1.3.1 Institution integrates cross-cutting issues relevant to Professional Ethics, Gender, Human Values, Environment and Sustainability and human values into the Curriculum

2022-23			
Programme	**Course Code**	**Title of the Course**	**Category**
B.Tech	20A3100801	Essence Of Indian Knowledge and Traditions	Human Values
B.Tech	20A3101503	Geo-Technical Engineering - I	Environment & Sustainaibility
B.Tech	20A3101592	Geo-Technical Engineering Lab	Environment & Sustainaibility
B.Tech	20A3101523	Environmental Impact Assessment	Environment & Sustainaibility
B.Tech	20A3201602	Water References Engineering	Environment & Sustainaibility
B.Tech	20A3201603	Geotechnical Engineering-2	Environment & Sustainaibility
B.Tech	20A3201622	Environmental Engineering	Environment & Sustainaibility
B.Tech	20A3201623	Disaster Management	Environment & Sustainaibility
B.Tech	20A3100802	Professional Ethics And Human Values	Professional Ethics
B.Tech	20A3200802	Research Methodology & IPR	Human Values

ACADEMIC YEAR

2022-23

20A3100801 ESSENCE OF INDIAN KNOWLEDGE AND TRADITIONS

Lecture – Tutorial:	2-0 Hours	**Internal Marks:**	30
Credits:	0	**External Marks:**	70

Prerequisites: NONE

Course Objectives:

1. To develop knowledge of fundamental management concepts, skills and tools, to aid in problem solving and decision making.
2. To develop and understanding about the organizational structure and relationship between authority and responsibility in various structures.
3. To discuss the evolution of principles that make it possible to design facilities, processes, and control systems with a degree of predictability as to their performance.
4. To develop comprehensive skills in planning, selecting, motivating, and developing the human references for organizational effectiveness.
5. To understand the broad scope of marketing, societal, ethical and other diverse aspects of marketing.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1 Understand the concept of Traditional knowledge and its importance

CO2 Know the need and importance of protecting traditional knowledge

CO3 Know the various enactments related to the protection of traditional knowledge

CO4 Understand the concepts of Intellectual property to protect the traditional knowledge

CO5 Develop comprehensive skills in planning, selecting, motivating, and developing the human references for organizational effectiveness.

CO6 Understand the broad scope of marketing, societal, ethical and other diverse aspects of marketing

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2-Medium, 3 – High)

	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	-	-	-	-	-	-	2		-	-	-	-	-
CO4	2	-	-	-	-	-	-	2		-	-	-	-	-
CO5	2	-	-	-	-	-	-	2		-	-	-	-	-
CO6	2	-	-	-	-	-	-	2		-	-	-	-	-

UNIT I

INTRODUCTION TO TRADITIONAL KNOWLEDGE:

Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge.

UNIT II

PROTECTION OF TRADITIONAL KNOWLEDGE:

The need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

LEGAL FRAMEWORK AND TK: A:

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmers Rights Act,2001 (PPVFR Act);B: The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indications act 2003.

UNIT III

TRADITIONAL KNOWLEDGE AND INTELLECTUAL PROPERTY:

Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

UNIT IV

TRADITIONAL KNOWLEDGE IN DIFFERENT SECTORS:

Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs

UNIT-V

Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

TEXT BOOKS:

1. Kapil Kapoor, "Text and Interpretation: The India Tradition", ISBN: 81246033375,2005.
2. "Science in Samskrit", Samskrita Bharti Publisher,ISBN-13:978-8187276333,2007.
3. NCERT, "Position paper on Arts, Music, Dance and Theatre", ISBN 81-7450-494-X,2006.

REFERENCE BOOKS:

1. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002
2. "Knowledge Traditions and Practices of India" Kapil Kapoor, Michel Danino.

E- RESOURCES:

- https://www.youtube.com/watch?v=sSgi_GZOwU8

20A3101503 GEO-TECHNICAL ENGINEERING I

Lecture – Tutorial:	2-1 Hours	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites: NONE

Course Objectives:

1. To enable the student to find out the index properties of the soil and classify it.
2. To enable the students to differentiate between compaction and consolidation of soils and to determine the consolidation settlement.
3. To enable the student to determine permeability of soils using various methods.
4. To impart the concept of seepage of water through soils and determine the seepage discharge.
5. To impart the concept of effective stress principal.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1 Identify various soils based on their characteristics.

CO2 Characterize and classify soils based on different limits.

CO3 Evaluate permeability and seepage of soils.

CO4 Determine the permeability of soils and stratified soils

CO5 Determine plasticity characteristics of various soils

CO6 Design consolidation process by predicting settlement of soils.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)

	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	-	-	-	-	-	-	-	-	3	
CO2	3	-	-	-	-	-	-	1	-	-	-	-	3	
CO3	3	2	-	-	-	1	-	-	-	-	-	-	2	
CO4	2	2	-	-	-	1	-	-	-	-	-	-	3	
CO5	2	2	-	-	-	1	-	-	-	-	-	-	3	
CO6	2	2	2	-	-	1	-	1	-	-	-	-	3	

UNIT I

TYPES AND CHARACTERISTICS OF SOILS:

Types of soils - formation and deposition - moisture content, unit weights, degree of saturation, voids ratio, porosity, specific gravity, mass specific gravity. Relationship between various soil parameters. Determination of Moisture content, Specific gravity and Unit weight using various methods.

PLASTICITY CHARACTERISTICS OF SOIL:

Consistency limits-liquid limit, plastic limit, shrinkage limit, plasticity, liquidity and consistency indices, flow & toughness indices. Determination of liquid limit, plastic limit and shrinkage limit. Soil classification based on particle size, texture, unified and Indian standard method.

UNIT II

PERMEABILITY OF SOIL:

Darcy's law- coefficient of permeability: determination by constant-head and falling-head methods. Permeability of stratified soils - factors affecting - Seepage Analysis-stream and potential functions - flow nets, graphical method to plot flow nets.

UNIT III

EFFECTIVE STRESS PRINCIPLE:

Introduction, effective stress principle, nature of effective stress, effect of water table. Capillary action, seepage pressure, quick sand condition. Compaction of Soil- theory of compaction- optimum moisture content- maximum dry density.

UNIT IV

STRESSES IN SOILS:

Stresses in soils due to point load, line load, strip load, uniformly loaded circular, rectangular loaded area. Influence factors, Isobars, Boussinesq's equation, Newmark's Influence

UNIT V

CONSOLIDATION OF SOIL:

Comparison between compaction and consolidation, initial, primary & secondary consolidation - Terzaghi's theory of consolidation, final settlement of soil deposits, computation of consolidation settlement and secondary consolidation.

TEXT BOOKS:

1. Soil Mechanics and Foundation Engg., K. R. Arora, Standard Publishers and Distributors, Delhi.
2. Geotechnical Engineering, C. Venkataramiah , New age International Pvt . Ltd, (2002).
3. Geotechnical Engineering , V.N.S.Murthy, BOOK World Enterprises ,Mumbai.

REFERENCE BOOKS:

1. Soil Mechanics and Foundation, B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi publications Pvt. Ltd., New Delhi
2. Basic and Applied Soil Mechanics, Gopal Ranjan & A. S. R. Rao, New age International Pvt . Ltd, New Delhi.

E-REFERENCES:

- http://www.btechmaterials.com/download/geotechnical-engineering-gte-material-notes/
- http://www.nptelvideos.in/2012/11/soil-mechanics.html

20A3101592 GEO-TECHNICAL ENGINEERING LAB

Practical	3 Hours	**Internal Marks:**	30
Credits:	1.5	**External Marks:**	70

Prerequisites: NONE

Course Objectives:

- To impart knowledge of determination of index properties (LL,PL&SL).
- To teach how to classify classification of soils.
- To teach how to determine compaction characteristics and consolidation behavior from relevant lab tests.
- Determine permeability of soils.
- To teach how to determine shear parameters of soil through different laboratory tests.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1	Determine index properties of soil and classify them.
CO2	Determine permeability of soils.
CO3	Determine Compaction characteristics.
CO4	Determine Consolidation characteristics.
CO5	Determine shear strength characteristics.
CO6	Determine field density.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)

	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	-	3	-	2	-	2	-	-	-	-	1	2
CO2	3	3	-	3	-	2	-	2	-	-	-	-	1	2
CO3	3	3	-	3	-	2	-	2	-	-	-	-	1	2
CO4	3	3		3		2		2					1	2
CO5	3	3		3		2		2					1	2
CO6	3	3		3		2		2					1	3

List of Experiments

1. To determine Specific gravity of given soil sample.
2. To determine Atterberg's Limits.(LL,PL,&SL).
3. To determine Field density-Core cutter and Sand replacement methods.
4. To classify Grain size analysis by sieving.
5. To classify Grain size analysis by Hydrometer Analysis Test.
6. To determine Permeability of soil - Constant and Variable head tests.
7. To determine water content and dry density by Compaction test.
8. To determine Consolidation test (to be demonstrated).
9. To determine strength parameters by using Direct Shear test.
10. To determine strength parameters by using Triaxial Compression test (UU Test).
11. To determine strength parameters by using Unconfined Compression test.
12. To determine strength parameters by using Vane Shear test.
13. To determine Differential free swell (DFS).
14. To determine CBR Test.

TEXT BOOKS:

1. Soil Mechanics and Foundation Engg., K. R. Arora, Standard Publishers and Distributors, Delhi.
2. Geotechnical Engineering, C. Venkataramiah, New age International Pvt Ltd, (2002).

REFERENCE BOOKS:

1. 'Determination of Soil Properties' by J. E. Bowles.
2. IS Code 2720 – relevant parts.

20A3101523 ENVIRONMENTAL IMPACT ASSESSMENT

Lecture – Tutorial:	2-1 Hours	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

PREREQUISITES: ENVIRONMENTAL ENGINEERING, AIR POLLUTION AND CONTROL, SOLID AND HAZARDOUS WASTE MANAGEMENT

Course Objectives:

- To impart knowledge on different concepts of Environmental Impact Assessment.
- To know procedures of risk assessment.
- To learn the EIA methodologies and the criterion for selection of EIA methods.
- To know the procedures for environmental clearances and audit.
- To gain the knowledge of different environmental regulations of Government of India.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1	Explain the role of stakeholder and public hearing in the preparation of EIA
CO2	Proficient in basics of EIA
CO3	Proficient in environmental related laws
CO4	Proficient in components and methods for prediction and assessment of impacts of air, water, etc.
CO5	Proficient in documentation and monitoring
CO6	Proficient in preparing EIA report for Projects like Irrigation and power generation

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)

	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	3	3					2	
CO2	3	-	1	2	-	2	3	3					2	
CO3		-	-	-	-	-	3	3					2	
CO4	2	-	1	-	-	2	3	3					2	
CO5	2	-	-	-	-	-	3	3					2	3
CO6							3	3					2	3

UNIT I

INTRODUCTION:

Environmental Impact Assessment (EIA) – Objectives of EIA report – Contents of EIA – Environmental Impact Statement (EIS) – Environmental Risk Assessment (ERA) – Legal and regulatory aspects in India – Types and Limitations of EIA – Issues in EIA – National – Cross sectoral – social and cultural.

UNIT II

COMPONENTS AND METHODS:

Components – Scoping – Screening. Identifying and evaluating alternatives. Mitigating measures dealing with uncertainty. Issuing environmental statement matrices – networks – checklists; Importance assessment techniques – cost benefit analysis – analysis of alternatives – methods for prediction and assessment of impact – Air – Water – Soil – Noise – Biological – Cultural – Social – Economic Environments, Standards and Guidelines for evaluation. Public participation in Environmental

decision-making.

UNIT III

DOCUMENTATION AND MONITORING:

Document planning – collection and organization of relevant information – use of visual display materials – team writing – remainder checklists. Environmental monitoring – Guidelines – policies – planning of monitoring programs. Environmental management plan. Post project audit. Expert system in EIA.

UNIT IV

CASE STUDIES:

Case studies of EIA of developmental projects. Dams, Sardar Sarovar Irrigation Project, Highway Projects, Power generation and their Impacts.

UNIT V

EIA notification by Ministry of Environment and Forest (Govt. of India):

Provisions in the EIA notification, procedure for environmental clearance, procedure for conducting environmental impact assessment report- evaluation of EIA report. Environmental legislation objectives, evaluation of Audit data and preparation of Audit report. Post Audit activities, Concept of ISO and ISO 14000. Case studies and preparation of Environmental Impact assessment statement for various Industries.

TEXT BOOKS:

- Environmental Impact Assessment, Canter Larry W., McGraw-Hill education Edi (1996)
- Environmental Impact Assessment Methodologies, Y. Anjaneyulu, B. S. Publication, Sultan Bazar, Hyderabad.
- Glasson, John, and Riki Therivel. Introduction to environmental impact assessment. Routledge, 2013.
- Eccleston, Charles H. Environmental impact assessment. John Wiley & Sons, New York, 2000.

REFERENCE BOOKS:

- Environmental Science and Engineering, J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers
- Environmental Science and Engineering, Suresh K. Dhaneja, S. K. , Katania & Sons Publication., New Delhi.
- Environmental Pollution and Control, H. S. Bhatia, Galgotia Publication (P) Ltd, Delhi

E-REFERENCES:

1.

20A3201602 WATER REFERENCES ENGINEERING

Lecture – Tutorial:	2-1 Hours	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites: HYDRAULICS

Course Objectives:

- Introduce hydrologic cycle and its relevance to Civil engineering.
- Make the students understand physical processes in hydrology and, components of the hydrologic cycle.
- Appreciate concepts and theory of physical processes and interactions.
- Learn measurement and estimation of the components hydrologic cycle.
- Provide an overview and understanding of Unit Hydrograph theory and its analysis.
- Understand flood frequency analysis, design flood, flood routing.
- Appreciate the concepts of groundwater movement and well hydraulics.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1	Develop design storms and carry out frequency analysis.
CO2	Determine storage capacity and life of reservoirs.
CO3	Develop unit hydrograph and synthetic hydrograph.
CO4	Estimate flood magnitude and carry out flood routing.
CO5	Determine aquifer parameters and yield of wells.
CO6	Model hydrologic processes.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)

	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	3	-	-	1	-	1	-	-	-	-	1	2
CO2	2	2	-	-	-	-	-	-	-	-	-	-	1	2
CO3	3	2	2	-	-	1	-	1	-	-	-	-	1	2
CO4	2	2	-	-	-	-	-	-	-	-	-	-	1	2
CO5	2	2	-	-	-	-	-	-	-	-	-	-	1	2
CO6	2	1	-	-	-	-	-	-	-	-	-	-	1	2

UNIT I

ENGINEERING HYDROLOGY AND PRECIPITATION:

Engineering hydrology and its applications, Hydrologic cycle, hydrological data-sources of data.

PRECIPITATION:

Types and forms, measurement, rain gauge network, presentation of rainfall data, average rainfall, continuity and consistency of rainfall data, frequency of rainfall, Intensity-Duration-Frequency (IDF) curves, Depth-Area-Duration (DAD) curves, Probable Maximum Precipitation (PMP), design storm.

UNIT II

ABSTRACTIONS FROM PRECIPITATION:

Initial abstractions. Evaporation: factors affecting, measurement, reduction Evapotranspiration: factors affecting, measurement, control - Infiltration: factors affecting, Infiltration capacity curve, measurement, infiltration indices.

UNIT III

RUNOFF AND HYDROGRAPH ANALYSIS:

Catchment characteristics, Factors affecting runoff, components, computation-empirical formulae, tables and curves, stream gauging, rating curve, flow mass curve and flow duration curve. Components of hydrograph, separation of base flow, effective rainfall hyetograph and direct runoff hydrograph, unit hydrograph, assumptions, derivation of unit hydrograph, unit hydrographs of different durations, principle of superposition and S-hydrograph methods, limitations and applications of unit hydrograph, synthetic unit hydrograph.

UNIT IV

FLOODS:

Causes and effects, frequency analysis- Gumbel's and Log-Pearson type III distribution methods, Standard Project Flood (SPF) and Probable Maximum Flood (MPF), flood control methods and management.

FLOOD ROUTING:

Hydrologic routing, channel and reservoir routing-Muskingum and Puls methods of routing.

UNIT V

IRRIGATION:

Necessity and importance, principal crops and crop seasons, types, methods of application, soil-water-plant relationship, soil moisture constants, consumptive use, estimation of consumptive use, crop water requirement, duty and delta, factors affecting duty, depth and frequency of irrigation, irrigation efficiencies, water logging and drainage, standards of quality for irrigation water, crop rotation.

TEXT BOOKS:

1. Engineering Hydrology, Jayarami Reddy, P., Laxmi Publications Pvt. Ltd., (2013), New Delhi
2. Irrigation and Water Power Engineering, B. C. Punmia, Pande B. B. Lal, Ashok Kumar Jain and Arun Kumar Jain, Lakshmi Publications (P) Ltd.

REFERENCE BOOKS:

1. Engineering Hydrology Subramanya, K, Tata McGraw-Hill Education Pvt Ltd (2013), New Delhi.
2. Irrigation Engineering and Hydraulic Structure, Santosh Kumar Garg, Khanna Publishers.

E-REFERENCES:

- http://www.nptelvideos.in/2012/11/water-REFERENCES-systemsmodeling.html
- http://www.nptelvideos.in/2012/11/advanced-hydrology.html
- http://freevideolectures.com/Course/100/Water-REFERENCES-Engineering
- http://www.btechmaterials.com/download/water-REFERENCES-engineering-materials-notes/
- http://www.btechmaterials.com/download/water-REFERENCES-engineering-ii-materials-notes/

20A3201603 GEOTECHNICAL ENGINEERING-II

Lecture – Tutorial:	2-1 Hours	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites: GEOTECHNICAL ENGINEERING-I

Course Objectives:

1) To impart knowledge on soil exploration.
2) To teach slope stability and safety assessment of earth retaining structures.
3) To impart knowledge on bearing capacity and settlement of shallow foundations.
4) To impart knowledge on bearing capacity and settlement of pile foundations.
5) To throw light on well foundation designs.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1	Understand the methods of soil exploration.
CO2	Compile soil investigation report
CO3	Assess stability of slopes and earth retaining structures
CO4	Determine safe bearing capacity and settlement of shallow foundations.
CO5	Design pile foundations.
CO6	Design well foundations.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)

	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	2
CO2	2	2	-	-	-	2	-	-	-	-	-	-	1	2
CO3	2	2	-	-	-	-	-	-	-	-	-	-	1	2
CO4	2	2	3	-	-	2	-	1	-	-	-	-	1	2
CO5	2	3	3	-	-	2	-	1	-	-	-	-	1	2
CO6	2	3	3	-	-	2	-	1	-	-	-	-	1	2

UNIT I

SOIL EXPLORATION:

Methods of soil exploration – Boring and Sampling methods – Penetration Tests – Pressure meter – Observation of ground water-Geophysical Methods-Programme planning and preparation of soil investigation report.

UNIT II

EARTH RETAINING STRUCTURES:

Infinite and finite earth slopes in sand and clay – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices – Taylor's Stability Number-Stability of slopes of dams and embankments - different conditions. Rankine's & Coulomb's theory of earth pressure – Culmann's graphical method - earth pressures in layered soils.

UNIT III

SHALLOW FOUNDATIONS:

Types of foundations and influencing factors - Bearing capacity – determination of bearing capacity – factors influencing bearing capacity – analytical methods to determine bearing capacity – Terzaghi's theory – settlements – Design aspects of

shallow foundations-IS Methods.

UNIT IV

PILE FOUNDATIONS:

Types of piles – Load carrying capacity based on static and Dynamic formulae– Pile load tests - pile groups in sands and clays- pile cap design.

UNIT V

WELL FOUNDATIONS:

Types – Different shapes – Components of well foundation – forces acting on well foundations - Design Criteria – Determination of staining thickness and plug - construction and Sinking of wells – Tilt and shift.

TEXT BOOKS:

1. C. Venkataramiah, Geotechnical Engineering, New age International Pvt . Ltd, (2002).
2. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Soil Mechanics and Foundation by, Laxmi, publications Pvt. Ltd., New Delhi.

REFERENCE BOOKS:

1. T. N. Ramamurthy, a textbook of geotechnical engineering (soil mechanics), s. Chand and company limited, new delhi.
2. Purushtoma raj, soil mechanics and foundation engineering, pearson publications.

E-REFERENCES:

- http://www.nptelvideos.in/2012/11/foundation-engineering.html
- http://www.btechmaterials.com/download/foundation-engineering-fe-material-notes/

20A3201622 ENVIRONMENTAL ENGINEERING

Lecture – Tutorial:	2-1 Hours	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites: ENVIRONMENTAL STUDIES

Course Objectives:

1) To teach requirements of water and its treatment.
2) To impart knowledge on sewage treatment methodologies.
3) To provide facts on Air pollution and control.
4) To enable with design concepts of wastewater treatment units
5) To throw light on importance of plumbing.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1 Understand about quality of water and purification process
CO2 Select appropriate technique for treatment of waste water.
CO3 Assess the impact of air pollution
CO4 Understand consequences of solid waste and its management.
CO5 Design domestic plumbing systems.
CO6 Selection of suitable treatment flow for raw water treatments.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)

	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
CO2	2							1					1	2
CO3	2							1					1	2
CO4	2							1					1	3
CO5	2	2	3					1					1	3
CO6	2							1					1	3

UNIT I

ESTIMATION OF QUALITY AND QUANTITY OF WATER:

Importance and Necessity of Protected Water Supply systems; Routine water analysis - physical, chemical and bacteriological tests; Standards for drinking water; Water borne diseases, Sources of Water: Surface and Ground water, comparison of sources with reference to quality, quantity and other considerations.

UNIT II

FLOW CHART OF PUBLIC WATER SUPPLY SYSTEM:

Water Demand and Quantity Estimation: Estimation of water demand for a town or city, Per capita Demand and factors influencing it - Types of water demands and its variations factors affecting water demand, Design Period Population Forecasting. - Capacity of storage reservoirs, Mass curve analysis.

UNIT III

TREATMENT OF WATER AND DISTRIBUTION:

Flowchart of water treatment plant, Treatment methods: Theory and Design of Sedimentation, Coagulation, Sedimentation with Coagulation, Filtration-Slow sand and rapid sand filters; Construction and Operation; Disinfection methods-chlorination; Removal of hardness.

Distribution of Water: Requirements- Methods of Distribution system, Layouts of Distribution networks.

UNIT IV

ESTIMATION OF QUANTITY AND QUALITY OF SEWAGE:

Estimation of sewage flow and storm water drainage – fluctuations- classification of sewerage systems – types of sewers - Hydraulics of sewers and storm drains– design diameter of sewers – appurtenances in sewerage – Man holes, Street Inlets

UNIT V

TREATMENT OF SEWAGE AND DISPOSAL:

Primary treatment-Screens-grit chambers-grease traps– floatation– sedimentation – design of preliminary and primary treatment units. Design of septic tank

SECONDARY TREATMENT:

Aerobic and anaerobic treatment process comparison. Suspended growth process: Activated Sludge Process, principles, and operational problems, Activated Sludge Processes.

TEXT BOOKS:

1. Elements of Environmental Engineering – K. N. Duggal, S. Chand & Company Ltd., New Delhi, 2012.
2. Environmental Engineering water supply Engineering- vol. 1 Santosh kumar Garg ,Khanna Publishers 2018 edition
3. Sewage waste disposal and Air pollution Engineering Santosh kumar Garg ,Khanna Publishers 2018 edition

REFERENCE BOOKS:

1. Environmental Engineering, D. Srinivasan, PHI Learning Private Limited, New Delhi, -2011 edition.
2. Wastewater engineering treatment and reuse - Metclff & Eddy MCGraw Hill Education (India) private Limited- 2003 edition

E-REFERENCES:

20A3201623 DISASTER MANAGEMENT

Lecture – Tutorial:	2-1 Hours	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites: NONE

Course Objectives:

- To explain concepts of fluid mechanics used in Civil Engineering.
- To explain basics of statics, kinematics and dynamics of fluids and various measuring techniques of hydrostatic forces on objects.
- To impart ability to solve engineering problems in fluid mechanics.
- To enable the student's measure quantities of fluid flowing in pipes, tanks and channels.
- To teach integral forms of fundamental laws of fluid mechanics to predict relevant pressures, velocities and forces.
- To strengthen the students with fundamentals useful in application-intensive courses dealing with hydraulics, hydraulic machinery and hydrology in future courses.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1	Understand the principles of fluid statics, kinematics and dynamics
CO2	Familiarize basic terms used in fluid mechanics
CO3	Understand flow characteristics and classify the flows
CO4	Apply the continuity, momentum and energy principles
CO5	Estimate various losses in flow through channels
CO6	Understand fundamentals of kinematics and equations Cartesian coordinates.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)

	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					1	2
CO2	3												1	2
CO3	3												1	2
CO4	3	2		3				2					1	3
CO5	2	2		3				2					1	3
CO6	2	2		2									1	3

UNIT I

INTRODUCTION:

Hazard, Risk, Vulnerability, Disaster, Meaning, Nature, Importance, Dimensions & Scope of Disaster Management, Disaster Management Cycle.

NATURAL DISASTERS:

Natural Disasters- Meaning and nature of natural disasters, their types and effects, Hydrological Disasters - Flood, Flash flood, Drought, Geological Disasters- Earthquakes, Tsunamis, Landslides, Avalanches, Volcanic eruptions, Mudflow.

UNIT II

TYPES OF NATURAL DISASTERS:

Wind related- Cyclone, Storm, Storm surge, Tidal waves, Heat and cold Waves, Climatic Change, Global warming, Sea Level rise, Ozone Depletion.

UNIT III

MAN – MADE DISASTERS:

CBRN – Chemical disasters, biological disasters, radiological disasters, nuclear disasters, Fire – building fire, coal fire, forest fire, Oil fire.

UNIT IV

TYPES OF MAN – MADE DISASTERS:

Accidents- road accidents, rail accidents, air accidents, sea accidents, Pollution - air pollution, water pollution, Deforestation, Industrial waste.

UNIT V

DISASTER DETERMINANTS:

Factors affecting damage – types, social status, habitation pattern, physiology and climate, Factors affecting mitigation measures, prediction, preparation, communication, area and accessibility, population, physiology and climate.

TEXT BOOKS:

- Disaster Management Guidelines, GOI-UND Disaster Risk Program (2009-2012).
- Damon, P. Copola, (2006) Introduction to International Disaster Management, Butterworth Heineman.
- Gupta A.K., Niar S.S and Chatterjee S. (2013) Disaster management and Risk Reduction, Role of Environmental Knowledge, Narosa Publishing House, Delhi.

REFERENCE BOOKS:

- Murthy D.B.N. (2012) Disaster Management, Deep and Deep Publication PVT. Ltd. New Delhi.
- Modh S. (2010) Managing Natural Disasters, Mac Millan publishers India LTD.

E-REFERENCES:

PROFESSIONAL ETHICS & HUMAN VALUES

Lecture – Tutorial:	2-0 Hours	**Internal Marks:**	30
Credits:	0	**External Marks:**	70

Course Objectives:

- To create an awareness on Engineering Ethics and Human Values.
- To instill Moral and Social Values and Loyalty
- To appreciate the rights of others
- To create awareness on assessment of safety and risk

Course Outcomes

Upon successful completion of the course, the student will be able to:

CO1	Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field
CO2	Identify the multiple ethical interests at stake in a real-world situation or practice
CO3	Articulate what makes a particular course of action ethically defensible
CO4	Assess their own ethical values and the social context of problems
CO5	Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects
CO6	Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	1										
CO2	3	1										
CO3	3	1										
CO4	3	1										
CO5	3	1										
CO6	3	1										

UNIT I

Human Values:

Morals, Values and Ethics-Integrity-Work Ethic-Service learning – Civic Virtue – Respect for others –Living Peacefully –Caring –Sharing –Honesty -Courage-Cooperation– Commitment – Empathy –Self Confidence Character –Spirituality.

Learning outcomes:

1. Learn about morals, values & work ethics.
2. Learn to respect others and develop civic virtue.
3. Develop commitment
4. Learn how to live peacefully

UNIT II

Engineering Ethics:

Senses of 'Engineering Ethics-Variety of moral issued –Types of inquiry –Moral dilemmas – Moral autonomy –Kohlberg's theory-Gilligan's Theory-Consensus and controversy –Models of professional roles-Theories about right action-Self-interest - Customs and religion –Uses of Ethical theories –Valuing time –Cooperation – Commitment. Learning outcomes:

1. Learn about the ethical responsibilities of the engineers.
2. Create awareness about the customs and religions.
3. Learn time management
4. Learn about the different professional roles.

UNIT III

Engineering as Social Experimentation:

Engineering As Social Experimentation –Framing the problem –Determining the facts – Codes of Ethics –Clarifying Concepts –Application issues –Common Ground - General Principles –Utilitarian thinking respect for persons. Learning outcomes: 1. Demonstrate knowledge to become a social experimenter. 2. Provide depth knowledge on framing of the problem and determining the facts. 3. Provide depth knowledge on codes of ethics. 4. Develop utilitarian thinking

UNIT IV

Engineers Responsibility for Safety and Risk:

Safety and risk –Assessment of safety and risk –Risk benefit analysis and reducing risk- Safety and the Engineer-Designing for the safety-Intellectual Property rights (IPR).

Learning outcomes:

1. Create awareness about safety, risk & risk benefit analysis. 2. Engineer's design practices for providing safety.
3. Provide knowledge on intellectual property rights.

UNIT V

Global Issues:

Globalization –Cross-culture issues-Environmental Ethics –Computer Ethics – Computers as the instrument of Unethical behavior –Computers as the object of Unethical acts – Autonomous Computers-Computer codes of Ethics –Weapons Development -Ethics and Research –Analyzing Ethical Problems in research. Learning outcomes:

1. Develop knowledge about global issues.
2. Create awareness on computer and environmental ethics
3. Analyze ethical problems in research.
4. Give a picture on weapons development.

TEXT BOOKS:

1) "Engineering Ethics includes Human Values" by M.Govindarajan, S.Natarajan and, V.S.Senthil Kumar-PHI Learning Pvt. Ltd-2009

2) "Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.

3) "Ethics in Engineering" by Mike W. Martin and Roland Schinzinger –Tata McGraw- Hill–2003.

4) "Professional Ethics and Morals" by Prof.A.R.Aryasri, DharanikotaSuyodhana-Maruthi Publications.
5) "Professional Ethics and Human Values" by A.Alavudeen, R.KalilRahman and M. Jayakumaran, Laxmi Publications.
6) "Professional Ethics and Human Values" by Prof.D.R.Kiran-"Indian Culture, Values and Professional Ethics" by PSR Murthy-BS Publication

III B.TECH I SEMESTER

Course Code: 20A3200802
Research Methodology & IPR

Lecture – Practical:	2-0 Hours	**Internal Marks:**	30
Credits	0	**External Marks:**	70

Prerequisites: None

Course Objectives

1) To understand the objectives and characteristics of a research problem.
2) To analyze research related information and to follow research ethics
3) To understand the types of intellectual property rights.
4) To learn about the scope of patent rights.
5) To understand the new developments in IPR.

Course Outcomes

Upon successful completion of the course, the student will be able to:

CO1	Judge the characteristics of a research problem
CO2	Justify research related information
CO3	Interpret intellectual property rights
CO4	Utilize scope of patent rights
CO5	Develop New IPR's

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						√	√	√	√			√
CO2						√	√	√	√			√
CO3						√	√	√	√			√
CO4						√	√	√	√			√
CO5						√	√	√	√			√

UNIT I

Research problem: Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT II

Literature study: Effective literature studies approaches, analysis Plagiarism, Research ethics, Technical writing: Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT III

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. **Process of Patenting and Development**: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.
UNIT IV
Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications
UNIT V
New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc, Traditional knowledge Case Studies, IPR and IITs.
Text Book: 1) Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'" 2) Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction" 3) Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners"
REFERENCE BOOKS:
1) Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd , 2007. 2) Mayall, "Industrial Design", McGraw Hill, 1992. 3) Niebel, "Product Design", McGraw Hill, 1974. 4) Asimov, "Introduction to Design", Prentice Hall, 1962.