & modelling packages in orthographic and isometric drawings

Course Outcomes: At the end of the course, student will be able to:	
CO 1	Define the qualities of precision and accuracy in engineering drawing. (BL-1)
CO 2	Draw engineering curves with different methods(BL-3).
CO 3	Develop the orthographic projection of points and straight lines(BL-3)
CO 4	Construct the planes and simple solids.(BL-3).
CO 5	Understand and practice basic AUTOCAD commands (BL-2)

COURSE CONTENT

Part-A Manual Drawing

TASK– 1	**Introduction and Conic sections**	10 Hours

Introduction to Engineering graphics: Principles of Engineering Graphics and their significance; various instruments used, drawing sheet sizes and title block, lettering, BIS conventions, types of lines and dimensioning methods.

Geometrical constructions: simple constructions, construction of Pentagon, Hexagon by general Method only.

Conic Sections:. Types of conics: Ellipse, Parabola and Hyperbola (Eccentricity method only),

TASK–-2	**Orthographic Projections**	10 Hours

Objectives and Principle of projection, Methods of projections, Comparison between firstangle and third angle projection.

Projections of points: Projection of points placed in different quadrants.

Projection of straight lines: Fundamental concepts**,** Line parallel, perpendicular and inclined to one and two reference planes placed in first quadrant only.

TASK–3	**Projections of Solids**	15 Hours

Projections of planes: Projection of planes (Triangle, Square, Pentagon, Circle) parallel,Perpendicular and inclined to one and two reference planes placed in first quadrant only.

Types of solids ; Polyhedra, Solids of revolution,

Projections of regular solids (Prisms, Pyramids, Cylinders and Cone),with its axis Perpendicular to one plane and parallel to other plane, Axis inclined to one plane and parallel to other plane.

TASK–4	**Isometric and Orthographic views**	10Hours

Isometric Projections: Principles, Isometric scale, Isometric views, Conventions, Isometric views of lines, planes, simple solids (Cube, Cylinder, and Cone), and Conversion of Isometric views to Orthographic views.		
Part B Computer Aided Drafting		
TASK–5	**Introduction to AutoCAD**	17 Hours
Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, stretching, fillets, arrays, dimensions. Dimensioning principles and conventional representations.		
TASK–6	**Orthographic and Isometric Projections**	18 Hours
Transformation of Isometric Projections into orthographic projections such as simple solids such ascylinder, cone, square prism, pentagonal pyramid Draw 3D model of mechanical components such as Stepped block, Bush bearing,		
Total hours:		**80 hours**

Text Book(s):

1. Bhatt N.D. "Elementary Engineering Drawing", Charotar Publishers, 2014.
2. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009
3. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai,2012.
4. Engineering Drawing by Dr AVS Sridhar Kumar, Dr. Krishnaiah, T P Vara Prasad. ,Spectrum education, Sun techno Publications, 2019

Reference Book(s):

1. Engineering Drawing and Graphic Technology -International Edition, Thomas E.French, Charles J. Vierck, Robert J. Foster, McGraw-Hill, 2014
2. Venugopal.K "Engineering Drawing and Graphics", New Age International (P)Ltd., New Delhi,2010

1. ENGLISH
Common to all Branches (CSE,ECE,EEE,CE,ME)

Semester	H / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
I	2	0	0	32	2	40	60	100

CO 1 : Acquire in depth knowledge on formulating appropriate sentences with grammatical accuracy and vocabulary building. (B.L:2)

CO 2 : Understand the factors that influence in use of grammar and effective strategies for professional written communication (B.L:2)

CO 3 : Explain the use of Grammar to improve effective writing Note making & Paraphrasing. (B.L:2)

CO 4 : Understand the Grammar to write dialogues and reviews effectively. (B.L:2)

CO 5 : Develop the skills and sub skills of reading and use strategies for reading effectively and provide knowledge on the structure and format of technical writing. (B.L:3)

Module 1

Grammar : Parts of Speech - Kinds of Sentences – Sentence structures: Identifying the sentences, Sentence Pattern, Sentence Improvement and Construction, Sentence Completion, Sentence Arrangement, Joining sentences, Para jumbles.

Vocabulary : Concept of word formation – Synonyms & Antonyms – Homonyms Homophones – Prefixes & suffixes – Commonly confused Words – One word substitutes – Idioms & Phrasal Verbs.

Module 2

Grammar & Vocabulary : Cohesive devices - linkers, sign posts and transition signals - Articles – Prepositions – Gerund - Verbs: Auxiliary verbs (Primary & Modal) – Tenses – Subject Verb agreement.

Writing : Principles of writing: clarity, simplicity, brevity, single focus, organization of thoughts - sequencing the ideas – Punctuation - Question formation (Wh- questions, Yes or No questions, Tag questions) - Letters (Formal & Informal) and Emails : Structure / template of common formal letters and emails: inquiry /complaint / placing an order.

Module 3

Grammar : Active and Passive Voice - Direct & Indirect Speech – Comparison of Adjectives – Cause and effect – Verb noun Collocations & Adjective - Noun Collocations.

Writing : Note Making – Summarizing - Paragraph Writing – Paraphrasing : Techniques of paraphrasing - Replacement of words and phrases, change of sentence structures.

Module 4

Grammar : Misplaced modifiers - If Clauses - Simple, Compound, Complex Sentences -Spotting Errors.

Writing : Dialogue writing (Formal & Informal) - compare and contrast paragraphs- Writing of Reviews: Book / Play / Movie.

Module 5

Reading Skills : Types of reading: Skimming, Scanning, Intensive & Extensive Reading – Reading Comprehension - Scramble Sentences - Complete the passage using contextual clues Identifying Main Ideas using Scanning - Technique Identifying Specific Ideas using Skimming Technique - Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.

Writing : Describing – Report Writing: definition - purpose – types – structure - formal and informal reports - stages in developing report- proposal, progress and final reports –examples.

Text Books:

1. Contemporary English Grammar –Structures and Composition by David Green, MacMillan India, 2014.
2. **Effective Technical Communication by Ashraf, M Rizvi,Tata McGraw-Hill, 2006.**

Reference Books:

1. English Conversation Practice by Grant Taylor, Tata McGraw Hill,2009.
2. Practical English Usage by Michael Swan, OUP, 4th Edition.
3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press,2009.
4. English Vocabulary in Use Advanced by Michael McCarthy, Felicity O'Dell, Cambridge University Press,2008.
5. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill 2009.

NARAYANA ENGINEERING COLLEGE:NELLORE								
	Chemistry for Civil Engineering lab							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
I	0	0	3		1.5	40	60	100

Pre-requisite: Nil

Course Objectives:

1. **To provide the learners hands-on-training on the practical applications of the concepts learnt in the theoretical sessions on water treatment, electrochemistry, lubricants, and using simple chemical methods.**

2. **The course will also train the learner to observe good lab practices, record readings and graphically represent the results, as well as analyze and interpret the influence of reaction conditions on the results.**

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

CO 1	Analyze quality parameters of water samples from different sources
CO 2	Perform quantitative analysis using instrumental methods.
CO 3	Utilize the fundamental laboratory techniques for analyses such as titrations, separation/purification/ and Spectroscopy
CO 4	**To be able to analyze and gain experimental skill.**

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3													
CO2	3													
CO3	3													
CO4	3													

1: Low, 2-Medium, 3- High

COURSE CONTENT	CO
Task-1 : Determination of Hardness of a ground water sample	
Objectives **1.** Determine the total hardness (total calcium and magnesium ion concentration) 2. Learn how to titrate with EDTA solution. 3.Determine permanent hardness and the temporary hardness	CO1
Task-2 : Estimation of DO by winklers method	
Objectives: 1. To determine the level of dissolved oxygen in a sample of water using Winkler's method. 2. Analyze the effects of various factors on the level of dissolved oxygen in a water sample (e.g., salt content, temperature, degree of mixing, and the presence of reducing compounds).	CO 1
Task- 3: Determination of chloride content of water.	
Objectives: 1. To determine the amount of chlorine present in given water sample. 2.Learn how to titrate with Silver nitrate and observe different levels of titration	CO 1
Task-4 : Potentiometry - determination of red -ox potentials and emf	

Objectives: 1. Determine the concentration of an unknown iron II) solution. By using potentiometer 2. Discuss how the potential changes with relative concentration of oxidised/reduced from, 3.Perform a red ox titration of ammonium iron (II) sulphate using potassium dichromate as oxidizing agent, 4. Determine the equivalence point of the red ox titration by plotting titration curve using potential change values and amount of oxidizing agent added during titration.	CO 1
Task-5: Determination of Alkalinity in water	
Objectives: 1. To determine the amount of base present in given samples. 2. Collect water samples from different industrial areas and determine the percentage of base by using hydrochloric acid.	CO 3
Task-6 : Determination of Strength of an acid in Pb-Acid battery	
Objective: 1. To determine the half –reactions involved in spontaneous oxidation –reduction reactions. 2. Explain the function of the lead storage and dry cell batteries …electrolysis involving two lead strips immersed in sulfuric acid.	CO 3
Task-7: Preparation of a Bakelite	
Objective: 1. To prepare phenol formaldehyde resin. (Bakelite) 2. Understand the differences between linear and cross linked polymers. 3. Compare and contrast the recycling properties of linear and cross linked polymers. 4. Compare the combustion properties of various types of material. 5. Define the following terms: polymer, monomer, repeat unit, cross linking, biopolymer	CO 1
Task-8: Estimation of Calcium in port land Cement	
Objective: 1. To estimate calcium cement by EDTA method. 2. To understand the strength of the port land cement.	CO 2
Task-9: Determination of Viscosity of lubricating oil by Red Viscometer	
Objective: 1. Measuring viscosity of fluids. 2.Describe a fluid as having “high “or “low” viscosity	CO 4
Task-10: Estimation of Ferrous Iron by Potassium Dichromate method.	
Objective: 1. Determine the percentage of ferrous iron in an unknown sample by red ox titration with potassium dichromate solution. 2. The student will pre-treat the sample to obtain the iron in the reduced (+2 oxidation) state**.** 3.The student will use a solution of primary standard as the titrant	CO 3
Additional Experiments:	
Task-11: Determination of cell constant and conductance of solutions	
Objective: **1. To determine conductivity of the given water sample. by using conductivity meter** **2. To understand the specific conductance**	CO 1
Task-12: Determination of percentage of Iron in Cement sample by colorimeter	
Objective: **1.To provides practical knowledge of instrumental for developing experimental skill in building colorimetric estimation of iron in cement.** **2.understand beers –lamberts law principle**	CO 2

Virtual Labs:

1. **http://vlab.amrita.edu/?sub=2&brch=190&sim=338&cnt=1**
2. **http://vlab.amrita.edu/?sub=2&brch=190&sim=339&cnt=1**
3. **http://vlab.amrita.edu/?sub=2&brch=190&sim=606&cnt=1**

Self-Study:

Contents to promote self-Learning:

SNO	Topic	CO	Reference
1	Estimation of hardness of water	CO 1	https://www.youtube.com/watch?v=Sa0WfA9UGG0
2	Potentiometric red-ox titration	CO 1	https://www.youtube.com/watch?v=wVJ8WQax0rQ
3	Preparation of polymer	CO 4	https://www.youtube.com/watch?v=PSSK5VGcC_0

Text Book(s):

1. **A Textbook of Quantitative Analysis, Arthur J. Vogel.**
2. **Jaya Shree, Anjireddy, Textbook of Engineering Chemistry, Wiley Precise Textbook Series, 20**
3. **Chemistry in Engineering and Technology, Volume W, Tata McGraw Hill Publishing Company**

Reference Book(s):

1. **S.K. Bhasin and Sudha Rani, "Laboratory Manual on Engineering Chemistry", Dhanpat Rai Publishing Company, New Delhi, 2nd edition.**
2. **Sunitha Rattan, "Experiments in Applied Chemistry", S.K. Kataria & Sons, New Delhi, 2nd edition.**

Web References:

1. **https://nptel.ac.in/courses/122101001/23**
2. **https://nptel.ac.in/courses/104103071/39**

NARAYANA ENGINEERING COLLEGE::NELLORE								
	PROBLEM SOLVING AND PROGRAMMING							R21
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
I	3	0	0	48	3	40	60	100

Pre-requisite: Mathematics Knowledge, Analytical and Logical skills

Course Objectives:

- To understand various steps in Program development.
- To understand the basic concepts in C Programming Language.
- To learn how to write modular and readable C Programs.
- To learn the syntax and semantics of a C Programming language.
- To learn structured programming approach for problem solving.

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

CO 1	Identify methods to solve a problem through computer programming. **(BL - 3)**
CO 2	Understand the use of operators and input/output. **(BL - 2)**
CO 3	Understand the difference and the usage of various control statements and Functions**(BL - 2)**
CO 4	Apply the Arrays and Pointers for solving problems. **(BL - 3)**
CO 5	Explain User-Defined Data Types and Files. **(BL - 2)**

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3											1	
CO2	1	2	1										1	
CO3	1	2	1		2								2	2
CO4	2	2	3	2	1							2	3	2
CO5	3	3	2	2								1	2	

1: Low, 2-Medium, 3- High

COURSE CONTENT

MODULE – 1	Fundamentals of Computers and Programming	10 HOURS

Introduction to Programming, Algorithms and Flowcharts: Programs and Programming, Programming languages, Compiler, Interpreter, Algorithms, Flowcharts, How to Develop a Program.
Basics of C: Introduction**,** Character Set, Structure of a C Program, A Simple C Program, Variables, Data Types and Sizes, Declaration, Identifiers, Keywords, Constants, Assignment, and Initialization.

At the end of the Module 1, students will be able to:

4. Solve problems using language independent notations. **(BL - 3)**
5. Understand the compilers and interpreters. **(BL - 2)**
6. Understand Basic Structured of Programming in C. **(BL - 2)**
4. Develop algorithms and flowcharts for problems.**(BL - 3)**
5. Understand various Tokens in C language.**(BL - 2)**

MODULE -2	Operators and Input and Output	9 HOURS

Operators and Expressions: Arithmetic Operators, Relational Operators, Logical Operators, Bitwise Operators, Conditional Operator, Comma operator, size of operator, Expressions, L values and R values, Expression Evaluation- Precedence and Associativity, Type Conversion.
Input and Output: Basic Screen and Keyboard I/O in C, Formatted Input and Output, Unformatted Input and Output Functions**.**

At the end of the Module 2, students will be able to:

5. Illustrate the working of expressions.**(BL - 2)**
6. Understand the precedence and Associativity rules of operators. **(BL - 2)**
7. Understand the rules of type conversion. **(BL - 2)**
8. Explain the Formatted and Unformatted I/O functions. **(BL - 2)**

MODULE-3	Control Statements and Functions	10 HOURS

Control Statements: Selection Statements - if, Nested if, if-else, Nested if-else, else-if ladder, switch Looping Statements - while, do-while, for, Nested loops, Unconditional Statements - goto, break, Continue, return.

Functions: Introduction, Using Functions, Passing Arguments to a Function, Working with Function, Scope and Extent, Recursion, The C Preprocessor, Storage classes

At the end of the Module 3, students will be able to:

5. Understand Selection Statements. **(BL - 2)**
6. Understand Looping and Unconditional Statements. **(BL - 2)**
7. Understand the basic concept of functions. **(BL - 2)**
8. Understand concepts of Recursion, Preprocessor and storage classes. **(BL - 2)**

MODULE-4	**Arrays and Pointers**	**10 HOURS**

Arrays and Strings: Introduction, One-Dimensional Array, Multidimensional Arrays, Passing Arrays to Function, Strings - Declaration, Initialization, Printing Strings, String Input, Character Manipulation, String Manipulation, Arrays of Strings.

Pointers: Fundamentals, Pointer Declarations, Operations on pointers, Passing Pointers to a Function, Pointers and Arrays, Arrays of Pointers, Pointer to Pointer, Pointer to Functions, Command line arguments, Dynamic Memory Management.

At the end of the Module 4, students will be able to:

4. Understand the concept of Arrays. **(BL - 2)**
5. Understand the concept of pointers. **(BL - 2)**
6. Explain Dynamic Memory Management. **(BL -2)**

MODULE-5	**User-Defined Data Types and Files**	**9 HOURS**

Structures and Unions: Basics of Structures, Nesting of Structures, Arrays of Structures, Structures and Pointers, Structures and Functions, Self-Referential Structures, Unions, Bit-fields, Enumerations, typedef.

Files: Introduction, Using Data Files in C, Working with Text Files, Random Accesses to Files.

At the end of the Module 5, students will be able to:

4. Explain user defined data types like structures and unions. **(BL - 2)**
5. Understand the concept of Self-Referential Structures. **(BL - 2)**
6. Understand the working of files. **(BL - 2)**

Total hours:	**48 HOURS**

Content Beyond Syllabus:

4. Analysis of Algorithms
5. Text Vs. Binary Files
6. Variable Length Argument Lists

Self-Study:

Contents to promote self-Learning:

S No.	Module	Reference
1	Fundamentals of Computers and Programming	https://nptel.ac.in/courses/106/106/106106127/ [Lec 1] https://nptel.ac.in/courses/106/105/106105214/ [Week 1 - Lec 1 To 2] https://nptel.ac.in/courses/106/105/106105171/ [Week 1 - Lec 1 To 4]
2	Operators and Input / Output	https://nptel.ac.in/courses/106/105/106105171/ [Week 1 - Lec 5] https://nptel.ac.in/courses/106/105/106105171/ [Week 2 - Lecture 7 To 10] https://nptel.ac.in/courses/106/105/106105171/ [Week 3 - Lec 11 To 14] https://nptel.ac.in/courses/106/106/106106127/ [Lec 4] https://nptel.ac.in/courses/106/106/106106127/ [Lec 5]
3	Control Statements and Functions	https://nptel.ac.in/courses/106/105/106105171/ [Week 3 - Lec 15] https://nptel.ac.in/courses/106/105/106105171/ Week 4 - Lec 16 To 20] [Week 5 - Lec 21 To 25] https://nptel.ac.in/courses/106/106/106106127/ [Lec 6 & 7]

		https://nptel.ac.in/courses/106/105/106105171/ [Week 7 - Lec 35] [Week 8 - Lecture 36 To 40] https://nptel.ac.in/courses/106/105/106105171/ [Week 11 - Lec 53 To 54]
4	Arrays and Pointers	https://nptel.ac.in/courses/106/106/106106127/ [Lec 20 To 27] https://nptel.ac.in/courses/106/105/106105171/ [Week 6 - Lec 26 To 30][Week 7 - Lec 32 To 34,48] [Week 12 - Lec 58, 59, 61] https://nptel.ac.in/courses/106/106/106106127/ [Lec 9 To 19]
5	User-Defined Data Types and Files	https://nptel.ac.in/courses/106/105/106105171/ [Week 11 - Lec 55, 56, 57, 60] https://nptel.ac.in/courses/106/106/106106127/ [Lec 36, 37, 38] https://nptel.ac.in/courses/106/106/106106127/ [Lec 60]

Text Book(s):

3. Pradip Dey, and Manas Ghosh, "Programming in C", 2018, Oxford University Press.
4. Byron Gottfried, Schaum's Outline of Programming with C, 4th Edition, 2018, McGraw-Hill

Reference Books :

14. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson.
15. Computer Fundamentals by Anita Goel, 2010, Pearson Publication
16. Brian W. Kernighan, and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, Pearson.
17. Programming in C, 3/e : A Practical Approach by Ajay Mittal, Pearson Publication
18. C: The Complete Reference by SCHILDT and HERBERT, McGraw Hill, 4th Edition, 2020
19. Problem Solving with C by SOMASHEKARA, M. T., GURU, D. S., MANJUNATHA, K. S., PHI Learning, 2nd Edition, 2018
20. C How to Program,Paul Deitel, Deitel & Harvey Deitel, 6th Edition, Pearson Education
21. Programming in C and Data Structures, Jeri R. Hanly, Elliot B. Koffman, Ashok Kamthane and A.Ananda Rao, Pearson Education, 1st Edition, 2010.
22. C for Engineers and Scientists, H.Cheng, Mc.Graw-Hill International Edition Education / PHI, 2009
23. Programming in C – Stephen G. Kochan, 4th Edition, PearsonEductaion, 2015
24. Programming in ANSI in C, E Balaguruswamy, Tata McGraw Hill, 8th Edition, 2019
25. Computer Concepts and Programming in C, R.S. Salaria, Khanna Publishing, 2017
26. Let us C, Yashavant P. Kanetkar, BBP Publications, Delhi, 16th Edition, 2017

Online Resources / Web Resources:

15.https://nptel.ac.in/courses/106/105/106105171/
16.https://nptel.ac.in/courses/106/106/106106127/
17.https://www.youtube.com/playlist?list=PLVlQHNRLflP8IGz6OXwlV_lgHgc72aXlh
18.https://www.youtube.com/watch?v=8PopR3x-VMY
19.https://www.youtube.com/watch?v=vl794HKeXug
20.https://books.goalkicker.com/CBook/
21.https://www.tutorialspoint.com/cprogramming/index.htm
22.https://www.programiz.com/c-programming
23.https://www.javatpoint.com/c-programming-language-tutorial
24.https://www.edureka.co/blog/c-programming-tutorial/
25.https://data-flair.training/blogs/c-tutorial/
26.https://www.programmingsimplified.com/c-program-examples
27.https://www.w3schools.in/category/c-tutorial/
28.C Programming Notes for Professionals book : https://books.goalkicker.com/CBook/

ENGLISH LANGUAGE LAB

Common to all Branches (CSE,ECE,EEE,CE,ME)

CO-1: To expose the students to develop knowledge and awareness of English speech sounds,

Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
II	0	0	3	48	1.5	40	60	100

word

accent, intonation and rhythm

CO-2: To sensitize the students to the nuances of English speech sounds, word accent, intonation and thythm

CO-3: To develop strategies appropriately to improve Listening skills and Spoken Skills

CO-4: T o improve the descriptive strategies and presentation styles

CO-5: To distinguish main ideas and specific details and make use of contextual clues to infer meanings of unfamiliar words from context.

CO-6: To improve the skills to exhibit the main ideas in the poster

TASK – 1

Introduction to Phonetics: Introduction to Sounds of Speech – Vowels – Consonants.

Practice-1: Listening Sounds of Speech – Vowels – Consonants with a focus on pronunciation
Practice-2: Highlighting the sounds of Vowels and Consonants

TASK – 2

Syllabification: Word Stress, Rules of word stress

Practice-3 : Practice on Intonation and Stress

TASK – 3

Listening Skills : Types of Listening Skills- Active listening and anticipating the speaker

Practice-4 : Listening for Specific & General Details

Practice-5 : Listening Comprehension

TASK – 4

Defining & Describing: Objects, Places and Events - Video Speech Writing- Review (Oral) (Books / Movies / Products..etc.,)

Practice-6 : Describing: Objects and Places

Practice-7 : Describing: Events and Process

Practice-8 : Review (Oral) : Books / Movies / Products..etc.,

Practice-9: Video Speech Writing

TASK – 5

Reading Comprehension- Information Transfer.

Practice-10 : Reading practice for practice of Pronunciation – understanding;

Practice-11 : writing paragraph- graphs, flow charts, diagrams - Information Transfer

TASK – 6

Giving and Asking Directions - Poster Presentation

Practice-12 : Giving and Asking Directions

Reference Books:

1. A Textbook of English Phonetics for Indian Students 2nd Ed .Balasubramanian (Macmillian),2012
2. SkillfulLevel2Reading&WritingStudent'sBookPack(B1)MacmillanEducational.
3. English Pronunciation in Use. Intermediate & Advanced, Hancock, M. 2009.CUP
4. Rizvi,Ashraf.M.,EffectiveTechnicalCommunication,McGrawHill,NewDelhi.2005
5. Raman, Meenakshi & Sangeetha Sharma. Technical Communication: Principles and Practice, Oxford University Press, New Delhi.2011.

Software :

1. Walden ELCS&AECS Lab
2. English In Mind (EIM) all level by Cambridge University
3. Cambridge Pronunciation Dictionary by Cambridge University
4. Oxford Advanced Learners Dictionary, Oxford University

Web Resources:

- *Grammar/Listening/Writing 1-language.com*
- *http://www.5minuteenglish.com/*
- *https://www.englishpra ctice.com/ Grammar/Vocabulary*
- *English Language Learning Online*
- *http://www.bbc.co.uk/learningenglish/*
- *http://www.better-english.com/*
- *http://www.nonstopenglish.com/*
- *https://www.vocabulary.com/*
- *BBC Vocabulary Games*
- *Free Rice Vocabulary Game Reading*
- *https://www.usingenglish.com/comprehension/*
- *https://www.englishclub.com/reading/short-stories.htm*
- *https://www.english -online.at/Listening*
- *https://learningenglish.voanews.com/z/3613*
- *http://www.englishmedialab.com/liste ning.htmlSpeaking*
- *https://www.talkenglish.com/*
- *BBC Learning English – Pronunciation tips*
- *Merriam-Webster – Perfect pronunciation ExercisesAll Skills*
- *https://www.englishclub.com/*
- *http://www.world-english.org/*
- *http://learnenglish.britishcouncil.org/*

Online Dictionaries

- *Cambridge dictionary online : https://dictionary.cambridge.org/*
- *MacMillan dictionary : https://www.macmillandictionary.com/*

Oxford learner's dictionaries : https://www.oxfordlearnersdictionaries.com/

SEMESTER II

Course Code	Category	Course Title	Contact Periods per week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
21PH1002	BS	Physics for Civil Engineering	3	0	0	3	3	40	60	100
21MA1003	BS	Vector Calculus Complex Variables and Transforms	3	1	0	4	4	40	60	100
21ES1007	ES	Building Material Science	2	0	0	2	2	40	60	100
21ES1008	ES	Engineering Mechanics	3	1	0	4	4	40	60	100
21PH1502	BS	Physics for Civil Engineering lab	0	0	3	3	1.5	40	60	100
21ES1510	ES	Engineering workshop	0	0	3	3	1.5	40	60	100
21ES1511	ES	IT workshop	0	0	3	3	1.5	40	60	100
21ES1512	ES	Building Material Science lab	0	0	2	2	1	40	60	100
21EN1502	HS	Communication skills lab	0	0	2	2	1	40	60	100
21MC8002-13	MC	Mandatory course II	2	0	0	2	0	--	--	--
		Counseling/Mentoring	0	0	1	1	0	--	--	--
		Sports/Hobby Clubs/Activities	0	0	2	2	0	--	--	--
		Activity Point Programme	During the Semester					20 Points		
		Total	**13**	**2**	**16**	**31**	**19.5**	**360**	**540**	**900**

NARAYANA ENGINEERING COLLEGE:NELLORE								
	PHYSICS FOR CIVIL ENGINEERING							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
II	3	0	0	3	3	40	60	100

Pre-requisite: Fundamental concepts of Physics

Course Objectives:

1. To impart knowledge on the basic concepts of crystallography and ultrasonics
2. To familiarize the basic concepts of acoustics along with its Engineering applications.
3. To provide knowledge on indoor lighting and visual comfort in the built environment.
4. To provide knowledge on the phenomenon of heat transfer so as to understand a wide variety of practical engineering problems.
5. To Familiarize types of sensors for various engineering applications

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

CO 1	Realize basic concepts of crystallography and importance of ultrasonics in engineering applications.
CO 2	Apply the knowledge of acoustics for designing of engineering structures.
CO 3	Explain building lighting system for maintaining proper levels of visual comfort and importance of LASERs in Engineering and Medical applications.
CO 4	classify different modes of heat transfer and explain heat conduction in a bad conductor and compound media.
CO 5	Identify the sensors for various engineering applications

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO1	3	2				1								
CO2	3	2												
CO3	3	2				1								
CO4	3	2												
CO5	3	2				1								

1: Low, 2-Medium, 3- High

COURSE CONTENT

MODULE – 1

CRYSTALLOGRAPHY AND ULTRASONICS

10h

Crystallography: Introduction – Space lattice –Unit cell – Lattice parameters – Crystal systems, Bravias lattice, directions and planes in a crystal, Miller indices – inter-planar distances –Packing fractions of SC, BCC and FCC. Bragg's law, Laue method and powder methods for crystal structure analysis

Ultrasonics – Introduction, Properties and Production by magnetostriction& piezoelectric methods, acoustic grating, detection of ultrasonic waves, Non Destructive Testing – pulse echo system through transmission and reflection modes , Medical applications.

At the end of the Module 1, students will be able to:

1. Classify various crystal systems (L2)
2. Identify different planes in the crystal structure (L3)
3. Analyze the crystalline structure by Bragg's X-ray diffractometer (L4)
4. Apply powder method to measure the crystallinity of a solid (L4)
5. understand Properties of ultrasonic waves (L2)
6. explain production of ultrasonic waves by piezo-electric , Magnetostrictive methods (L2)
7. describe non-destructive testing of materials by ultrasonic waves (L2)
8. realize Medical applications of ultrasonic waves (L2

MODULE -2

ACOUSTICS

10h

Acoustics Introduction –classification of sound, characteristics of sound, weber-Frechner law,sound intensity level, sound pressure level, Phon, Sone, Echoes, reverberation and reverberation time, Sabine's formula, Reverberation theory, Growth of sound energy in the hall , decay of sound energy in the hall, deduction of Sabine's formula, Absorption coefficient and its determination, factors affecting acoustics of buildings and their remedies.

At the end of the Module 2., students will be able to:

1. explain characteristics of sound (L2)
2. describe Echoes, reverberation and reverberation time (L2)
3. derive expressions for Growth and decay of sound energy in the hall (L2)
4. recognize factors affecting acoustics of buildings and their remedies (L2)

MODULE-3

LIGHTING DESIGNS & LASERS, 10h

Lighting designs**:** Radiation quantities – spectral quantities. photometry: cosines law, inverse square law. Vision – photobic, mesophic, scotopic visions. Visual field glare, day light calculations , day light design of windows.

Lasers: Introduction, Properties of lasers: monochromaticity, coherence, directionality, brightness; Spontaneous & stimulated emission of radiation, Einstein coefficients, Population inversion, Pumping methods, Types of lasers: Nd- YAG Laser, He–Ne Laser, Semiconductor laser; Applications.

At the end of the Module 3, students will be able to:

1. understand radiation quantities (L2).
2. describe photobic, mesophic, scotopic visions (L2).
3. explain day light calculations, day light design of windows (L2).
4. describe Spontaneous & stimulated emission of radiation (L2)
5. Understand the basic concepts of LASER light Sources (L2)
6. describe the construction and working of different types of Lasers (L2)
7. identify the applications of lasers in various fields (L3)

MODULE-4

THERMAL PHYSICS 9h

Introduction, modes of heat transfer (conduction, convection and radiation), coefficient of thermal conductivity, rectilinear flow of heat along a uniform bar, thermal conductivity of bad conductor (Lee's disc method), heat conduction through compound media (materials in series and parallel). Thermal insulation and its benefits - Factors affecting the thermal performance of buildings.

At the end of the Module 1, students will be able to:

1. Explain different modes of heat transfer (L2)
2. describe Lee's disc method for finding coefficient of thermal conductivity of a bad conductor (L2)
3. explain rectilinear flow of heat along a uniform bar (L2)
4. Explain heat conduction in compound media (L2).

MODULE-5

SENSORS **9h**

Sensors:(qualitative description only): Different types of sensors and applications; Strain and Pressure sensors- Piezoelectric, magnetostrictive sensors, Fibre optic methods of pressure sensing; Temperature sensors - bimetallic strip, pyroelectric detectors, Hall-effect sensor, smoke and fire detectors.

At the end of the Module 3, students will be able to:

1. identify different types of sensors and applications (L3)
2. explain working of Strain and Pressure sensors (L2)
3. describe working of Fibre optic pressure and Temperature sensors (L2)
4. explain working of Hall-effect sensor, smoke and fire detectors (L2)

Total hours:	**50 hours**

Content beyond syllabus:

1. nano materials

Self-Study:

Contents to promote self-Learning:

SNO	Topic	CO	Reference
1	**CRYSTALLOGRAPHY AND ULTRASONICS**	CO1	https://youtu.be/hwYzBBkkhyU **https://youtu.be/hhJj36mQbaw?t=892**
2	**ACOUSTICS**	CO2	**https://youtu.be/QhXK7BfVass?t=1552**
3	LIGHTING DESIGNS & LASERS	CO3	**https://youtu.be/XBPBF-T10ws**
4	**THERMAL PHYSICS**	CO4	**https://youtu.be/5TcPGx82Hnk**
5	**SENSORS**	CO5	https://youtu.be/wpAA3qeOYiI

Text Book(s):

1. Stevens, W.R., "Building Physics: Lighting: Seeing in the Artificial Environment, Pergaman Press, 2013.

2.. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy" AText book of Engineering Physics"- S. Chand Publications, 11th Edition 2019.

3.. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2012.

Reference Book(s):

1. D.K. Bhattacharya and A. Bhaskaran, "Engineering Physics"- Oxford Publications-2015

3. Ian R Sinclair, Sensor and Transducers, 3rd eds, 2001, Elsevier (Newnes)

3. Shatendra Sharma, Jyotsna Sharma, " Engineering Physics", Pearson Education,2018

Online Resources / Web Resources:

1. http://www.peaceone.net/basic/Feynman/
2. http://physicsdatabase.com/free-physics-books/
3. http://www.damtp.cam.ac.uk/user/tong/statphys/sp.pdf
4. http://www.freebookcentre.net/Physics/Solid-State-Physics-Books.html
5. http://link.springer.com/book
6. http://www.thphys.physics.ox.ac.uk
7. http://www.sciencedirect.com/science
8. http://www.e-booksdirectory.com

NARAYANA ENGINEERING COLLEGE: NELLORE								
I-B. Tech	**VECTOR CALCULUS COMPLEX VARIABLES & TRANSFORMS**							R-2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
II	3	1	0	64	4	40	60	100

Pre-requisite: inter mathematics

Course Objectives: This course aims to providing the knowledge for the student about on

1. To enlighten the learners in the concept of vector differentiation and integration.
2. To understand the concept the limit, continuity & differentiation of complex variable
3. To Evaluate the improper integrals by complex integration
4. To understand the concepts of Laplace transforms and Inverse Laplace transforms & its properties.
5. To understand the concepts of Fourier series, Fourier transforms and its properties.

Course Outcomes: After successful completion of the course, the student will able to:

CO 1	Interpretate the different operators such as gradient, curl and divergence to find out point function (L-3)
CO 2	Understand the concept the limit, continuity & differentiation of complex variable (L-3)
CO 3	Evaluate the integral by using contour integration .(L-5)
CO 4	Apply the Laplace transform to convert time domain into frequency domain & Inverse Laplac transforms techniques to solve the differential equations. (L-3
CO 5	Develop the Fourier Series to the given periodic functions (L-3)

CO-PO Mapping

CO	PO												PSO	
	PO1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	3												
CO2	3	3												
CO3	3	3												
CO4	3	3												
CO5	3	3												

1- Low, 2-Medium, 3- High

COURSE CONTENT		
MODULE – 1	**Vector Calculus**	**Hours: 12h(9L+3T)**

Scalar and vector point functions, vector operator del, del applies to scalar point functions Gradient, del applied to vector point functions-Divergence and Curl, Line integra circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

At the end of the Module 1, students will be able to:

1. Apply del to Scalar and vector point functions (L-3)
2. Illustrate the physical interpretation of Gradient, Divergence and Curl (L-2)
3. Apply del to scalar and vector point functions. (L-3)
4. Illustrate the physical interpretation of gradient, divergence and curl. (L-2)

MODULE -2	Complex variables – Differentiation	Hours: 12h(9L+3T)

Introduction to functions of complex variable-concept of Limit & continuity Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions finding harmonic conjugate-construction of analytic function by Milne Thomson method.

At the end of the Module 2, students will be able to:

1. Find the work done in moving a particle along the path over a force field (L-1)
2. Evaluate the rates of fluid flow along and across curves. (L-5)
3. Evaluation of surface areas integrals by applying Green`s theorems. (L-5)
4. Evaluation of volume integrals by applying Gauss theorems. (L-5)
5. Evaluation of line integrals by applying Stokes theorems. (L-5)

MODULE-3	Complex variables – Integration	Hours: 12h(9L+3T)

Line integral-Contour integration, Cauchy's integral theorem (without proof) Cauchy Integral formula (without proof), zeros of analytic functions, singularities Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals (around unit circle semi-circle with f(z) not having poles on real axis).

At the end of the Module 3, students will be able to:

1. Understand the integration of complex functions. (L-3)
2. Apply Cauchy's integral theorem and Cauchy's integral formula. (L-3)
3. Understand singularities of complex functions. (L-3)
4. Evaluate improper integrals of complex functions using Residue theorem. (L-3)

MODULE-4	Laplace Transforms	Hours: 16h(12L+4T))

Definition-Laplace transform of standard functions-existence of Laplace Transform Inverse transform – First shifting Theorem, transforms of derivatives and integrals Unit step function– Second shifting theorem–Dirac's delta function Convolution theorem Laplace transform of Periodic function. Differentiation and integration of transform solving Initial value problems to ordinary differential equations with constant coefficients using Laplace transforms

At the end of the Module 4, students will be able to:

1. Understand the concept of Laplace transforms and find the Laplace transforms of elementary functions. (L-3)
2. Find the Laplace transforms of general functions using its properties. (L-2)
3. Understand Laplace transforms of special functions (Unit step function, Unit Impulse & Periodic). (L-3)
4. Apply Laplace transforms to solve Differential Equations. (L-3)

MODULE-5	Fourier Transform Fourier Series & Fourier Transforms	Hours: 12h(9L+3T)

Fourier Series: Determination of Fourier coefficients (Euler's)–Dirichlet conditions for the existence of Fourier series–functions having discontinuity-Fourier series of Even and odd functions – Half-range Fourier sine and cosine expansions.

Fourier Transform: Fourier integral theorem (without proof)–Fourier sine and cosine integrals-complex form of Fourier integral. Fourier transform Fourier sine and cosine transforms Properties – Inverse transforms.

At the end of the Module 5, students will be able to:

1. Understand the concepts of Fourier transforms. (L-2)
2. Apply the properties of Fourier transforms to various engineering problems. (L-3)
3. Apply the concepts of Fourier transforms to Find impulse. (L-3)
4. Make use of the Fourier transforms and its inverse in practical applications of electronics engineering. (L-3)

Total hours	**64**

Content beyond syllabus

1. Complex Fourier series.
2. Parseval's Identity for Fourier Transforms.

Self-Study:

Contents to promote self-Learning:

SNO	Topic	CO	Reference
1	Vector Differentiation & vector integration	**CO1**	https://youtu.be/a19x_YG0oLg
2	Complex differentiation	**CO2**	https://youtu.be/pfCwRLK29h4https://youtu.be/KHiw9Vs-aLM
3	Complex integration	**CO3**	https://youtu.be/luJMl37-nsohttps://youtu.be/EDVJotmT584
4	Laplace transform &Inverse Laplace transforms	**CO4**	https://youtu.be/9NqdBXNyJPkhttps://youtu.be/0ZlThUd-yyw
5	Fourier series & Fourier transforms	**CO5**	https://youtu.be/4cSZDHxyBf4

Text Book(s):

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers.
2. Ramana B.V., "Higher Engineering Mathematics", McGraw Hill Publishers.

Reference Book(s):

1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley.
2. Veerarajan T., "Engineering Mathematics", Tata McGraw-Hill.
3. N.P. Bali and Manish Goyal,"AText ook of Engineering Mathematics",Laxmi Publication

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Online Resources/ Web References:

1. http://keralatechnologicaluniversity.blogspot.in/2015/06/erwin-kreyszig-advanced-engineering-mathematics-ktuebook-download.html
2. http://www.faadooengineers.com/threads/13449-Engineering-Maths-II-eBooks .
3. http://www.efunda.com/math/math_home/math.cfm
4. http://www.ocw.mit.edu/resources/#Mathematics
5. http://www.sosmath.com/
6. http://www.mathworld.wolfram.com

https://youtu.be/VzGnb2K4RGQ

NARAYANA ENGINEERING COLLEGE:NELLORE								
	BUILDING MATERIAL SCIENCE							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
II	2	0	0	48	2	40	60	100

Pre-requisite: Nil

Course Objectives:

1. Develop knowledge of material science and behavior of various building materials used in construction
2. Identify the construction materials required for the assigned work.
3. Provide procedural knowledge of the simple testing methods of cement, lime and concrete etc.

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

CO 1	Find properties of stone and Brick and its characteristics
CO 2	Determine the manufacturing process of lime and cement.
CO 3	Study the test on Aggregate and standard water quality of mixing
CO 4	Study the classification of wood and wood products.
CO 5	Study the different miscellaneous materials.

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	-	-	1	2	-	2	-	1	-	-	3	2	1
CO2	3	-	-	-	2	-	1	-	-	-	-	3	2	-
CO3	2	-	-	-		-	-	-	-	2	-	2	2	-
CO4	2	-	-	1	2	-	-	-	-	2	-	2	3	-
CO5	2	-	2	1	2	-	1	-	1	2	-	3	3	2

1: Low, 2-Medium, 3- High

COURSE CONTENT

MODULE -1	STONES AND BRICKS	(9H)

Stones: Introduction, classification of rocks, common building stones, quarrying of stones, dressing of stone, characteristic of good building stone, criteria for selection of stones.

Bricks: Clay bricks, ingredients of good brick earth, process of bricks, characteristics of good clay bricks, classification of clay bricks, defects of clay bricks; special bricks-Fly ash bricks, hollow bricks -uses.

At the end of the Module 1, students will be able to:

1. Remember the properties of stone and Bricks (BL1)
2. Explain the different principles applicable on study of classification of rocks (BL2)
3. Understand the process to measurement characteristic of good clay bricks (BL2)
4. Demonstrate the defects of clay bricks (BL3)

MODULE -2	LIME AND CEMENT	(10H)

Lime: Manufacture of lime, classifications of limes, properties of lime- putty-characteristics and usage precaution in handling of lime-storage of lime.

Cement: Raw materials used, Process of Manufacturing, Chemical composition, Bogue's Compounds - Types of cement, Tests on cement – Uses of cement. Properties of Cement – Storage of Cement.

At the end of the Module 2, students will be able to:

1. Determine the Manufacture of lime (BL3)
2. Know the basic concepts of cement (BL2)
3. Demonstrate the knowledge of test on cement (BL3)

MODULE-3	AGGREGATES AND WATER	(11H)

Aggregates: Classification of aggregate–Coarse and fine aggregates, Particles hapeand Texture, Specific gravity, Bulk density, porosity and Absorption, Moisture content of Aggregate– sand; sources, impurities- classification of sand for making concrete-Bulking of sand, Sieve analysis- tests for quality of sand. Pozzolanas- pozzolanic materials- advantages of addition of pozzolanas.Water: Introduction – Quality of mixing water – Effect of mixing water from different sources –Water for washing aggregates–Standards for curing water.

At the end of the Module 3, students will be able to:

1. Explain the different test on aggregate (BL2)
2. Differentiate the classification of flows (BL4)
3. Determine the effect of mixing water from different sources (BL4)
4. Define the standards for curing water (BL2)

MODULE-4	WOOD AND WOOD PRODUCTS	(9H)

Wood: Introduction, classification of trees, structure of timber, classification of timber, characteristics of good timber, seasoning of timber, defects in timber, decay in timber, preservation of timber, suitability of timber for specific uses, Properties of timber.Wood Products: Veneers; Plywood and its types, Fiber boards; laminated wood, merits of plywood and laminated wood, Lamina Boards, Block boards, Batten board, Particleboards.

At the end of the Module 4, students will be able to:

1. Determine the classification of timber (BL4)
2. List the types of timbers (BL1)
3. Classify the plywood and its types (BL2)
4. Determine the veneers and plywood (BL4)

MODULE-5	MISCELLANEOUS MATERIALS	(9H)

Ferrous metals: Types (iron, pig iron, cast iron, wrought iron, steel, rolled steel sections and reinforcing steel bars)Tensile testing of steel sections (IS: 1608) – Common anti-corrosive coatings. Ceramic Materials: introduction, properties; Refractories: classification, properties;Glass: constituents, commercial forms of glasses, Glass fibers and its applications;**Paints:** Introduction, Constituents, covering power; water paints-classes; enamel paints; varnish, varnishing, types; Bitumen, tar and asphalt-types and applications; water proofing materials; Geosynthetics; composite materials-examples, applications.

At the end of the Module 5, students will be able to:

1. Determine the different miscellaneous materials (BL3)

2. Describe the applications of Glass fibers (BL6)
3. Find the characteristics of paint (BL2)
4. Determine the process of steel (BL3)

Total: 48 Hours

Term work:

1. Assignment on manufacture process of cement.
2. Developing a demo model on different size of aggregates

Content beyond syllabus:

2.

Self-Study:

Contents to promote self-Learning:

SNO	Topic	CO	Reference
1	**STONES AND BRICKS**	CO1	A text of Building material by S K Duggal – New Age International Publishers; Second Edition.
2	**LIME AND CEMENT**	CO2	A text Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) ltd., New Delhi.
3	**AGGREGATES AND WATER**	CO3	A text of Building material by S K Duggal – New Age International Publishers; Second Edition.
4	**WOOD AND WOOD PRODUCTS**	CO4	A text Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) ltd., New Delhi.
5	**MISCELLANEOUS MATERIALS**	CO5	A text Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) ltd., New Delhi.

Text Book(s):

1. Building material by S K Duggal – New Age International Publishers; Second Edition
2. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain – LaxmiPublications (P) ltd., New Delhi.

Reference Book(s):

1. Building materials by Rangawala, charotar Publishing house, New Delhi.
2. Building materials by P.C. Varghese, Prentice -Hall of India private Ltd, New Delhi
3. Building Materials and construction by S.S.Bhavikatti, Vikas Publishing House Pvt. Ltd.

Online Resources:

1. **https://www.journals.elsevier.com/construction-and-building-materials**
2. **https://bie.tg.nic.in/Pdf/BuildingMaterialsConstruction.pdf**
3. **https://easyengineering.net/building-materials-and-construction_18/**

Web References:

1. www.nptel.ac.in/courses/105101088/2 home.htm
2. nptel.ac.in/courses/105/106/105106053/
3. nptel.ac.in/courses/105/106/105106053/
4. https://nptel.ac.in/courses/105/107/105107156/

NARAYANA ENGINEERING COLLEGE: NELLORE								
	ENGINEERING MECHANICS							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
II	3	1	0	48	4	40	60	100

Pre-requisite: Differentiation and integration topics in mathematics.

Course Objectives:

1. To learn the fundamentals of mechanics concept of force and its types.
2. To learn the effect of friction on equilibrium.
3. To develop knowledge in analyzing different types of trusses.
4. To gain proficiency in understanding the concept moment of inertia.
5. To learn kinematics, kinetics of particle and rigid body, related principles.

Course Outcomes: After successful completion of the course, the student will be able to:
Compute the resultant of system of forces in plane and space acting on bodies. (BL-3) Solve the mechanics problems associated with friction forces. (BL-3)
Determine the support-reactions and analyze the internal forces of the members of various trusses and frames. (BL-4)
Calculate the location of centroid of composite areas. (BL-4)
Apply transfer theorems to determine properties of various sections. (BL-4)
Solve problems related to kinetics. (BL-3)

COURSE CONTENT

MODULE – 1	**System of Forces**	**10 H**

Composition and resolution of forces, parallelogram law, principle of transmissibility, types of force systems - concurrent and concurrent coplanar forces, resultant of coplanar force systems couple, moment of a force Varignon's theorem, concept of free body diagrams, concept of equilibrium of coplanar force systems.

MODULE -2	**Friction**	**09 H**

Definition of Friction and its applications, angle of friction, angle of repose, coefficient of friction. Typesof Friction, laws of static friction, Description and application of friction on blocks on horizontal and inclined planes.

MODULE-3	**Analysis of Trusses**	**09 H**

Introduction to plane trusses, analysis of plane trusses by method of Joints, method of sections & tension coefficient method.

MODULE-4	**Centroid & Moment of Inertia**	**10H**

Definition of Centroid & Centre of Gravity, Axes of Symmetry, Location of Centroid of Rectangle, Triangle, Semicircle, Quadrant and sector of a circle by method of integration. Numerical problems onCentroid of Composite sections.

Concept of Moment of inertia, perpendicular axis theorem, parallel axis theorem, and moment of inertia of Rectangular, Circular, Semicircular, Quadrant of a circle Triangular sections by method of integration. Numerical Problems on moment of inertia of composite section.

MODULE-5	**Kinematics & Kinetics**	**10 H**

Rectilinear and Curvilinear motion, Velocity, Acceleration, and Motion of a projectile, Relative motion. Kinetics of rectilinear motion, Newton's laws of motion, D'Alembert's principle, Work-energymethod, Impulse-momentum equation, Kinetics of circular motion, Rotation.	
Total	**48 h**

Text Book(s):

1. S.S .Bhavikatti, "Engineering Mechanics", 4th edition, New Age International, 2008.
2. R.K. Bansal, "A text book of Engineering Mechanics", LaxmiPublications,2010
3. Irving Shames, GKM Rao, "Engineering Mechanics: Statics and Dynamics", 4thedition, Pearson,2009.

Reference Book(s):

1. Basudeb Bhattacharya., "Engineering Mechanics", 2ndedition, Oxford University Press (India),2015.
2. K L Kumar, Veenu Kumar, "Engineering Mechanics", 4th edition, Tata McGraw-Hill, 2010.
3. Engineering Mechanics, R.S.Khurmi, S.Chand, 2012.

NARAYANA ENGINEERING COLLEGE:NELLORE								
	PHYSICS FOR CIVIL ENGINEERING LAB							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
ii	0	0	2	36	1	40	60	100

Pre-requisite: Nil

Course Objectives:

1. To provide student to learn about some important experimental techniques in physics with knowledge in theoretical aspects so that they can excel in that particular field. To prepare students for performing requirement analysis and design of variety of applications.
2. To enable the students to understand the importance of sensors and resonance phenomenon.
3. To make the students to identify the variation of illuminating power of the lamp with the applied voltage and inverse square law of light

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

CO 1	learn important concepts of physics through involvement in the experiments by applying theoretical knowledge.
CO 2	To make the students to identify the importance of sensors and resonance phenomenon.
CO 3	recognize the applications of laser in finding the wavelength, slit width and its role in diffraction studies
CO 4	To make the students to understand the important parameters of optical fibres and Hall effect phenomenon.

CO-PO Mapping

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

1: Low, 2-Medium, 3- High

COURSE CONTENT	CO
Task 1 - Determination of spring constant of springs using Coupled Oscillator	
objective:To study normal modes of oscillation of two coupled pendulums and to measure the normal mode frequencies as well as spring constant. Two identical compound pendulums are coupled by means of a spring. Normal mode oscillations are excited and their frequencies are measured.	CO 1
Task:2 Determination of velocity of sound and compressibility of liquid-ultrasonic interferometer	
Objective: Determination of velocity of sound and compressibility of liquid using ultrasonic interferometer	CO 1
Task -3 Determination of the rigidity modulus of the material of a given wire using Torsional Pendulum	

objective: To determine the rigidity modulus of the material of a given wire using Torsional Pendulum A torsion pendulum consist of a disk-like mass suspended from thin rod. When the mass is twisted about the axis of the wire , the wire exerts a torque on the mass, tending to rotate it back to its original position. If twisted and released, the mass will oscillate back and forth to its original position executing a simple harmonic motion. This experiment can be used to assess the shear elastic behavior of a given material .	CO 1
Task -4 . Determination of thermal conductivity of a bad conductor (Lee's disc method).	
objectives: 1.To know about different modes of heat transfer, via conduction, convection and radiation 2.To find the coefficient of thermal conductivity of a bad conductor by Lee's method. Thermal conductivity (k), is the property of a material that indicates its ability to conduct heat. Conduction will take place only if there exists a temperature gradient in a solid (or stationary fluid) medium. Conductive heat flow occurs in direction of the decreasing temperature. This transfer will continue until thermal equilibrium is reached. The rate at which the heat is transferred is dependent upon the magnitude of the temperature gradient, and the specific thermal characteristics of the material. Thermal conductivity is quantified in the units of W/mK,	CO 1
TASK -5 To determine the numerical aperture and acceptance angle of a given optical fiber	
Objective: To determine the numerical aperture and acceptance angle of a given optical fiber. In optical fibres light travel by multiple total internal reflections. Numerical aperture represents light gathering powerof optical fibre. Acceptance angle represents maximum limiting angle at one end of optical fibre for the liglht ray to travel by multiple total internal reflections through the core region of thefibre. 1. Optical fibers may be used for accurate sensing of physical parameters and fields like pressure, temperature and liquid level. 2. For military applications like fiber optic hydrophones for submarine and underwater sea application and gyroscopes for applications in ships, missiles and aircrafts.	CO 4
TASK-6 Determination of pressure variation using Strain Guage sensor	
Objective: Determination of pressure variation using Strain Guage sensor	CO 2
TASK -7 Verification of laws of transverse vibration of a stretched string using sonometer	
objective: To **Verify laws of transverse vibration of a stretched string using sonometer** In this experiment we will verify three laws which establish 1)Relation between natural frequency (n) and length of vibrating segment(l). 2)Relation between natural frequency (n) and tension (T) in the string. 3) Relation between natural frequency(n) and linear mass density (m).	CO 2
TASK -8 Determination of wavelength of LASER light using diffraction grating	
Objectives :1. To determine the concept of diffraction 2. To determine the wavelength of the given Laser source.	CO 3
TASK -9 . Laser: Diffraction at a single slit	
Objective:Determination of width of a given single slit using laser diffraction method Laser beam has high monochromaticity,coherence and directionality. Hence it forms a clear diffraction pattern and we can measure width of a single slit accurately.	CO 3
TASK -10: Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.	

The objective :To determine a) sign of the charge carriers, b) charge carrier concentration, c) mobility of the charge carriers of a given semiconductor	CO4
Additional Experiments:	
TASK -11 Laser: Diffraction at a double slit	
Objective: Determination of width of a given double slit using laser diffraction method. With this experiment we can demonstrate diffraction nature of lasers and measure width of a double slit accurately.	CO 3
TASK -12 Variation of illuminating power of the lamp with the applied voltage	
Objective: To study the Variation of illuminating power of the lamp with the applied voltage	CO 1
Virtual lab: 1) Laser beam divergence and spot size https://vlab.amrita.edu/?sub=1&brch=189&sim=342&cnt=1 2. Michelson's Interferometer- Wavelength of laser beam https://vlab.amrita.edu/?sub=1&brch=189&sim=1106&cnt=1 3. Melde's String Apparatus https://vlab.amrita.edu/?sub=1&brch=201&sim=882&cnt=1	

Self-Study:

Contents to promote self-Learning:

SNO	Topic	CO	Reference
1	Newton rings		**https://youtu.be/PU-SeNfIRcs**
2	Diffraction grating experiment - Wavelength of mercury spectrum		**https://youtu.be/N0lxwqANsd4**
3	Experiment - Laser Grating- Determination of Wavelength of Given Laser Source		**https://youtu.be/764Fr0mnOrQ**

Text Book(s):

1. C. L. Arora, “Practical Physics”, S. Chand & Co., New Delhi, 3rd Edition, 2012.
2. Vijay Kumar, Dr. T. Radhakrishna, “Practical Physics for Engineering Students”, S M Enterprises, 2nd Edition, 2014.

Reference Book(s):

1. S. Balasubramanian, M.N. Srinivasan “A Text book of Practical Physics”- S Chand Publishers, 2017.
2. C.H. Bernard and C.D. Epp, John Wiley and Sons, "Laboratory Experiments in College Physics" Inc., New York, 1995.
3. Dr.Ruby Das, C.S.Robinson, Rajesh Kumar and Prasanth Kumar “A text book of Engineering Physics Practical”, 1st edition, Sahu University Science Press, 2010.
4. Jayaraman, “Engineering Physics Laboratory Manual”, 1st edition, Pearson Education, 2014.

Web Resources:

1. https://www.scribd.com/doc/143091652/ENGINEERING-PHYSICS-LAB.
2. https://www3.nd.edu/~wzech/LabManual_0907c.pdf.
3. https://www.morebooks.de/store/gb/book/engineering-physics-lab-manual/isbn/978-3-330-34402.

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NARAYANA ENGINEERING COLLEGE:NELLORE								
	ENGINEERING WORK SHOP							R2021
Semester	Hours / Week			Totalhrs	Credits	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
II	0	0	3	48	1.5	40	60	100

COURSE CONTENT (TRADES FOR PRACTICE)

Trade -1 Carpentry (10 H)

Familiarity with different types of wood sand tools used in wood working and make following joints from out of 300x40x25mm soft wood stock.

a) Half–Lap joint.
b) Mortise and Tenon joint

Trade-2 Fitting (10 H)

i.]Familiarity with different types of tools used in fitting and do the fitting exercises out of 80 x 50 x 5 mm M.S. stock

a) V-fit b) Dovetail fit

Trade - 3 Sheet Metal Work (10 H)

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from out of 22 or 20 guage G.I. sheet

a) Tapered tray b) Conical funnel

Trade - 4 Electrical House Wiring (9 H)

Familiarities with different types of basic electrical circuits and make the following electrical connections

a) Two lamps in series
b) Two way switch
c) Tube light
d) Two lamps in parallel with 3 pin plug and switches

Trade 5 - Welding (9 H)

Familiarity with different types of tools used in welding and do the following welding exercises

1. Single V butt joint
2. Lap joint

DEMO EXPERIMENTS:

1. **Plumbing,**
2. **Two wheeler tyre puncture**
3. **Power Tools**

Text Book(s):

1. Hajra Choudhury S.K., Hajra Choudhury A.K., Nirjar Roy S.K. "Elements of WorkshopTechnology"Vol-I2008&Vol-II2010MediaPromoters&Publishers Pvt.Limited, Mumbai.
2. Kalpakjian S. and Steven S.Schmid, "Manufacturing Engineering and Technology" 4thEdition, Pearson Education IndiaEdition,2002.
3. P. Kannaiah &K. L. Narayana "Workshop manual" 2ndEd., Scitech publications Pvt.Ltd.,Hyderabad,2008.

Reference Book(s):

1. Gowri P., Hariharan and Suresh Babu A., "Manufacturing Technology-I", PearsonEducation2008.

NARAYANA ENGINEERING COLLEGE:NELLORE								
	ENGINEERING A N D I T WORK SHOP							R2021
PART – A ENGINEERING WORK SHOP								
Semester	Hours / Week			Total hrs	Credits	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
II	0	0	4	64	2	40	60	100

Pre-requisite: Basic mathematics.

Course Objectives:

1. To know basic workshop processes and adopt safety practices while working with various tools and equipments
2. To identify, select and use various marking, measuring, holding, striking and cutting tools & equipments.
3. To know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
4. To gain knowledge about the usage of tools like Word processors, Spreadsheets, Presentations
5. To learn about Networking of computers and use Internet facility for Browsing andSearching

Course Outcomes: After successful completion of the course, the student will be able to	
CO 1	Understand the safety aspects in using the tools and equipments. (BL-2)
CO 2	Apply tools for making models in respective trades of engineering workshop.(BL-3
CO 3	Apply basic electrical engineering knowledge to make simple house wiring circuits and check their functionality.(BL-3)
CO 4	Understand to disassemble and assemble a Personal Computer and prepare the computer ready to use (BL-2)
CO 5	Apply knowledge to Interconnect two or more computers for information sharing (B 3)

COURSE CONTENT (TRADES FOR PRACTICE)

Trade -1 Carpentry (8 H)

Familiarity with different types of woods and tools used in wood working and make following joints from out of 300x40x25mm soft wood stock.

a) Half–Lap joint.
b) Mortise and Tenon joint

Trade-2 Fitting (8 H)

Familiarity with different types of tools used in fitting and do the fitting exercises out of 80 x 50 x 5 mm M.S. stock

a) V-fit b) Dovetail fit

Trade - 3 Sheet Metal Work (8 H)

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from out of 22 or 20 guage G.I. sheet

a) Tapered tray b) Conical funnel

Trade - 4 Electrical House Wiring (8 H)

Familiarities with different types of basic electrical circuits and make the following electrical connections

a) Two lamps in series
b) Two way switch
c) Tube light
d) Two lamps in parallel with 3 pin plug and switches

Text Book(s):

1. **Hajra Choudhury S.K., Hajra Choudhury A.K., Nirjar Roy S.K. "Elements of Workshop Technology" Vol-I 2008 & Vol-II 2010 Media Promoters & Publishers Pvt. Limited, Mumbai.**
2. **Kalpakjian S. and Steven S. Schmid, "Manufacturing Engineering and Technology" 4th Edition, Pearson Education India Edition, 2002.**
3. **P. Kannaiah & K. L. Narayana "Workshop manual" 2nd Ed., Scitech publications**
4. **Pvt. Ltd., Hyderabad, 2008.**

NARAYANA ENGINEERING COLLEGE:NELLORE								
	BUILDING MATERIAL SCIENCE LAB							R2020
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
II	0	0	3	48	1.5	40	60	100

Pre-requisite:

Course Objectives:

4. Learn basic concepts of building material and the particle size and shape suitable for construction .
5. Develop understanding on various technological applications for processing of test on cement durability for construction.
6. Examine the various test for utilizing the aggregate in building construction

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

CO 1	Students can able to understand the particle knowledge on bricks sizes and water absorption
CO 2	Students can able to understand the particle knowledge on different test on cement
CO 3	Students can able to understand the particle knowledge on different test on aggregate
CO 4	
CO 5	

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	-	2	-	1	2	1	-	-	-	3	3	3
CO2	3	2	-	2	-	1	2	1	-	-	-	3	3	3
CO3	3	2	-	2	-	1	2	1	-	-	-	3	3	3
CO4														
CO5														

1-Low, 2-Medium, 3- High

	CO
Task- 1: Tests on brick	CO1
Task1a: Shape and size of the given bricks	CO1
Objective:. To determine the shape and size of the given bricks	
Task- 1b: Water absorption of brick	CO1
Objective: To determine water absorption of bricks	
Task- 1c: Compression strength of bricks	CO1
Objective: To determine the compressive strength sample of cement.	
Task- 2:Tests on Cement	CO2
Task- 2a: Fineness of cement	CO2
Objective:. To determine the fineness of a given sample of cement	
Task- 2b: Standard consistency of cement	CO2
Objective : To determine the normal consistency of a given sample of cement	
Task- 2c: Setting time of standard cement paste	CO2
Objective: To determine the initial and final setting time of a given sample of cement.	
Task- 3: Tests on aggregate	CO3
Task- 3a: Specific gravity and water absorption of coarse aggregate	CO3

Objective: To determine specific gravity and water absorption of a given sample of coarse aggregate	
Task- 3b: Particle size distribution of coarse aggregate	CO3
Objective: To determine the particle size distribution of coarse aggregate	
Task- 3c: Flakiness and elongation index tests of coarse aggregate	CO3
Objective: To determine the shape and size of the coarse aggregate	
Task- 3d: Particle size distribution of fine aggregate	CO3
Objective: To determine the particle size distribution of Fine aggregate	
Additional Experiments	
Task- e: To determine the specific gravity of fine aggregate	
Objective: To determine the specific gravity of fine aggregate	
Task- f: To determine the impact value of coarse aggregate	
Objective: To determine the impact value of coarse aggregate	

Virtual labs:

1. https://virtlabs.tech/building-materials/
2. https://www.nist.gov/programs-projects/virtual-cement-and-concrete-testing-laboratory

Text Books:

1. 1.Building material by S K Duggal – New Age International Publishers; Second Edition
2. 2. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) ltd., New Delhi.

Reference Book(s):

1.Building materials by Rangawala, charotar Publishing house, New Delhi.

2. Building materials by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi

3. Building Materials and construction by S.S.Bhavikatti, Vikas Publishing House Pvt.Ltd.

COMMUNICATION SKILLS LAB
Common to all Branches (CSE, ECE,EEE,CE,ME)

Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
II	0	0	2	32	1	40	60	100

CO -1: To enable students comprehend the concept of communication skills.
CO-2: To enable students to participate and learn the right ways of debating
CO -3: To enable students to participate and learn the right ways of Group discussion
CO - 4: To improve the skills of writing resume
CO –5: To enhance the skills of oral presentation

TASK – 1

Ice - Breaking Activity, Introducing Oneself and Others – Role Plays - Oral Description of Pictures, Photographs, Products, and Process

Practice-1 : - Ice Breaking Activity, Introducing Oneself and Others.
Practice-2 : Role Plays
Practice-3 : Oral Description of Pictures, Photographs, Products, and Process

TASK – 2

What is Debate, How to Debate, Tips for Debate, Debate Practice, Explanation of Debate Techniques, Debate Videos Presentation-Telephone Etiquette, Making an Appointment, Telephone Talk and Tips

Practice-4: Debate (Planned & Extempore)
Practice-5: Telephonic Conversation Practice

TASK – 3

What is Group Discussion, Types of Group Discussion, Tips and Techniques for Effective Group Discussion, Group Discussion Videos Presentation

Practice-6: Group Discussions (Planned & Extempore)
Practice-7 : Group Discussions ()

TASK – 4

Email writing - Resume Writing: Cover Letter – Structure of Resumes – Types of Resumes

Practice-8 : Cover Letter
Practice-9 : Resume Writing

TASK – 5

Oral presentations (individual and group) through Seminars / PPTs - Importance of Body Language - Poster Presentation - Public Speaking Tips, Effective Presentation of renowned speakers.

Practice-10 : Public Speaking / Oral Presentations
Practice-11 : Presentation using PPTs
Practice-12 : Poster Presentation

Software :

5. Walden ELCS&AECS Lab
6. English In Mind (EIM) all level by Cambridge University
7. Cambridge Pronunciation Dictionary by Cambridge University
8. Oxford Advanced Learners Dictionary, Oxford University

Web Resources:

- *Grammar/Listening/Writing 1-language.com*
- *http://www.5minuteenglish.com/*

- *https://www.englishpractice.com/ Grammar/Vocabulary*
- *English Language Learning Online*
- *http://www.bbc.co.uk/learningenglish/*
- *http://www.better-english.com/*
- *http://www.nonstopenglish.com/*
- *https://www.vocabulary.com/*
- *BBC Vocabulary Games*
- *Free Rice Vocabulary GameReading*
- *https://www.usingenglish.com/comprehension/*
- *https://www.englishclub.com/reading/short-stories.htm*
- *https://www.english-online.at/Listening*
- *https://learningenglish.voanews.com/z/3613*
- *http://www.englishmedialab.com/listening.htmlSpeaking*
- *https://www.talkenglish.com/*
- *BBC Learning English – Pronunciation tips*
- *Merriam-Webster – Perfect pronunciation ExercisesAll Skills*
- *https://www.englishclub.com/*
- *http://www.world-english.org/*
- *http://learnenglish.britishcouncil.org/*

Online Dictionaries

- *Cambridge dictionary online : https://dictionary.cambridge.org/*
- *MacMillan dictionary : https://www.macmillandictionary.com/*

Oxford learner's dictionaries : https://www.oxfordlearnersdictionaries.com/

SEMESTER III

Course Code	Category	Course Title	Contact Periods per week				Credits	Scheme of Examination M Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Tot Mar
21MA1006	BS	Probability Statistics and Numerical Methods	3	0	0	3	3	40	60	10
21ES1009	ES	Mechanics of Fluids	3	0	0	3	3	40	60	10
21CE2001	PC	Building Construction and Planning	3	0	0	3	3	40	60	10
21CE2002	PC	Mechanics of Solids	3	0	0	3	3	40	60	10
21CE2003	PC	Surveying - I	3	0	0	3	3	40	60	10
21EN1001-08	HS	Universal Human Values	3	0	0	3	3	40	60	10
21CE2501	PC	Building drawing	0	0	3	3	1.5	40	60	10
21CE2502	PC	Mechanics of Solids lab	0	0	3	3	1.5	40	60	10
21CE2503	PC	Surveying- I Lab	0	0	3	3	1.5	40	60	10
21CD6001	SC	Career competency Development - I	0	0	2	2	1	40	60	10
21CC6001	SC	Value added course/Certificate course- I	0	0	0	0	1	40	60	10
		Counseling/Mentoring	0	0	1	1	0	--	--	--
		Sports/ Hobby Clubs/ Activities	0	0	2	2	0	--	--	--
		Activity Point Programme	During the Semester					20 Points		
		Total	**18**	**0**	**14**	**32**	**24.5**	**440**	**660**	**110**

NARAYANA ENGINEERING COLLEGE:NELLORE								
21ES1009	MECHANICS OF FLUIDS							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
III	3	0	0	48	3	40	60	100

Pre-requisite: Nil

Course Objectives:

7. To introduce and explain basic fundamentals of Fluid Mechanics, which is used in the applications of Aerodynamics, Hydraulics, Marine Engineering, Gas dynamics etc.
8. Learn the importance, application and interrelationship of various properties of fluid like mass density, viscosity, and surface tension.
9. To apply the working concepts of various devices used to measure the velocity and discharge of fluid.
10. To determine the forces on plane and curved surfaces in a fluid at rest and the concepts of buoyancy and meta-centre.
11. To study the properties of a moving fluid like velocity and acceleration, and the forces on fluid through the continuity equation, Euler's and Bernoulli's equations.

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

CO 1	Students able to identify the properties of fluids, Pressure and Understand the importance of flow measurement & Statics.
CO 2	Students able to Determine the hydrostatic forces and buoyancy forces on different bodies.
CO 3	Students able to understand the kinematics of fluid's with different equations like continuity equation etc.
CO 4	Students able to find the velocity & discharge by using orifices, notches & weirs.
CO 5	Students able to understand the friction, minor & major losses in pipes and its experimental procedures.

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	-	-	2	-	-	-	1	1	-	3	2	-
CO2	3	2	2	-	1	-	-	-	-	-	-	1	2	-
CO3	2	2	-	-		-	-	-	-	2	-	2	2	-
CO4	3	2	-	2	2	-	-	-	-	2	-	2	3	-
CO5	3	3	2	2	3	-	1	2	2	3	2	3	3	2

1: Low, 2-Medium, 3- High

COURSE CONTENT

MODULE -1	PROPERTIES OF FLUIDS AND PRESSURE MEASUREMENT	(9H)

Properties of fluids: introduction: Dimensions and units – properties of fluids-mass density, specific weight, specific volume, specific gravity, viscosity-units, dynamic and kinematic viscosity, newton's law of viscosity, Newtonian and non-Newtonian fluids, variation of viscosity with temperature; surface tension-surface tension on liquid droplet, hollow bubble and liquid jet; capillarity-capillary rise and capillary fall.

Pressure Measurement: Fluid Pressure at a Point; Pascal's law, Hydrostatic law, Atmospheric, Absolute, gauge, atmospheric and vacuum pressures; Hydrostatic paradox; Pressure

measurement – manometers- Simple, differential and Micro Manometers; vapor pressure and cavitation.

At the end of the Module 1, students will be able to:

5. Remember the properties of fluids. (BL1)
6. Explain the different principles applicable on study of fluids (BL2)
7. Understand the process to measurement of pressure by various instruments (BL2)
8. Demonstrate the fluid statics on different surfaces (BL3)

MODULE -2	HYDROSTATIC FORCES AND BUOYANCY	(9H)

Hydrostatic forces on surfaces: Total Pressure and Centre of Pressure- on Horizontal Plane Surface; Vertical Plane Surface; Inclined Plane Surface and Curved Surfaces. **Buoyancy:** Buoyancy; Buoyant Force and Centre of Buoyancy, Stability of submerged bodies and floating bodies; Metacenter and metacentric height, analytical method for metacentric height..

At the end of the Module 2, students will be able to:

4. Determine the total and central pressure on different surfaces (BL3)
5. Know the basic concepts of buoyancy (BL2)
6. Demonstrate the knowledge of metacentric (BL3)

MODULE-3	KINEMATICS AND DYNAMICS OF FLUID FLOW	(13H)

Kinematics of Fluid Flow: Introduction**,** Methods of describing fluid motion; Classification of fluid flow; Steady, unsteady, uniform and non-uniform flows; Laminar and turbulent flows; three-, two- and one- dimensional flows; Irrotational and rotational flows. Streamline; Pathline; Streakline.Rate of flow, continuity equation, continuity equation in three-dimension.

Dynamics of Fluid flow: Forces acting on a Fluid in Motion; Equations of motion; Euler's equation of motion; Bernoulli's equation; assumptions. Practical applications of Bernoulli's equation: Venturimeter, Rate of flow through venturimeter, inclined venturimeter; Orifice meter, Rate of flow through Orifice Meter; Measurement of velocity by Pitot tube, Pitot-static tube.

At the end of the Module 3, students will be able to:

5. Classify the kinematics of fluids (BL2)
6. Differentiate the classification of flows (BL4)
7. Determine the measurement of velocity through various devices (BL4)
8. Classify the dynamics of fluids (BL2)

MODULE-4	ORIFICES, MOUTHPIECES, NOTCHES AND WEIRS	(8H)

Orifices and Mouthpieces: Orifice-Classification of Orifices; Flow through an orifice, Hydraulic co-efficient, Determination of coefficients for an Orifice, Flow through large rectangular Orifice; Flow through submerged Orifice – fully sub-merged and partially sub- merged. Mouth piece-Classification of Mouthpieces, Flow through external and internal cylindrical Mouthpiece.

Notches and Weirs: Introduction, Classification of Notches and Weirs, Flow through rectangular, triangular and trapezoidal notches and weirs; End contractions; Velocity of approach; Cipolletti weir; Discharge over Broad crested weir, narrow crested weir and submerged weir.

At the end of the Module 4, students will be able to:

5. Determine the coefficients for an orifice (BL4)
6. List the types of mouthpieces (BL1)
7. Classify the notches and weirs (BL2)

8. Calculate the discharge of different types of notches and weirs (BL3)

MODULE-5	FLOW THROUGH PIPES	(9H)

Flow through pipes: Energy losses in pipelines; loss of energy due to friction-Darcy Weisbach equation; Minor energy losses in pipelines; Hydraulic Grade Line and Total Energy Line; Siphon; Pipes in series, concept of equivalent length; pipes in parallel& branched pipes.

Laminar & Turbulent flow in pipes: Reynolds's experiment; Characteristics of laminar flow; Steady laminar flow through a circular pipe (Hazen poiseuille equation). Characteristics of turbulent flow, Prandtl's mixing length theory, Hydro dynamically smooth and rough boundaries.

At the end of the Module 5, students will be able to:

5. Determine the loss of energy due to friction (BL3)
6. Draw the HGL & TEL (BL6)
7. Find the characteristics of laminar flow (BL2)
8. Determine the hydro boundaries of different surfaces (BL3)

Total: 48 Hours

Term work:

3. Solve three reservoir problem / pipe network analysis using Excel or any programming language.
4. Assignment on drawing of flow net graphically.
5. Developing a demo model related to any fluid flow phenomenon (physical model/ soft model).

Content beyond syllabus:

3. Archimedes Principle
4. Friction in pipes
5. Flow through pipes
6. Hydraulic jump
7. Specific Energy

Self-Study:

Contents to promote self-Learning:

SNO	Topic	CO	Reference
1	Fluid properties – Types of fluids	CO1	A text of Fluid mechanics and hydraulic machines by Dr.R.k.Bansal – Laxmi Publications (P) Ltd., New Delhi.
2	Conditions of equilibrium of submerged and floating bodies	CO2	A text of Fluid mechanics and hydraulic machines by Dr.R.k.Bansal – Laxmi Publications (P) Ltd., New Delhi.
3	Flow nets	CO3	Modi P N and Seth S M, —Hydraulics and Fluid Mechanics, Standard Book House, Delhi, 1998.
4	Momentum equation and its application, Notches and weirs	CO4	Modi P N and Seth S M, —Hydraulics and Fluid Mechanics, Standard Book House, Delhi, 1998. A text of Fluid mechanics and hydraulic machines by Dr.R.k.Bansal – Laxmi Publications (P) Ltd., New Delhi.
5	laminar and Turbulent	CO5	Modi P N and Seth S M, —Hydraulics and Fluid Mechanics, Standard Book House, Delhi, 1998.

		Boundary layers, HGL and TEL		

Text Book(s):

1. A text of Fluid mechanics and hydraulic machines by Dr.R.k.Bansal – Laxmi Publications (P) Ltd., New Delhi.

2. Hydraulics and Fluid Mechanics by P. M. Modi and S. M. Seth, Standard Book House.

Reference Book(s):

1. Fluid Mechanics by Mohhanty A K, 'Second Edition, Prentice Hall of India Private Limited, New Delhi.
2. Theory and Applications of Fluid Mechanics, by K.Subrahmanya, Tata McGraw Hill.

Online Resources:

4. http://nptel.ac.in/courses/105103095/1-101
5. https://www.coursera.org/courses?query=fluid%20mechanics
6. https://www.classcentral.com/course/swayam-introduction-to-fluid-mechanics-7945
7. https://ocw.mit.edu/courses/mechanical-engineering/2-06-fluid-dynamics-spring-2013/syllabus/
8. https://engineeringcoursesonline.com/fluid-mechanics-online-course

Web References:

5. https://www.cambridge.org/core/journals/journal-of-fluid-mechanics
6. https://www.begellhouse.com/journals/fluid-mechanics-research.html
7. http://www.sciencepublishinggroup.com/journal/index?journalid=315
8. https://www.hilarispublisher.com/fluid-mechanics.html

NARAYANA ENGINEERING COLLEGE: NELLORE								
21CE2001								R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
III	3	0	0	48	3	40	60	100

Pre-requisite: Nil

Course Objectives:

1. Develop knowledge of material science and behaviour of various building materials used in construction
2. Identify the construction materials required for the assigned work.
3. List the requirements and different types of stairs
4. Project planning and its implementation.
5. To get maximum benefit from building and its services in terms of quality, timely completion and cost-effectiveness.
6. To compile different aspects of Building Construction, Planning and Drawing of residential buildings & Public Building

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

CO 1	Students able to understand the different types of foundation, masonry, Floors
CO 2	Students able to understand the different types of Arches, Doors and Windows, Lintels and Roof
CO 3	Students able to demonstrate the causes of DPC and treatment of water leakages
CO 4	Students able to learn the different building Bylaws and Building planning
CO 5	Students able to memorizes Learn the different planning of building and Residential building

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	1	-	-	1	1	-	-	-	-	1	2	1	-
CO2	2	2	2	-	2	2	-	-	-	-	2	2	2	2
CO3	1	1	-	1	-	-	-	2	-	-	-	-	2	-
CO4	-	2	-	-	-	-	-	-	-	-	2	2	2	-
CO5	1	-	-	-	-	1	-	-	-	-	-	2	-	-

1: Low, 2-Medium, 3- High

COURSE CONTENT

MODULE – 1	**COMPONENTS OF BUILDING -I**	**(10H)**

Foundations: components of a building, Concept of foundations; Factors affecting selection of foundations; requirements of a good foundation; Types of foundations-shallow foundations, deep foundations; causes of failures of foundations.

Masonry: Introduction, terms used in masonry; brick masonry-terms used in brick masonry, bonds in brick masonry, supervision of brick work, defects in brick work. Partition walls.

Floors: components of ground floor, selection of flooring material, materials used for flooring, types of flooring.

At the end of the Module 1, students will be able to:

1. At the end of module 1 students can know the components of building (BL -2)
2. Learn the different types of foundations (BL-1)
3. Illustrate the terms used in masonry (BL-2)
4. Students can able to understand the material used for flooring (BL-2)

MODULE-2	COMPONENTS OF BUILDING II	(10H)

Arches: Introduction, technical terms, stability of an arch, types of arches; **Lintels**: Introduction, classification of lintels. **Stairs:** Technical terms, requirement of a good stair, dimension of a step, types of stairs; Elevators, Escalators. **Doors and windows**: Introduction, location of doors and windows; Doors- size of doors, door frames, types of doors; windows-Introduction, types of windows; ventilators

Roofs: Introduction, types of roofs; Pitched Roof-Basic elements of pitched roof, types of pitched roofs, trusses, roof covering materials, light weight roofing; flat roofs-advantages, types; curved roofs.

At the end of the Module 2, students will be able to:

1. Learn the types of Arches (BL-2)
2. Students can able to understand the types of windows and also sizes of doors (BL-2)
3. Understand the types of roofs in building components (BL – 2)

MODULE-3	FINISHINGS, TREATMENT AND SUPPORTING STRUCRURES	(10H)

Pointing: Introduction, preparation of surface, method of pointing, types of painting's; Plastering: Introduction, terminology, no of coats of plastering, methods of cement plastering, types of plastering finishes, defects in plastering. **Damp Proofing**: Introduction, causes, effects, materials used for damp proofing, methods of damp proofing, DPC treatment in buildings; **Water Leakages**: Reasons, preventive measures, water proofing of flat roofs. **Scaffolding**: Introduction, component parts and types; **Form work**: introduction, requirements of good form work, cost of form work, material used for preparing form work.

At the end of the Module 3, students will be able to:

1. Understand the concept of supporting structures in building planning (BL-2)
2. Analysis Preventive measures in water leakage (BL-4)
3. Illustrate the process of damp proofing treatment in building. (BL-1)

MODULE-4	PLANNING AND REGULATIONS OF BUILDINGS	(9H)

Planning of Buildings: Types of buildings, types of residential buildings, site selection for residential building; Space requirement for a building-point to be considered, determining areas
For different units of buildings.

Building Byelaws and Regulations: Introduction, Terminology, Objectives of building byelaws, Minimum plot sizes, Open space requirements, Plinth area, floor area, carpet area, Floor area ratio(FAR), Floor space Index (FSI), Principles underlying building byelaws.

At the end of the Module 4, students will be able to:

1. Understand the planning and regulation of building. (BL-2)
2. Learn the Bye laws and regulations (BL-2)
3. Study the Principle underlying building byelaw (BL-1)

MODULE-5	PLANNING OF BUILDINGS	(9H)

Planning of Residential Buildings: Minimum standards for various parts of buildings, requirements of different rooms and their grouping, characteristics of various types of residential buildings.
Planning of Public Building: Planning of Educational institutions, Hospitals, Office buildings, Industrial buildings, Hotels and Motels, Hostels

At the end of the Module 5, students will be able to:

1. Study the requirements of room and their grouping (BL-1)
2. Learn the planning of residential Buildings. (BL-1)
3. Learn the Planning of public building (BL-1)

Total hours:	**48 hours**

Term work:

The sources are from Website

Content beyond syllabus:

VENTILATION AND ACOUSTICS

Ventilation: Introduction, functional requirements of ventilation system, types of ventilation; air conditioning, essentials of comfort air conditioning, systems of air conditioning, essentials of air conditioning system.

Acoustics: introduction, sound in enclosures, reflection of sound, defects due to reflected sound, absorption of sound, absorbents, absorbent materials, common acoustical defects, acoustical design of halls, sound insulation-wall insulation, floors and ceiling insulations.

Self-Study:

Contents to promote self-Learning:

SNO	Topic	CO	Reference
1	**COMPONENTS OF BUILDING -I**	CO1	**https://civilengineer-online.com/13-basic-components-of-a-building-structure/**
2	**COMPONENTS OF BUILDING II**	CO2	**https://civilengineer-online.com/13-basic-components-of-a-building-structure/**
3	**FINISHINGS, TREATMENT AND SUPPORTING STRUCRURES**	CO3	**https://www.slideshare.net/rithikarockingravisnkar/formwork-construction-in-structures**
4	**PLANNING AND REGULATIONS OF BUILDINGS**	CO4	**https://www.slideshare.net/sameerthaiyam1/lding-by-laws**
5	**PLANNING OF BUILDINGS**	CO5	https://www.slideshare.net/rakeshverma60/buildiplanning-69626949

Text Book(s):

1. Construction management by Sanga Reddy and Meyyappan —– Kumaran Publications.
2. Construction Management and Accounts by Sharma -Satyaprakashan, Tech India Publications. .

Reference Book(s):

1. Construction Contracts by Jimmie Hinze, McGraw hill education, 2013.
2. Contracts and Legal environment by Joseph T. Bockreth, McGraw hill education, 2013.
3. Construction Project Management -Theory and Practice by Kumar NeerajJha Pearson

publications, 2ndedition, 2012.

Online Resources:

1. http://www.nptel.iitm.ac.in/courses/
2. **https://www.researchgate.net/publication/279409230_Quality_and_Safety_Management_in_Construction**
3. **http://www.ccsenet.org/journal/index.php/jsd/article/download/1221/1184.**

Web Resources:

1. http://www.ijaerd.com/papers/special_papers/ISNCI09.pdf

2. https://www.researchgate.net/publication/293226801_Advanced_concrete_technology

3. https://nptel.ac.in/content/syllabus_pdf/105104161.pdf

NARAYANA ENGINEERING COLLEGE:NELLORE								
21CE2002	MECHANICS OF SOLIDS							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
III	3	0	0	48	3	40	60	100

Pre-requisite:

1.Concepts of equilibrium forces, actions and reactions

2.Knowledge of civil engineering materials and structural components of buildings

3.Basic concepts of material properties

Course Objectives:

1. To understand & analyze various types of loads, stresses & strains along with main causes of failure of machine parts.
2. To know the mechanism of load transfer in beams, the induced stress resultants and deformations.
3.. Apply the concepts of mechanics to find the stresses at a point in a material of a structural member
4. To Evaluate the principal stress and principal strain at a point of a stressed member and draw the Mohr's circle of stresses.
5. To Predict failure of a material using various theories of failure, and their relative applications.

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

CO 1	Students able to explain the concepts of simple stresses and strains and estimation of stresses.
CO 2	Examine the variation of bending moment and shear force at any section of a member.
CO 3	Assess Bending and shear stresses in beams subjected to different loadings for different machine parts
CO 4	Ability to transform the state of stress at a point and determine the principal and maximum shear stresses using equations as well as the Mohr's circle
CO 5	Explain the types of column and apply the Euler's theory to find the parameters for different end condition.

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	1	-	-	-	-	-	-	-	-	1	1
CO2	3	3	2	1	-	-	-	-	-	-	-	-	1	1
CO3	3	3	2	1	-	-	-	-	-	-	-	-	1	1
CO4	3	3	2	1	-	-	-	-	-	-	-	-	1	1
CO5	3	3	2	1	-	-	-	-	-	-	-	-	1	1

COURSE CONTENT

MODULE – 1	SIMPLE STRESS AND STRAINS	(9H)

Simple Stress and Strains: Types of external loads – internal stresses –normal and shear stresses – strain – Hooke's law – working stress –stress strain diagrams – Poisson's ratio – relationship between elastic constants – Elongation of bars of constant and varying sections – statically indeterminate problems in tension and compression – Temperature effects – strain energy and complementary energy strain energy due to tension, compression and shear.

At the end of the Module 1, students will be able to:

1. Explain the concept of simple stresses and strain and the various elastic constants (BL2)

2.Ability to calculate internal forces in members subject to axial loads, shear, torsion and bending and plot their distributions (BL3)

MODULE -2	SHEAR FORCE AND BENDING MOMENT	(10H)

Shear Force and Bending Moment: Different types of beams – various types of loading – Relationship connecting intensity of loading, shearing force and bending moment – shear force and bending moment diagrams for cantilever beams and simply supported beams for different types of loading.

At the end of the Module 2, students will be able to:

1.Draw shear force and bending moment diagram on beams under varying load conditions (BL3)

2.Recognize various types of loads applied on structural components of simple framing geometries and understand the nature of internal stresses that will develop within the components (BL2)

MODULE-3	FLEXURE STRESSES AND SHEAR STRESSES	(9H)

Flexural Stresses : Theory of simple bending – Assumptions – Derivation of bending equation: M/I =f/y = E/R – Neutral axis – Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections – Design of simple beam sections

Shear Stresses: Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T and angle sections

At the end of the Module 3, students will be able to:

1.Understand the theory of simple bending (BL2)

2. Analyze the stress variations in composite materials (BL4)

MODULE-4	ANALYSIS OF STRESS AND STRAIN ON OBLIQUE SECTIONS, THIN AND THICK CYLINDERS	(8H)

Analysis of Stress and Strain on Oblique Sections: Stress on inclined planes for axial and biaxial stress fields – principal stresses –Mohr's circle of stress.

Thin and Thick Cylinders: Stresses in thin cylinders – thick cylinders – Lame's equation – stresses in thick cylinders due to internal and external pressures

At the end of the Module 4, students will be able to:

1. Analyze stress at a point and determine the principal and maximum shear stresses using equations as well as the Mohr's circle (BL4)

2. Analyze stress in cylinders due to internal and external pressures (BL4)

MODULE-5	TORSION, THEORIES OF COLUMNS	(12H)

Torsion: Torsion of solid and hollow circular shafts – Pure shear –strain energy in pure shear and torsion

Theory of Columns: Direct and bending stresses in short columns- Kern of a section. Buckling and stability – Euler's buckling/crippling load for columns with different end conditions – Rankine's formula

At the end of the Module 5, students will be able to:

1.Discuss the concept of column buckling and critical load and stress (BL2)

2.Understanding of column buckling and ability to calculate critical load and stress(BL2)

3.Apply basic equation of torsion in design of circular shafts and helical springs (BL3)

Total hours:	**48 Hours**

Term work:

LIST OF TOPICS FOR STUDENT SEMINARS:

1. Stresses and strain
2. Types of beam
3. Bending stress and shear stress
4. Mohr's circle
5. Principle stresses and strain
6. Slope and Deflection of beam
7. Concept of Bending Equation
8. Important role of Strength of Materials

Content beyond syllabus:

1. Conjugate beam method.

Self-Study:

Contents to promote self-Learning:

SNO	Topic	CO	Reference
1	Stress & strains	CO1	**http://www.engineerstudent.co.uk/stress_and_strain.html**
2	Shear & Bending moment	CO2	**https://en.wikipedia.org/wiki/Shear_and_moment_diagram**
3	Expression for Bending Stress	CO3	**https://ia600801.us.archive.org/1/items/StrengthOfMaterialsByRamamrutham/strength%20of%20**

				material%20by%20%20bansal.pdf page(294-296)
	4	Mohr's circle	CO4	**https://archive.org/details/StrengthOfMaterialsByRamamrutham**
	5	Stability of columns,	CO5	https://nptel.ac.in/courses/105/105/105105108/ **https://archive.org/details/StrengthOfMaterialsByRamamrutham**

Text Book(s):

1. Strength of materials by R.K. Bansal, Laxmi Publications.
2. Strength of Materials by Er.R.K.Rajput, S.Chand Publishing, New Delhi.

Reference Book(s):

1. Strength of Materials by R Subramanian, Oxford University Press.
2. Strength of Materials by Timoshenko, Vol. I & Vol. II, CBS Publishers &Distributers, New Delhi.
3. Strength of Materials by D.S. Bedi, Khanna Publishing House.

Online Resources:

1. https://link.springer.com/journal/11223
2. https://www.journals.elsevier.com/mechanics-of-materials
3. http://www.aboutcivil.org/solid-mechanics.html
4. http://nptel.ac.in/courses/105105108/
5. http://nptel.ac.in/downloads/112106141/

Web References:

1. http://www.nptel.ac.in

2 http://www.rmcet.com/Resources

3.https://ia600801.us.archive.org/1/items/StrengthOfMaterialsByRamamrutham/STRENGTH_OF_MATERIALS_PART1.PDF

4.https://archive.org/download/StrengthOfMaterialsByRamamrutham

NARAYANA ENGINEERING COLLEGE: NELLORE								
21CE2003	SURVEYING - I							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
III	3	0	0	48	3	40	60	100

Pre-requisite: Nil

Course Objectives:

1. Understand the concepts of different types of surveying and the procedures for carrying out the survey works.
2. Learn the advanced surveying equipment's and its techniques.
3. To measure the area by chaining.
4. To measure the height and distance by theodolite.
5. To measure the angles and distances by using tacheometric and trigonometric methods.

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

CO 1	Students able to generalized the basic concept of surveying and chain surveying
CO 2	Students able to identify the methods of compass surveying and Plane Table surveying
CO 3	Students able to calculate the levelling surveying
CO 4	Students able to compute the Theodolite and Traversing surveying
CO 5	Students able to measure the contouring & computation of areas and volumes

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	1	-	-	1	-	-	-	1	-	1	2	2	1
CO2	2	2	1	-	-	-	1	-	-	1	-	1	2	-
CO3	2	2	-	-	-	-	1	-	-	-	-	1	2	-
CO4	2	2	-	1	1	-	-	-	-	-	-	1	2	1
CO5	3	2	-	1	1	-	-	-	-	-	-	1	2	1

1: Low, 2-Medium, 3- High

COURSE CONTENT

MODULE – 1	BASIC CONCEPTS & CHAIN SURVEYING	(8H)

Basic concepts: Surveying– History, primary divisions, Classification, Principles of surveying, Basic Measurements; Instruments and Basic methods; units of measurement, Plan and map, Scales. Errors- Accuracy and Precision, Sources and types of errors. **Chain Surveying**: Principles of chain survey, Methods of measuring distance, Direct and indirect ranging, Metric chains, Chaining on plane and sloping ground, Basic problems in chaining, chaining past obstacles, Cross–staff survey, Plotting of chain survey, Errors

At the end of the Module 1, students will be able to:Discuss the different traditional method of surveying (BL -2)

1. Detail study of basic concept of surveying (BL-1)
2. Study the definition and principles of surveying (BL-1)
3. Analyze the different problems in chaining (BL – 2)
4. Study the different errors in chaining (BL-4)

MODULE-2	COMPASS SURVEY & PLANE TABLE SURVEYING	(9H)

Compass survey: Introduction, Bearings and angles, Designation of bearings, fore bearing and back bearing, Theory of Magnetic compass (i.e., prismatic compass), Measurement of bearings of lines, Open and closed traverse, calculation of included angles, Magnetic Declination, Local Attraction-Related Problems, Errors in compass survey.

Plane table surveying: Introduction, Accessories, Working operations, Methods of plane tabling, Two point and Three-point problems.

At the end of the Module 2, students will be able to:

4. Identify the basic concept of compass surveying (BL – 4)
5. Explain the different methods of plane table surveying (BL-2)
6. Illustrate the importance working of prismatic and surveyor compass (BL-4)

MODULE-3	LEVELLING	(9H)

levelling: Introduction, basic definitions, methods of levelling, levelling instruments-dumpy level, levelling staff, Sensitivity of a Level tube , Temporary adjustments of dumpy level, theory of simple and differential levelling, Classification of direct levelling methods, Calculation of reduced levels by height of instrument and rise & fall methods, Reciprocal levelling, Profile levelling Difficulties in levelling, errors in levelling.

At the end of the Module 3, students will be able to:

4. Discuss the different process of leveling (BL- 3)
5. Analyze the fly leveling and reciprocal leveling (BL-2)
6. Illustrate the importance of errors in leveling (BL-4)
7. Identify the basic concept of terms used in leveling (BL-4)

MODULE-4	THEODOLITE TRAVERSING	(10H)

Theodolite: Vernier Theodolite, Basic definitions, Fundamental lines and desired relations; Temporary adjustments; Measurement of a horizontal angle, Repetition and Reiteration methods of horizontal angle measurement, Measurement of vertical angle.

Traverse surveying: Introduction, Selection and marking of traverse stations, methods of traversing, traversing by free needle and fast needle method, traversing by direct observation of angles, checks in closed traverse, closing error, methods of balancing the traverse, Omitted measurements.

At the end of the Module 4, students will be able to:

1. Discuss the Introduction and definition of Theodolite surveying (BL-2)
2. Study the method of repetition and reiteration survey (BL-3)
3. Discuss the Errors in theodolite (BL-4)
4. To understand Traverse surveying (BL-3)
5. Illustrate the different types of traverses (BL-2)

MODULE-5	CONOTURING & COMPUTATION OF AREAS AND VOLUMES	(12H)

Contouring: Introduction, contour interval, Characteristics of contours, Methods of locating contours - Direct and indirect methods, Contour gradient, Uses of contour maps. **Areas**: methods of determining areas, areas by sub-division into triangles, areas from offsets to a base line- regular and irregular intervals, Simpson's rule. **Volumes:** embankments and cutting for a level section, two level sections, three level section and multi-level section, prismoid formula,

trapezoidal formula, volume from spot levels, volume of earth work from contour plan.

At the end of the Module 5, students will be able to:

4. Study the characteristics of contours and uses of contour maps (BL-2)
5. Analyze the different problems to computation of Areas and volumes (BL-1)

Total hours: 48 hours

Term work:

1. The sources are from Website

Content beyond syllabus:

Minor instruments: uses and working of the minor instrument-Box sextant, Planimeter, Pentagraph,

Clinometers.

Self-Study:

Contents to promote self-Learning:

SNO	Topic	CO	Reference
1	**BASIC CONCEPTS & CHAIN SURVEYING**	CO1	http://www.neurisa.org/resources/documents/jmcnichol sa.pdf http://www.amsheela.org.in/dwn/civil/II_YEAR_2MARKS 4_surveying-i_2015_07_16_10_57_06_997.pdf
2	**COMPASS SURVEY & PLANE TABLE SURVEYING**	CO2	**http://ce.cet.ac.in/downloads/Study%20Material/Su /Plane%20Table%20Surveying.pdf http://www.ace-edu.in/wp-content/uploads/2018/06/Surveying-Lab-1.pdf**
3	**LEVELLING**	CO3	**https://www.slideshare.net/gauravhtandon1/levellin 26905390**
4	**THEODOLITE TRAVERSING**	CO4	http://gn.dronacharya.info/CivilDept/Downloads/questio rs/IIIsem/UNIT-4B.pdf http://www.ce.memphis.edu/1112/notes/project_3/trav rveying_traverse.pdf
5	**CONTURING & COMPUTATION OF AREAS AND VOLUMES**	CO5	https://www.slideshare.net/engkhanmsh/volume-and-ar calculation https://www.slideshare.net/gauravhtandon1/contouring 26905323

Text Book(s):

1. Surveying Vol. 1 & II by Dr. K. R. Arora, Standard Book House.
2. Surveying Vol. I & II by B.C. Punmia, Laxmi Publications

Reference Book(s):

1. Text book of surveying by C.Venkataramaiah, Universities Press.
2. Plane Surveying by Chandra AM, New age International Pvt.Ltd.

3. Surveying Vol. I &II byS.K. Duggal, McGraw Hill Education (India) private limited.

4. Surveying and Levelling by Kanetkar T.P., and Kulkarni, Vols. I and II, United Book

Corporation.

5. Surveying and levelling by R.Subramaniah, Oxford university press.

6. Surveying by Mimi Das Saikia, PHI Pubilications.

Online Resources:

1. http://nptel.ac.in
2. https://nptel.ac.in/courses/105104101/

Web Resources:

1. http://www.sasurieengg.com/e-course-material/CIVIL/II-Year%20Sem%204/CE6404%20SUR%20II.pdf
2. https://lecturenotes.in/subject/273/advanced-surveying-as
3. http://www.vssut.ac.in/lecture_notes/lecture1428642587.pdf

4 https://www.academia.edu/25746683/ADVANCED_SURVEYING_LECTURE_MODULE

NARAYANA ENGINEERING COLLEGE : NELLORE								
	BUILDING DRAWING							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
III	0	0	3	48	1.5	40	60	100

Pre-requisite:

Course Objectives:

1. Communicate a design idea/concept graphically/ visually
2. Develop Parametric design and the conventions of formal engineering drawing
3. Produce and interpret 2D & 3D drawings

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

CO 1	Students able to draw the detailed floor plans and elevations.
CO 2	Students able to draw sectional views of a building for RCC framed buildings.
CO 3	Students able to draw the typical reinforcement details of typical Spread footings
CO 4	Students able to draw the detailing of north light roof structures.
CO 5	Students able to draw the perspective view of storey building.

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO5	2	-	-	-	-	-	-	-	-	-	-	2	-	-

1-Low, 2-Medium, 3-High

COURSE CONTENT

TASK -1: Drawing of Conventional signs for building materials and symbols for Electrical, sanitary installations and fittings.

Objective: The objective of Conventional signs for building materials and symbols -construction industry is to demonstrate how a building, object, or system should be built up, applied, rectified, or restored.

TASK -2: Drawing of Various Bonds in Brick Work.

Objective: Bond in masonry Brick Work is to identify its stability and strength

Objective: The objective of drawing different types of Bonds in Brick work

TASK -3: Structural detailing of Beam, isolated footing and column.

Objective: To find Area, Thickness, Reinforcement Detailing and also Bearing stresses for Beam, isolated footing and column.

TASK -4: Drawing of Fully panelled window / fully glazed window – Elevation and cross section

Objective: Fully panelled window / fully glazed window for houses is to keep the house cross-

ventilated for keeping the indoor Room's atmosphere with light and fresh air
TASK -5: Drawing of Dog legged staircase – Plan and Sectional Elevation
Objective: To allow an arrangement that occupies a shorter, though wider, floor area than a straight flight.
TASK -6: Drawing of King post / Queen post trusses
Objective: The King post / Queen post trusses upholds the tension/compression members to support a beam to prevent the sagging of tie beam at the centre of a span.
TASK -7: Draw Plan, Elevation & Section of the Residential building – Single Bedroom and Hall (Load bearing wall structure) for the given line sketch and specifications
Objective: To Draw plans, Elevations & Sections using the proper Dimension Techniques and Dimension styles for Residential buildings to document the project.
TASK -8: Draw Plan, Elevation & Section of the Residential building- double bedroom, Living room, Kitchen with open veranda (Load bearing wall structure) for the given line sketch and specifications
Objective: To Draw plans, Elevations & Sections using the proper Dimension Techniques and Dimension styles for every room to document the project.
TASK -9: Draw Plan, Elevation & Section of the office building for the given line sketch and specifications.
Objective: To Draw plans, Elevations & Sections using the proper Dimension Techniques and Dimension styles for office building to document the project.
TASK -10: Draw Plan, Elevation & Section of the School building for the given line sketch and specifications.
Objective: To Draw plans, Elevations & Sections using the proper Dimension Techniques and Dimension styles for school building to document the project.
ADDITIONAL EXPERIMENTS
TASK -11: Draw Plan, Elevation & Section of the two storied residential building for the given line sketch and specifications
Objective: To Draw plans, Elevations & Sections using the proper Dimension Techniques and Dimension styles for two storied residential building to document the project.
TASK -12: Drawing plan, elevation and section of an industrial building for the given line sketch and specifications
Objective: To Draw plans, Elevations & Sections using the proper Dimension Techniques and Dimension styles for industrial building to document the project.
Virtual Labs: 1. **http://www.aust.edu/civil/lab_manual/ce_100.pdf.**

2. **https://www.wiziq.com/tutorials/civil-engineering-drawing.**
3. **http://civilengineering-notes.weebly.com/building-drawing.html.**

Text Book(s):.

1. Building Planning and Drawing by Dr.N. Kumara Swamy and A.Kameswara Rao, Charotar Publishing House.
2. Building Planning Drawing and Scheduling by Gurucharansingh and Jagadish Singh, Standard Publishers Distributors.

Reference Book(s):

1. Building Drawing with an integrated approach to Built environment by M.G.Shah, C.M.Kale and S.Y.Patki, McGraw-Hill Publishing Company Limited, New Delhi.
2. Civil Engineering Drawing Series 'B' by R.Trimurty, M/S Premier Publishing House.

NARAYANA ENGINEERING COLLEGE:NELLORE								
21CE2502	MECHANICS OF SOLIDS LAB							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
III	0	0	3	48	1.5	40	60	100

Pre-requisite:

Course Objectives:

1. Ability to apply knowledge of mathematics and engineering in calculating the mechanical properties of structural materials.
2. Ability to function on multi-disciplinary teams in the area of materials testing.
3. Ability to use the techniques, skills and modern engineering tools necessary for engineering. 4. Understanding of professional and ethical responsibility in the areas of material testing.
5. Ability to communicate effectively the mechanical properties of materials.

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

CO 1	Students able to examine the stress-strain curves of different materials used in the field under different loading conditions.
CO 2	Students able to differentiate between properties of materials affect strength under various conditions.
CO 3	Students able to calculate simple tensile and shear stress using the appropriate guidelines and formats.
CO 4	Students able to analyze the bending stress on different types of sections.
CO 5	Students able to understand deflection of different sections at different loading conditions.

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO5	2	-	-	-	-	-	-	-	-	-	-	2	-	-

1-Low, 2-Medium, 3-High

COURSE CONTENT

TASK -1: Tension test on mild steel bar

Objective: To conduct tensile test on a mild steel specimen and determine the following:

Limit of proportionality, Upper yield point, Ultimate strength, Lower yield point, Ultimate strength, Fracture strength, Young's modulus, Percentage elongation, Percentage reduction in area, Ductility, Toughness, True-stress & true-strain values, Malleability

TASK -2: Torsion test on mild steel bar

Objective: To conduct torsion on mild steel or cast iron specimens to fine out modulus of rigidity or to fine angle of twist of the materials which are subjected to torsion.

TASK -3: Izode Impact test
Objective: To perform the Izod Impact on Metals
TASK -4: Charpy Impact test
Objective: To perform the Charpy Impact on Metals
TASK -5: Rockwell Hardness test.
Objective: To determine the Rockwell Hardness of a given test specimen
TASK -6: Brinell hardness test.
Objective: To determine the Brinell Hardness of a given test specimen
TASK -7: Compression test on spring
Objective: Determination of modulus of rigidity of springs – close coiled and open coiled.
TASK -8: Bending test of wooden / steel beam
Objective: To determination of flexural strength and Modulus of elasticity
TASK -9: Compression test on wood and brick.
Objective: To determine the load carrying capacity of bricks under compression
TASK -10: Verification of Clark-Maxwell's theorem
Objective: To verify clerk- Maxwell's Reciprocal Theorem and to determine the Young's modulus of beam arterial of the apparatus
ADDITIONAL EXPERIMENTS
TASK -11: Tension test on HYSD bar
Objective: To determine tensile test on a HYSD bar determine the following: Limit of proportionality, Upper yield point, Ultimate strength, Lower yield point, Ultimate strength, Fracture strength, Young's modulus, Percentage elongation, Percentage reduction in area, Ductility, Toughness, True-stress & true-strain values, Malleability
TASK -12: Rockwell Hardness test for Aluminium
Objective: To determine the Rockwell Hardness of an aluminium
Virtual Labs: 1. **http://sm-nitk.vlabs.ac.in/index.html#**

Text Book(s): 1. Strength of materials by R.K. Bansal, Laxmi Publications. 2. Strength of Materials by Er.R.K.Rajput, S.Chand Publishing, New Delhi.

Reference Book(s):

1. Strength of Materials by R Subramanian, Oxford University Press.
2. Strength of Materials by Timoshenko, Vol. I & Vol. II, CBS Publishers &Distributers, New Delhi.
3. Strength of Materials by D.S. Bedi, Khanna Publishing House.

NARAYANA ENGINEERING COLLEGE: NELLORE								
21CE2503	SURVEYING -I LAB							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
III	0	0	3	45	1.5	40	60	100

Pre-requisite:

Course Objectives:

1. To impart the practical knowledge in the field, it is essential to introduce in curriculum.
2. Drawing of Plans and Maps and determining the area are pre requisites before taking up any Civil Engineering works.
3. Surveying of an area by chain survey (closed traverse) & plotting.
4. Two point and three-point problems in plane table survey.
5. Levelling – Longitudinal and cross-section and plotting.

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

CO 1	Students able to understand the different methods and techniques of surveying like levelling, compass survey, contouring and curve settings etc. and their applications in surveying.
CO 2	Students able to use survey instruments in carrying out survey, collect data, write reports and able to perform required calculations to achieve the objective for different types of surveying for different Engineering projects.
CO 3	Students able to apply the concept of Tacheometry for surveying in difficult and hilly areas to obtain the topographical map of area.
CO 4	Students able to control the accumulation of errors in projects.
CO 5	Students able to Prepare the survey sheet according to the method used.

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	-	-	-	-	-	-	-	-	-	-	2	2	-
CO2	2	-	-	-	-	-	-	-	-	-	-	2	2	-
CO3	2	-	-	-	-	-	-	-	-	-	-	3	2	-
CO4	2	-	-	-	-	-	-	-	-	-	-	3	2	-
CO5	2	-	-	-	-	-	-	-	-	-	-	2	2	-

1-Low, 2-Medium, 3-High

COURSE CONTENT

TASK -1: Simple chain survey

Objective: Survey of a given area by using chain survey (closed traverse) and plotting.

TASK -2: Compass Survey

Objective: To determine distance between two inaccessible points with compass

TASK -3: Compass Survey

Objective: Surveying of a given area by prismatic compass (closed traverse) and plotting after adjustment.

TASK -4: Radiation method, intersection methods by plane table survey

Objective: To plot a given area by Radiation and Intersection methods of Plane Table Survey
TASK -5: Two-point and three point problems in plane table survey
Objective: To find the required station by using two-point and three point problems
TASK -6: Reduction of levels: (i) Height of collimation method, (ii)Rise and fall method
Objective: To determine to difference in elevation between the given points adopting height of collimation (HC).
TASK -7: Levelling
Objective: Fly leveling (differential leveling) of a given area by using dumpy level
TASK -8: Theodolite-Horizontal angles
Objective: Measurement of horizontal angles with theodolite by using method of repetition and reiteration.
TASK -9: Theodolite- Horizontal distance
Objective: Measure horizontal distance between two inaccessible points.
TASK -10: Theodolite-Vertical angles
Objective: Measurement of vertical angles with theodolite.
TASK -11: Contouring
Objective: To determination Contour plan of a given area
ADDITIONAL EXPERIMENTS
TASK -1: Compass Surveying- Induced anagle
Objective: Measurement of bearings of sides of traverse with prismatic compass and computation of correct induced angle.
TASK -2: Leveling-fly leveling & check leveling
Objective**:** Fixing bench mark with respect to temporary bench mark with dumpy level by fly leveling and check leveling.
Virtual Labs: 4. **http://sl-iitr.vlabs.ac.in/exp3/index.php?sectio** 5. **http://sl-iitr.vlabs.ac.in/exp3/index.php?section=Experiment** 6. **http://sl-iitr.vlabs.ac.in/exp2/index.php?section=Theory** 7. **http://sl-iitr.vlabs.ac.in/exp1/index.php?section=Gallery**

Text Book(s):

1. S.S. Bhavikatti, " Surveying theory & Practice", 2nd edition, Dreamtech press, wiley distributors.
2. C. Venkataramaiah, " Text book of surveying", 2nd edition, university press, 2018.

Reference Book(s):

1. Arora K R “Surveying” Vol 1,2& 3, Standard book house, Delhi, 2004.

SEMESTER IV

Course Code	Category	Course Title	Contact Periods per week				Credits	Scheme of Examinati Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Tota Mark
21CE2004	PC	Concrete Technology	3	0	0	3	3	40	60	100
21CE2005	PC	Hydraulics & Hydraulic Machinery	3	0	0	3	3	40	60	100
21CE2006	PC	Structural Analysis	3	0	0	3	3	40	60	100
21CE2007	PC	Surveying - II	3	0	0	3	3	40	60	100
	OE	Open elective I	3	0	0	3	3	40	60	100
21CE2504	PC	Hydraulics& Hydraulic Machinery lab	0	0	3	3	1.5	40	60	100
21CE2505	PC	Structural Analysis practice	0	0	3	3	1.5	40	60	100
21CE2506	PC	Surveying –II Lab	0	0	3	3	1.5	40	60	100
21CD6002	SC	Career competency Development II	0	0	2	2	1	40	60	100
21IC6001	SC	Industry Oriented Course I	0	0	0	0	1	100	00	100
21MC8002-13	MC	Mandatory course III	2	0	0	2	0	--	--	--
		Counseling/Mentoring	0	0	1	1	0	--	--	--
		Sports/Hobby Clubs/Activities	0	0	2	2	0	--	--	--
		Activity PointProgramme	During the Semester					20 Points		
		Total	**17**	**0**	**14**	**31**	**21.5**	**460**	**540**	**1000**

NARAYANA ENGINEERING COLLEGE:NELLORE								
	CONCRETE TECHNOLOGY							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
III	3	1	0	48	4	40	60	100

Pre-requisite: Student should have knowledge of fundamentals of Materials of constructions, Building Materials.

Course Objectives:

1. Understand the theoretical concept of Concrete material which includes Cement, Admixtures and Aggregates,
2. Learn different types of aggregates, admixtures & know the mechanism of hydration of cement.
3. Comprehend the properties of Fresh Concrete, & manufacturing process of concrete
4. Understand the properties of hardened concrete, factors affecting Elasticity, creep & Shrinkage in concrete.
5. Understand the concept of mix design of concrete& its importance in estimation of composition of materials.
6. Know various types of special concretes & its application.

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

CO 1	Explain the properties of the constituent materials of concrete and its Manufacturing.
CO 2	Study the behavior of concrete at its fresh and hardened state, describe and carry out tests relevant to the use of concrete on site.
CO 3	Explain factors affecting strength of concrete and their properties.
CO 4	Define special concretes, their application for practical purpose.
CO 5	Understand the factors influencing concrete mix & know the BIS method of mix design.

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	-	-	-	-	2	1	-	-	-	-	-	-	-
CO2	3	-	-	-	-	2	1	-	-	-	-	-	-	-
CO3	3	-	-	-	-	2	1	-	-	-	-	-	-	-
CO4	3	-	-	-	-	2	1	-	-	-	-	-	-	-
CO5	3	-	-	-	-	2	1	-	-	-	-	-	2	-

1: Low, 2-Medium, 3- High

COURSE CONTENT

MODULE – 1	CEMENT AND MANUFACTURE OF CONCRETE	(10H)

Cement: Portland cement, chemical composition, hydration, setting and fineness of cement, structure of hydrated cement, mechanical strength of cement gel, water held in hydrated cement paste, heat of hydration; Tests on cements – Fineness of cement using sieve test and air-permeability method, Normal consistency and setting times using Vicat apparatus, soundness test using Le-Chatlier apparatus (detailed procedures to be covered in laboratory); Grades of cement.

Manufacture of concrete: Batching, mixing, transporting, placing, compacting, finishing, and curing; Ready Mixed Concrete (RMC): Introduction, advantages of RMC, components of RMC plant, process adopted in RMC plant, handling and placing, code recommendations.		
At the end of the Module 1, students will be able to: 1. Explain the composition of cement, Tests on cement(BL2) 2. Explain the process of manufacturing of cement (BL2)		
MODULE -2	**FRESH CONCRETE AND ADMIXTURES**	**(10H)**
Fresh concrete: Workability, Factors affecting workability, Measurement of workability by different tests, setting time of concrete, Effect of time and temperature on workability, Segregation, bleeding; Water/cement ratio-Abram's law, Gel/Space ratio. **Admixtures**: Introduction, Types of admixtures, plasticizers, action of plasticizers, super plasticizers, effect of super plasticizes on fresh concrete and properties of hardened concrete; Retarders, accelerators; Air-entraining admixtures, factors affecting amount of air-entrainment, effect of air-entrainment on the properties of concrete; pozzolanic admixtures-types, fly ash, effect of fly ash on fresh and hardened concrete, high volume fly ash concrete, silica fume, available forms, effect of silica fume on fresh and hardened concrete.		
At the end of the Module 2, students will be able to: 1.Understand the Workability and its factors(BL3) 2.Understand the Admixtures and their types (BL3)		
MODULE-3	**HARDENED CONCRETE**	**(10H)**
Strength of concrete: Factors affecting strength of concrete, gain of strength with age, Effect of maximum size of aggregate on strength, relation between compressive and tensile strength, bond strength; Testing-compression test, determination of tensile strength, factors influencing the strength results; **Elasticity**- elastic properties of concrete, modulus of elasticity and strength, Factors affecting modulus of elasticity, Dynamic modulus of elasticity, Poisson's ratio; **Creep**-measurement of creep, factors affecting creep, effect of creep; **Shrinkage**- mechanism of shrinkage, classification of shrinkage, Factors affecting shrinkage		
At the end of the Module 3, students will be able to: 1.Understand the factors affecting strength of concrete(BL2)		

2. Explain the Elasticity, Creep, Shrinkage of concrete(BL2)		
MODULE-4	**SPECIAL CONCRETES & NON-DESTRUCTIVE TESTING**	**(9H)**
Special Concretes: Light weight concrete, no-fines concrete, high density concrete, fibre reinforced concrete, self-compacting concrete, high strength concrete, high performance concrete, cold weather concreting, hot weather concreting, polymer concrete. **Non Destructive Testing**: Importance, Methods-Rebound hammer test, penetration and pull-out test, Ultrasonic pulse velocity test, Principles, applications and limitations; Corrosion meter, Cover meter and core cutter.		
At the end of the Module 4, students will be able to: 1. Explain the special concretes and their uses (BL4) 2. Understand the concepts of NDT (BL4)		
MODULE-5	**MIX DESIGN**	**(9H)**
Durability: Durability and impermeability; cracking, carbonation, alkali-silica reaction, chemical attack, physical aggression; **Concrete Mix Design**: Introduction, object of mix design Factors governing mix design, Methods of expressing proportions, statistically quality control, Introduction to different methods of mix design, Concrete mix design by I.S. method.		
At the end of the Module 5, students will be able to: 1. Explain the Durability of concrete(BL4) 2. Understand the Concrete Mix Design(BL4)		
	Total hours:	**48 Hours**

Term work:

LIST OF TOPICS :

9. Prepare a case study of failure of structures due to wrong design, use of poor quality of materials and faulty construction methods.
10. Mix Design of M50 Grade concrete using BIS method.
11. Visit to nearby multi-storeyed building/Apartment construction and Study the workability of concrete.

Content beyond syllabus:

1. Advanced materials usage in concrete

Self-Study:

Contents to promote self-Learning:

SNO	Topic	CO	Reference
1	Cement And Manufacture Of Concrete	CO1	**http://www.engineerstudent.co.uk/concrete.html**
2	Fresh Concrete And Admixtures	CO2	**https://en.wikipedia.org/wiki/Freshconcrete.html**
3	Hardened Concrete	CO3	**https://ia600801.us.archive.org/1/items/concrteByMSshetty.pdf**
4	Special Concretes & Non-Destructive Testing	CO4	**https://archive.org/details/concretetechnologynysanthakumar**
5	Mix Design	CO5	https://nptel.ac.in/courses/105/105/105105108/ **https://archive.org/details/https://archive.org/details/concreteMLGambhir**

Text Book(s):

1. Concrete technology by M.S.Shetty, S.Chand& Company Pvt. Ltd., New Delhi

2. Concrete Technology by, A.R. Santha Kumar, Oxford University Press, New Delhi

3. Concrete Technology by M.L. Gambhir, Tata Mc. Graw Hill Publishers, New Delhi

Reference Book(s):

1. Properties of Concrete by Neville, A.M., Low Priced Edition.

2. Text Book of Concrete Technology by P.D. Kulkarni, R.K.Ghosh and Y.R.Phaul, New International.

3. Concrete Technology by A.M. Neville and J.J. Brooks, Pearson Publications.

4. High Performance Concretes and Applications by S.P. Shah, S.H. Ahmad and Edward Arnold, Taylor and Francis Publishers.

Online Resources:

6. https://link.springer.com/journal/1243
7. https://www.journals.elsevier.com/concretechnology
8. http://www.aboutcivil.org/concretechnology.html
9. http://nptel.ac.in/courses/105105108/
10. http://nptel.ac.in/downloads/112106141/

Web References:

1. http://www.nptel.ac.in

2 http://www.rmcet.com/Resources

3.https://ia600801.us.archive.org/1/items?concretetechnology.PDF

4.https://archive.org/download/concretetechnologybyNeville

NARAYANA ENGINEERING COLLEGE:NELLORE								
21CE2005	**HYDRAULICS & HUDRAULIC MACHINERY**							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
IV	3	0	0	48	3	40	60	100

Pre-requisite: Student should have knowledge about the following subjects.
1.Fluid Mechanics

Course Objectives:

1. To develop a basic knowledge of open channel flow relationships by applying fluid properties, hydrostatics, and the conservation equations for mass, momentum, and energy.
2. To gain proficiency in applying the conservation equations to open channel flow problems.
3. To learn concepts of impact of jets on vanes & impulse turbine.
4. To learn the basics of reaction turbines.
5. To gain proficiency in understanding hydraulic turbines.
6. To learn the basics and design of centrifugal pumps.

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

CO 1	Students able to illustrate types of flows and types of channels and velocity distribution.
CO 2	Students able to understand the non-uniform flow in open channels
CO 3	Students able to classify the concepts on impact of jets and impulse turbines
CO 4	Students able to demonstrate the reaction turbines components and working principle
CO 5	Students able to discuss the working principles of centrifugal pumps

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	1	1	2	2	3	-	-	-	-	-	-	2	1
CO2	2	1	2	1	2	1	-	-	-	-	-	-	2	1
CO3	2	2	-	-	2	-	-	-	-	-	-	-	3	1
CO4	2	1	2	1	2	1	-	-	-	-	-	-	2	2
CO5	2	2	1	1	2	2	-	-	-	-	-	-	1	2

1-Low, 2-Medium, 3- High

COURSE CONTENT

MODULE – 1	FLOW IN OPEN CHANNELS	(10H)

Introduction, Classification of flows, types of channels, velocity distribution, the chezy equation, empirical formulae for the chezy constant; most economical section of channel, most economical Rectangular, Triangular channel sections; most economical trapezoidal channel section, best side slope for most economical trapezoidal channel section; most economical circular channel section for maximum velocity and maximum discharge conditions. Concept of specific energy, Specific energy curves; critical depth, critical velocity, Critical flow, Critical flow

in a rectangular channel, Critical slope, discharge curve; Different slope conditions.
At the end of the Module 1, students will be able to: 1. Understanding of the 3 basic equations of flow (continuity, momentum and energy) by correctly applying them to different problem statements. The typical case involves using a combination of equations to solve simultaneously for the unknown of interest. Also typical is the need for "appropriate" assumptions in a problem (BL2) 2. To learn the fundamentals of Uniform and Non-Uniform flow in open channels (BL1) 3. Analyse the channel sections like rectangular, triangular, trapezoidal etc. (BL4)

MODULE -2	NON-UNIFORM FLOW IN OPEN CHANNELS	(10H)

Gradually Varied Flow: Introduction, Dynamic equation; Dynamic equation for GVF in wide rectangular channel, classification of channel bottom slopes, Surface Profiles; Characteristics of surface profiles, Back water Curves and Draw down curves; Computation of surface profiles by single step method. **Rapidly Varied Flow:** Hydraulic jump; Elements and characteristics of hydraulic jump; Hydraulic jump in rectangular channels, height and length of the jump, Energy loss in a hydraulic jump, Types of hydraulic jump; applications of hydraulic jump.
At the end of the Module 2, students will be able to: 1. To give an idea about the gradually varied flow their equations and computations. (BL2) 2. To give an idea about the rapidly varied flow their equations and computations. (BL2) 3. To know the applications of momentum principles. (BL3)

MODULE-3	IMPACT OF JETS & IMPULSE TURBINE	(10H)

Impact of Jets: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for Work done and efficiency. **Impulse Turbine:** Hydraulic Turbines - Introduction, layout of a hydro power plant, head and efficiencies of hydraulic turbines, Classification of hydraulic turbines; Pelton turbine- Introduction, parts, Velocity triangles, work done and efficiency, working proportions, design of Pelton wheel.
At the end of the Module 3, students will be able to: 1. To impart the knowledge of impact of jets (BL2) 2. To know about hydraulic turbines (BL2) 3. To impart the knowledge of pelton wheel turbine (BL2)

MODULE-4	REACTION TURBINES	(9H)
Radial flow Reaction Turbine: velocity triangles and work done for inward radial flow turbine, degree of reaction, discharge, speed ratio, flow ratio. Francis turbine: main components and working, work done and efficiencies, design proportions. **Axial flow Reaction Turbine:** Kaplan turbine- main components and working, working proportions; Draft tube-types of draft tubes, draft tube theory and efficiency of draft tube; Cavitation: causes, effects.		
At the end of the Module 4, students will be able to: 1. To make the student is expected to prepare models for prototypes of hydraulic structures. (BL3) 2. To impart the knowledge on pumps and turbines. (BL2) 3. Differentiate between radial flow and axial flow reaction turbine (BL4)		
MODULE-5	**CENTRIFUGAL PUMPS & DIMENSIONAL ANALYSIS**	**(9H)**
Centrifugal Pumps: Introduction, component parts and working of a centrifugal pump, work done by the impeller; heads, losses and efficiencies; minimum starting speed, Priming, specific speed, limitation of suction lift, net positive suction head(NPSH); Cavitation effects, Multistage centrifugal pumps. **Dimensional Analysis and Similitude**: Introduction, derived quantities, Dimensional homogeneity; Methods of dimensional analysis- Rayleigh's method, Buckingham–Pi theorem; model analysis; similitude - types of similarities; Dimensionless numbers; Model laws.		
At the end of the Module 5, students will be able to: 1. To make the student is expected to have thorough knowledge on the selection of pumps for practical purposes. (BL3) 2. To understand the dimensional analysis methods and modal analysis. (BL2) 3. Differentiate between centrifugal pump and reciprocating pump. (BL4)		
	Total hours:	**48 Hours**

Term work:
1. Graphical determination of energy loss in Hydraulic Jump. 2. Assignment on GVF computation using Direct Step and VenTe Chow method. 3. Report on Site visit to Hydropower generation plant/Research Institute.

Content beyond syllabus:

1. **Hydropower Engineering –** Classification of hydropower plants, load factor, utilization factor, capacity factor, estimation of hydropower potential.

Self-Study:

Contents to promote self-Learning:

SNO	Topic	CO	Reference
1	**MODULE-1**	CO1	**https://youtu.be/vLfsrd7td14**
2	**MODULE-2**	CO2	**https://youtu.be/rXaf8U2nTzc**
3	**MODULE-3**	CO3	**https://youtu.be/aF2JruZYnZ4**
4	**MODULE-4**	CO4	**https://youtu.be/JXS2ED1STi4**
5	**MODULE-5**	CO5	www.nptel.ac.in

Text Book(s):

1) Fluid Mechanics, Hydraulic and Hydraulic Machines by Modi & Seth, Standard book house.
(2) A text of Fluid mechanics and hydraulic machines by Dr.R.K.Bansal – Laxmi Publications (P) Ltd., New Delhi.

Reference Book(s):

1. Fluid Mechanics & Hydraulic Machines by SS Rattan, Khanna Publishing House.
2. Elements of Open channel flow by Ranga Raju, Tata Mc.Graw Hill, Publications.
3. Fluid Machinery by Sadhu Singh, Khanna Publishing House, Delhi.
4. Flow in Open channels by K.Subramanya. Tata Mc Graw Hill Publishers.

Online Resources:

11. https://www.e4training.com/hydraulic_courses/courses1.php
12. https://www.e4training.com/hydraulic_pumps/index.php
13. https://www.e4training.com/hydraulic_pumps/pumps1.php

Web References:

1.https://books.google.com/books/about/Hydraulics_and_Hydraulic_Machines.html?id=qZdbAAAAQBAJ.

2. https://www.researchgate.net/publication/301552929_hydraulics_hydraulic_machines

NARAYANA ENGINEERING COLLEGE:NELLORE								
21CE2006	STRUCTURAL ANALYSIS							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
IV	3	0	0	48	3	40	60	100

Pre-requisite: 1.Engineering Mechanics
2.Strength of Materials

Course Objectives:

1. Ability to idealize and analyze statically determinate and indeterminate structures.
2. To equip the students with the force and displacement methods of structural Analysis.
3. To Identify the formulation and sign conventions associated with the Slope Deflection method.
4. To Understand flexibility matrices to solve problems in beams
5. To learn matrix stiffness method for analysis of skeletal structures.
6. To Calculate the internal forces in cable and arch type structures

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

CO 1	Students able to analyze statically indeterminate Beams and Frames
CO 2	Students able to analyze indeterminate structures
CO 3	Students able to analyze the structure using Flexibility method
CO 4	Students able to analyze the structure using Stiffness method
CO 5	Students able to analyze the three hinged arches, Draw influence line diagram

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	2	2	1	2	-	-	-	2	2	-	2	3	-
CO2	2	2	2	1	2	-	-	-	2	2	-	2	3	-
CO3	2	2	2	1	2	-	-	-	2	2	-	2	3	-
CO4	2	2	2	2	2	3	1	-	-	-	-	2	2	1
CO5	2	2	2	1	2	-	-	-	2	2	-	2	3	-

1- Low, 2-Medium, 3- High

COURSE CONTENT

MODULE – 1	STATICALLY INDETERMINATE BEAMS AND FRAMES	(10H)

Statically indeterminate Beams and Frames: Determinateness of structures, stability and indeterminacy, External and Internal Redundancy Methods of Analysis-Force Method and Displacement Method. Clapeyron's Theorem of Three Moments, Application of theorem for -General Loading, Fixed Beams, Sinking of supports. (Involving not more than 3 unknowns) Castigliano's Second Theorem, Application of theorem for -General Loading, Fixed Beams, Sinking of supports and frames. (Involving not more than 3 unknowns)

At the end of the Module 1, students will be able to:

1. Apply equations of equilibrium to structures and compute the reactions (BL3)

2. Calculate the deflections of truss structures and beams (BL3)

3. Analyse force method and displacement method on beams (BL4)

MODULE -2	ANALYSIS OF INDETERMINATE STRUCTURES	(10H)

Analysis of Indeterminate Structures: Slope Deflection Method, sign conventions, development of slope deflection equations, modification for simple ends, Application to beams and sway and non-sway Frames. (Involving not more than 3 unknowns)
Moment Distribution Method, Carry over moment, distribution factors, fixed end moments, modification of stiffness for simple ends, Application to beams and sway and non-sway frames. (Involving not more than 3 unknowns

At the end of the Module 2, students will be able to:

1. Calculate the slope deflections for beams and frames (BL3)

2. Analyse beams and rigid frames using Moment Distribution method (BL4)

3. Discuss about sway and non-sway frames (BL2)

MODULE-3	FLEXIBILITY METHOD	(9H)

Flexibility Method: Fundamental concepts, formulation of flexibility matrix, application to beams and sway and non-sway frames. (Involving not more than 3 unknowns) Application to pin jointed plane trusses. (Involving not more than 3 unknowns).

At the end of the Module 3, students will be able to:

1. Determine response of structures by classical, iterative and matrix methods (BL3)

2. Analyze the Structural Beams using Flexibility Matrix Method (BL4)

MODULE-4	STIFFNESS METHOD	(9H)

Stiffness Method: Fundamental concepts, formulation of stiffness matrix, application to beams using member approach. (Involving not more than 3 unknowns) Application to sway and non-sway frames. (Involving not more than 3 unknowns)

At the end of the Module 4, students will be able to:

1. Determine response of structures by classical, iterative and matrix methods (BL3)

2. Analyze the Structural Beams using Stiffness Matrix Methods (BL4)

MODULE-5	THREE HINGED ARCHES AND INFLUENCE LINE DIAGRAM	(10H)

Three Hinged Arches: Concept, analysis of parabolic and semi-circular arch with supports at same and different levels. Horizontal thrust, radial shear and normal thrust for parabolic and semi-circular arch.

Influence Line Diagram: Basic concepts, influence line diagram for reactions, shear and bending moment for simply supported and overhanging beams.

At the end of the Module 5, students will be able to:

1. Explain Arches and its behaviour under different loading and support conditions (BL2)

2. Calculate the internal forces in cable and arch type structures (BL3)

3. Draw the influence line diagram for beams (BL3)

Total hours:	**48 hours**

Term work:

1. The Term work shall include assignments based on above syllabus to be completed during Tutorial class.

2. The tutorials should also include analysis of continuous beams/portal frames/using excel sheets/structural analysis software's.

Content beyond syllabus:

1.Conjugate beam method

Self-Study:

Contents to promote self-Learning:

SNO	Topic	CO	Reference
1	Analysis of frames	CO1	**https://www.youtube.com/watch?v=Lo4tXDwmUKg**
2	Slope Deflection Method	CO2	https://www.youtube.com/watch?v=1iMKqDgOClQ
3	Flexibility Method	CO3	https://academic.csuohio.edu/duffy_s/Class%20Info%20on%20Web/511_06.pdf
4	Stiffness Method	CO4	https://engineering.purdue.edu/~aprakas/CE474/CE474-Ch5-StiffnessMethod.pdf
5	Moving Loads and	CO5	**https://www.slideshare.net/MadujithSagara/in**

		Influence Lines, Three hinged arch		**fluence-lines-structural-analysis-theories** https://nptel.ac.in/content/storage2/courses/105105109/pdf/m5l32.pdf

Text Book(s):

1. Structural Analysis by S.S. Bhavikatti, Volume 1 and 2, Vikas Publishing House, Pvt. Ltd.
2. Theory of Structures by S. Ramamurtham, Dhanpat Rai Publishing Company (p) Ltd,

Reference Book(s):

1. Theory of Structures- B.C.Punmia, Ashok kumar Jain and Arun Kumar Jain, Laxmi Publications (P) Ltd.
2. Mechanics of Structures Vol. II - S.B. Junnerkar and H.J. Shaha, Charotar Publishing House.
3. Advanced Structural Analysis by A.K. Jain, Nem Chand Bros.

Online Resources:

1. http://www.vssut.ac.in/lecture_notes/lecture1428730889.pdf

2. http://web.iitd.ac.in/~sbhalla/cel717.pdf

3. https://link.springer.com/journal/40091

4. http://journals.azad.ac.ir/ijase/

5. http://textofvideo.nptel.iitm.ac.in/105101086/lec4.pdf

Web Resources:

1. https://www.youtube.com/watch?v-strain energy

2.nptel.ac.in/courses/105106050/20

3.nptel.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/.../m2l7.pdf

4.textofvideo.nptel.iitm.ac.in/

21CE2007	**SURVEYING -II**							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
IV	3	0	0	48	3	40	60	100

Pre-requisite: Nil

Course Objectives:

1. This subject deals with geodetic measurements and Control Survey methodology and its adjustments.
2. The student is also exposed to the Modern Surveying.
3. To provide knowledge of Total Station & advanced surveying instruments.
4. Develop skills in using Total Station & advanced surveying instruments and analyse data.
5. Develop skills to set out Curves in the field using both Total Station.

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

CO 1	Students able to apply the knowledge of principles and purpose of Tacheometry in finding out the constants
CO 2	Students able to formulate the Triangulation and setting out of curve by linear and angular methods.
CO 3	Students able classify the different types of curves
CO 4	Students able to Summarize the basic principles of GPS and total station, EDM in civil engineering
CO 5	Students able to memorize the basic principles of remote sensing and geographical information systems

CO-PO Mapping

CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	1	-	-	1	-	-	-	1	-	1	2	2	1
CO2	2	2	1	-	-	-	1	-	-	1	-	1	2	-
CO3	2	2	-	-	-	-	1	-	-	-	-	1	2	-
CO4	2	2	-	1	1	-	-	-	-	-	-	1	2	1
CO5	3	2	-	1	1	-	-	-	-	-	-	1	2	1

1: Low, 2-Medium, 3- High

COURSE CONTENT

MODULE – 1	**TACHEOMETRIC SURVEYING**	**(8H)**

Tacheometric surveying: Definition, Advantages of tachometric surveying, Basic systems of tacheometric measurement, Principle of stadia measurements, Determination of constants K and C, Inclined sight with staff vertical, Inclined sight with staff normal to the line of sight, Movable hair method, Tangential method, Subtense bar, Errors in tachometry.

At the end of the Module 1, students will be able to:

1. Discuss the basic system of tacheometric measurement (BL -2)

2. Detail study of determination of constant K and C (BL-1)
3. Study the Tangential Method (BL-1)
4. Study the different errors in tachometry survey (BL-4)

MODULE-2	TRIANGULATION & SETTING OUT WORKS	(9H)

Triangulation: Principles of triangulation, Uses of triangulation survey, Classification of triangulation, operations of triangulation survey, Signals and towers, Satellite station, Base line & Extension of the base line.

Setting out works: Introduction, Control stations; Horizontal control Reference grid, Vertical control, Positioning of a structure; offset pegs, setting out a foundation- reference pillars, batter boards, setting out with a theodolite; Graded stakes; setting out a sewer; Setting out a culvert.

At the end of the Module 2, students will be able to:

1. Identify the Triangulation surveying (BL – 4)
2. Study the setting out work by using theodolite (BL-2)
3. Illustrate the important uses of theodolite (BL-4)

MODULE-3	CURVES	(9H)

Curves: Simple curves–Definitions and Notations, designation of a curve, Elements of simple curves, location of tangent points, selection of peg interval, Methods of setting simple curves (based on equipment) – Rankines method, Two theodolite method. Compound curves – Elements of compound curve, setting out compound curve. Reverse curves – Elements of reverse curve, relationship between various elements..

At the end of the Module 3, students will be able to:

1. Discuss the different process of curves (BL- 3)
2. Analyze the methods of setting simple curves (BL-2)
3. Illustrate the importance elements of curves (BL-4)

MODULE-4	MODERN FIELD SURVEY SYSTEMS	(10H)

Modern Field Survey Systems: Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station – Accessories – Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey; Global Positioning Systems Segments, GPS measurements, errors and biases, Surveying with GPS, Co- ordinate transformation, accuracy considerations.

At the end of the Module 4, students will be able to:

1. Study the modern field survey systems (BL-3)
2. Discuss the Errors in Total station (BL-4)
3. To understand concept of EDM and GPS (BL-3)

MODULE-5	CONCEPTS OF REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEMS	(12H)

Remote Sensing: Concept of remote sensing, Principles of remote sensing, Components of remote sensing, Elements in remote sensing, Platforms for remote sensing, Types of remote sensing, Remote sensing systems, the principal steps used to analyses remotely sensed data, Data reception, transmission and processing.

Geographic Information Systems (GIS): Definition, Objectives of GIS, Components of GIS, GIS architecture, Data – Raster and vector data processing methods, Data input, Data storage and retrieval, Data manipulation and analysis, Data output, Applications of GIS in Civil Engineering.

At the end of the Module 5, students will be able to:

1. Study the characteristics of concept of Remote sensing and GIS (BL-2)
2. Analyze the elements in Remote sensing (BL-1)
3. Understand the concept of Applications of GIS in Civil Engineering (BL-2)

Total hours: 48 hours

Term work:

1. The sources are from Website

Content beyond syllabus:

Photogrammetry Surveying: Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereo plotting instruments, mosaics, map substitutes.

Self-Study:

Contents to promote self-Learning:

SNO	Topic	CO	Reference
1	**TACHEOMETRIC SURVEYING**	CO1	**https://www.slideshare.net/neharajpl/tach tric-surveying-89058562**
2	**TRIANGULATION & SETTING OUT WORKS**	CO2	**https://www.slideshare.net/ShivamMehta2 ing-out-work https://www.slideshare.net/sheilasham/tri tion-28081746**
3	**CURVES**	CO3	**https://www.slideshare.net/Lord1911/curv and-there-application-in-survey**
4	**MODERN FIELD SURVEY SYSTEMS**	CO4	**https://www.slideshare.net/mshanmugara dern-surveying**
5	**CONCEPTS OF REMOTE SENSING AND**	CO5	lideshare.net/amalmurali47/seminar-2892594 https://www.slideshare.net/arniontech/gis-

NARAYANA ENGINEERING COLLEGE:NELLORE			
	GEOGRAPHIC INFORMATION SYSTEMS		presentation-13885167

Text Book(s):

1. Surveying, Vol- II and III by Arora, K.R., StaUKnda00rd Book House.
2. Advanced Surveying: Total Station, GIS and Remote Sensing by Madhu, N, Sathikumar, R and Satheesh Gopi, Pearson India.

Reference Book(s):

1. Geomatics Engineering by Manoj, K. Arora and Badjatia, Nem Chand & Bros.
2. Surveying and Levelling, Vol. I and II by Bhavikatti, S.S., I.K. International.
3. Remote sensing and Geographical information system by Anji Reddy, M., B.S. Publications.

Online Resources:

1. http://nptel.ac.in
2. https://nptel.ac.in/courses/105104101/

Web Resources:

1. http://www.sasurieengg.com/e-course-material/CIVIL/II-Year%20Sem%204/CE6404%20SUR%20II.pdf
2. https://lecturenotes.in/subject/273/advanced-surveying-as
3. http://www.vssut.ac.in/lecture_notes/lecture1428642587.pdf

4 https://www.academia.edu/25746683/ADVANCED_SURVEYING_LECTURE_MODULE

21CE2504	**HYDRAULICS & HYDRAULIC MACHINERY LAB**							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
IV	0	0	3	48	1.5	40	60	100

Pre-requisite: Student should have knowledge about the following subjects.
1.Fluid Mechanics

Course Objectives:

1. To provide practical knowledge in verification of principles of fluid flow
2. To impart knowledge in measuring pressure, discharge and velocity of fluid flow
3. To understand Major and Minor Losses
4. To gain knowledge in performance testing of Hydraulic Turbines and Hydraulic Pumps at constant speed and Head

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

CO 1	Students able to analyze flow rates, velocities, energy losses and momentum flux for fluid system and also understand the fundamentals of laminar and turbulent boundary layer.
CO 2	Students able to present data or governing equations in non-dimensional form, design experiments, and perform model studies
CO 3	Students able to decide when appropriate to use ideal flow concepts and the Bernoulli equation.
CO 4	Students able to calibrate various flow measuring devices in pipe and open channel flow.
CO 5	Students able to determine various losses and velocity in pipe flow in field.

CO-PO Mapping

CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO5	2	-	-	-	-	-	-	-	-	-	-	2	-	-

1-Low, 2-Medium, 3- High

Task- 1: Verification of Bernoulli's equation.

Objective: 1.To Determine the variation of the pressure along a converging-diverging pipe section.

2. The objective is to validate Bernoulli's assumptions and theorem by experimentally proving that the sum of the terms in the Bernoulli equation along a streamline always remains a constant.

Task- 2: Calibration of Venturimeter.

Objective: To study the variation of Cod and discharge with respect the head.

Task- 3: Calibration of Orifice meter.

Objective: To Determine the coefficient of Discharge (Cd) using the orifice meter.

Task- 4: Determination of Coefficient of discharge for Orifice by constant head method.

Objective: To Determine the coefficient of Discharge (Cd).

Task- 5: Calibration of contracted Rectangular Notch.

Objective: To Determine the coefficient of discharge of Rectangular notch.
Task- 6: Calibration of contracted Triangular Notch.
Objective: To Determine the coefficient of discharge of Triangular Notch.
Task- 7: Determination of Coefficient of discharge for an external mouthpiece by variable head method.
Objective: To Determine the coefficient of Discharge (Cd) of the given mouth piece.
Task- 8: Determination coefficient of friction of a pipe
Objective :To Determination coefficient of friction of a pipes
Task- 9: Impact of jet on vanes.
Objective: To Verify the momentum equation experimentally through Impact of jet experiment.
Task- 10: Efficiency test on centrifugal pump.
Objective: To plan the operational characteristics curves of multistage centrifugal pump.
Additional Experiments
Task- 1: Performance test on Pelton wheel turbine.
Objective: Performance characteristics (output and efficiency variation with speed) for different openings of the nozzle at a constant input head.
Task- 2: Draw performance curves of centrifugal pump.
Objective: To plan the operational characteristics curves of centrifugal pump.
Task- 3: Study of Hydraulic jump.
Objective: To Determine the Hydraulic jump in a Horizontal rectangular channel and development of different relationships between Height, length, efficiency and energy loss of a jump.
Virtual labs: 1. http://eerc03-iiith.vlabs.ac.in/List%20of%20experiments.html

Text Books: 1. Fluid Mechanics, Hydraulic and Hydraulic Machines by Modi & Seth, Standard book house. 2. Flow in Open channels by K.Subramanya. Tata Mc Graw Hill Publishers.

Reference Book(s): 1. Fluid Mechanics & Hydraulic Machines by SS Rattan, Khanna Publishing House. 2. Elements of Open channel flow by Ranga Raju, Tata Mc.Graw Hill, Publications. 3. Fluid Machinery by Sadhu Singh, Khanna Publishing House, Delhi.

NARAYANA ENGINEERING COLLEGE:NELLORE								
21CE2505	STRUCTURAL ANALYSIS PRACTICE							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
IV	0	0	3	48	1.5	40	60	100

Pre-requisite:

Course Objectives:

1. Ability to idealize and analyze statically determinate and indeterminate structures.
2. To equip the students with the force and displacement methods of structural Analysis.
3. To Identify the formulation and sign conventions associated with the Slope Deflection method.
4. To Understand flexibility matrices to solve problems in beams
5. To learn matrix stiffness method for analysis of skeletal structures.
6. To Calculate the internal forces in cable and arch type structures

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

CO 1	Students able to analyze statically indeterminate Beams and Frames
CO 2	Students able to analysis of indeterminate structures
CO 3	Students able to analyze the structure using Flexibility method
CO 4	Students able to analyze the structure using Stiffness method
CO 5	Students able to analyze the three hinged arches, Draw influence line diagram

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	2	2	1	2	-	-	-	2	2	-	2	3	-
CO2	2	2	2	1	2	-	-	-	2	2	-	2	3	-
CO3	2	2	2	1	2	-	-	-	2	2	-	2	3	-
CO4	2	2	2	2	2	3	1	-	-	-	-	2	2	1
CO5	2	2	2	1	2	-	-	-	2	2	-	2	3	-

1- Low, 2-Medium, 3- High

COURSE CONTENT

Task 1: Statically indeterminate Beams and Frames

Practice problems on Determination of degree of indeterminacy, Clapeyron's Theorem of Three Moments and Castigliano's Second Theorem for General loading (involving not more than 3 unknowns)

Task 2: Analysis of Indeterminate Structures

Practice problems on Slope Deflection Method and Moment Distribution Method applied to beams and sway and non-sway Frames. (Involving not more than 3 unknowns)

Task 3: Flexibility Method

Practice problems on Flexibility Method applied to beams, pin jointed trusses and sway and non-sway frames. (Involving not more than 3 unknowns)

Task 4: Stiffness Method

Practice problems on Stiffness Method applied to beam and sway and non-sway frames. (involving not more than 3 unknowns)

Task 5: Three Hinged Arches and Influence Line Diagram

Practice problems on Influence Line Diagram for reactions, shear and bending moment for simply supported and overhanging beams. Practice problems on Three Hinged Parabolic and Semi-circular Arches to determine Horizontal thrust, radial shear and normal thrust

Task 6: Approximate Methods of Analysis

Practice problems on approximate methods of analysis of multi-storied multi-bay 2-D rigid jointed frames by substitute frame method, portal method and cantilever method.

Self-Study:

Contents to promote self-Learning:

SNO	Topic	CO	Reference
1	Analysis of frames	CO1	**https://www.youtube.com/watch?v=Lo4tXDwmUKg**
2	Slope Deflection Method	CO2	https://www.youtube.com/watch?v=1iMKqDgOClQ
3	Flexibility Method	CO3	https://academic.csuohio.edu/duffy_s/Class%20Info%20on%20Web/511_06.pdf
4	Stiffness Method	CO4	https://engineering.purdue.edu/~aprakas/CE474/CE474-Ch5-StiffnessMethod.pdf
5	Moving Loads and Influence Lines, Three hinged arch	CO5	**https://www.slideshare.net/MadujithSagara/influence-lines-structural-analysis-theories** https://nptel.ac.in/content/storage2/courses/105105109/pdf/m5l32.pdf

Text Book(s):

1. Mechanics of Structures Vol. II - S.B. Junnerkar and H.J. Shaha, Charotar Publishing House

2. Theory of Structures- B.C.Punmia, Ashok kumar Jain and Arun Kumar Jain, Laxmi Publications (P) Ltd.

3. Structural Analysis- Madan Mohan Das, Bhargab Mohan Das and Mimi Das Saikia, PHI Learning Private Ltd.

4. Structural Analysis- S.S.Bhavikatti, Vikas Publishing House Pvt. Ltd.

Reference Book(s):

1. Intermediate Structural Analysis- C.K.Wang, Tata Mc Graw Hill Education Pvt. Ltd. New Delhi
2. Structural Analysis- R.C.Hibbler , Pearson
3. Matrix Methods of Structural Analysis- Dr. A.S.Meghre and S.K.Deshmukh, Charotar Publishing House

Online Resources:

1. http://www.vssut.ac.in/lecture_notes/lecture1428730889.pdf
2. http://web.iitd.ac.in/~sbhalla/cel717.pdf
3. https://link.springer.com/journal/40091
4. http://journals.azad.ac.ir/ijase/
5. http://textofvideo.nptel.iitm.ac.in/105101086/lec4.pdf

NARAYANA ENGINEERING COLLEGE: NELLORE								
20CE2506	SURVEYING –II LAB							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
IV	0	0	3	48	1.5	40	60	100

Pre-requisite: Nil

Course Objectives:

1. This subject deals with geodetic measurements and Control Survey methodology and its adjustments.
2. The student is also exposed to the Modern Surveying.
3. To provide knowledge of Total Station & advanced surveying instruments.
4. Develop skills in using Total Station & advanced surveying instruments and analyse data.
5. Develop skills to set out Curves in the field using both Total Station.

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

CO 1	Apply the knowledge of principles of theodolite in finding out the angles, distances, traversing
CO 2	Apply the knowledge of principles of tachometric in finding out the height, distances and elevation
CO 3	Student able to do contouring, traversing, find out area from total station
CO 4	Students able to take measurements using ASD
CO 5	Students able to generate a simple curve, contour plan and building layout for given area

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	-	-	-	-	-	-	-	-	-	-	2	-	1
CO2	2	-	-	-	-	-	-	-	-	-	-	2	2	-
CO3	2	-	-	-	-	-	-	-	-	-	-	1	2	-
CO4	2	-	-	-	-	-	-	-	-	-	-	1	2	1
CO5	3	-	-	-	-	-	-	-	-	-	-	1	2	1

1: Low, 2-Medium, 3- High

COURSE CONTENT

Task -1: Measurement of horizontal and vertical angles theodolite by method of repetition & reiteration method.

Task -2: Determination of horizontal distance between two inaccessible points with theodolite.

Task -3: Locating given building by theodolite traversing

Task -4: Determination of elevation of point by trigonometric levelling
Task -5: Height and distances using principles of tachometric surveying
Task -6: To set out a simple circular curve by Rankine's method
Task -7: To study the various electronic surveying instruments like EDM, Total Station etc
Task -8: Determine of area using total station
Task -9: Traversing using total station.
Task -10: Contouring using total station.
Task -11: To take measurements using ASD Spectrometer.
Task -12: To take measurements using ASD Field Spec range.
Additional experiments
Task -14: Contour plan of given area.
Task -15: To give layout of given plan of building.
Task -16: Determination of remote height using total station.
Virtual labs: 1. http://sliitr.vlabs.ac.in/sliitr/List%20of%20experiments.html?domain=Civil%20Engineering

Text Book(s): 1. S.S. Bhavikatti, "Surveying theory & Practice", 2nd edition, Dreamtech press, wiley distributors. 2. C. Venkataramaiah, "Text book of surveying", 2nd edition, university press, 2018.
Reference Book(s): 1. Arora K R "Surveying" Vol 1, 2& 3, Standard book house, Delhi, 2004.
Online Resources: 1. http://nptel.ac.in 2. https://nptel.ac.in/courses/105104101/

Web Resources:

1. http://www.sasurieengg.com/e-course-material/CIVIL/II-Year%20Sem%204/CE6404%20SUR%20II.pdf
2. https://lecturenotes.in/subject/273/advanced-surveying-as
3. http://www.vssut.ac.in/lecture_notes/lecture1428642587.pdf

4 https://www.academia.edu/25746683/ADVANCED_SURVEYING_LECTURE_MODULE