GUJARAT TECHNOLOGICAL UNIVERSITY

CYBER SECURITY
SUBJECT CODE: 2150002
B.E. 5th SEMESTER

Type of course: NA

Prerequisite: Basic fundamental knowledge of computers, Internet and network

Rationale: NA.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		ESE (V)		PA (I)	
					PA	ALA	ESE	OEP		
0	1	2	3	0	0	0	50	30	20	100

Content:

Sr. No.	Topics	Weightage %
1	**Systems Vulnerability Scanning** Overview of vulnerability scanning, Open Port / Service Identification, Banner / Version Check, Traffic Probe, Vulnerability Probe, Vulnerability Examples, OpenVAS, Metasploit. Networks Vulnerability Scanning - Netcat, Socat, understanding Port and Services tools - Datapipe, Fpipe, WinRelay, Network Reconnaissance – Nmap, THC-Amap and System tools. Network Sniffers and Injection tools – Tcpdump and Windump, Wireshark, Ettercap, Hping Kismet	25
2	**Network Defense tools** Firewalls and Packet Filters: Firewall Basics, Packet Filter Vs Firewall, How a Firewall Protects a Network, Packet Characteristic to Filter, Stateless Vs Stateful Firewalls, Network Address Translation (NAT) and Port Forwarding, the basic of Virtual Private Networks, Linux Firewall, Windows Firewall, Snort: Introduction Detection System	25
3	**Web Application Tools** Scanning for web vulnerabilities tools: Nikto, W3af, HTTP utilities - Curl, OpenSSL and Stunnel, Application Inspection tools – Zed Attack Proxy, Sqlmap. DVWA, Webgoat, Password Cracking and Brute-Force Tools – John the Ripper, L0htcrack, Pwdump, HTC-Hydra	25
4	**Introduction to Cyber Crime and law** Cyber Crimes, Types of Cybercrime, Hacking, Attack vectors, Cyberspace and Criminal Behavior, Clarification of Terms, Traditional Problems Associated with Computer Crime, Introduction to Incident Response, Digital Forensics, Computer Language, Network Language, Realms of the Cyber world, A Brief History of the Internet, Recognizing and Defining Computer Crime, Contemporary Crimes, Computers as Targets, Contaminants and Destruction of Data, Indian IT ACT 2000.	10
5	**Introduction to Cyber Crime Investigation** Firewalls and Packet Filters, password Cracking, Keyloggers and Spyware, Virus and Warms, Trojan and backdoors, Steganography, DOS and DDOS attack, SQL injection, Buffer Overflow, Attack on wireless Networks	15

Reference Books:

1. Anti-Hacker Tool Kit (Indian Edition) by Mike Shema, Publication Mc Graw Hill.
2. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole and Sunit Belpure, Publication Wiley

Course Outcome:

After learning the course the students should be able to: student should understand cyber-attack, types of cybercrimes, cyber laws and also how to protect them self and ultimately society from such attacks

List of Experiments:

1. TCP scanning using NMAP
2. Port scanning using NMAP
3. TCP / UDP connectivity using Netcat
4. Network vulnerability using OpenVAS
5. Web application testing using DVWA
6. Manual SQL injection using DVWA
7. XSS using DVWA
8. Automated SQL injection with SqlMap

Design based Problems (DP)/Open Ended Problem:

GUJARAT TECHNOLOGICAL UNIVERSITY

DISASTER MANAGEMENT
SUBJECT CODE: 2150003
B.E. 5th SEMESTER

Type of course: Applied Mechanics

Prerequisite: NA

Rationale: This subject is conceptual applications of principles of management to mitigate various disasters.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		ESE (V)		PA (I)	
					PA	ALA	ESE	OEP		
3	0	0	3	70	20	10	0	0	0	100

ESE-End Semester Exam, PA-Progressive Assessment, E-External, M-Mid semester, V-Viva (External) , I-Internal

Sr. No.	Topics	Teaching Hrs.	Weightage %
1	**Understanding Disasters** Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity – Disaster and Development, and disaster management	4	10
2	**Types, Trends, Causes, Consequences and Control of Disasters** Geological Disasters (earthquakes, landslides, tsunami, mining); Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves); Biological Disasters (epidemics, pest attacks, forest fire); Technological Disasters (chemical, industrial, radiological, nuclear) and Man-made Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters); Global Disaster Trends – Emerging Risks of Disasters – Climate Change and Urban Disasters	8	20
3	**Disaster Management Cycle and Framework** Disaster Management Cycle – Paradigm Shift in Disaster Management Pre-Disaster – Risk Assessment and Analysis, Risk Mapping, zonation and Microzonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness During Disaster – Evacuation – Disaster Communication – Search and Rescue – Emergency Operation Centre – Incident Command System – Relief and Rehabilitation – Post-disaster – Damage and Needs Assessment, Restoration of Critical Infrastructure – Early Recovery – Reconstruction and Redevelopment; IDNDR, Yokohama Strategy, Hyogo Framework of Action	8	20
4	**Disaster Management in India** Disaster Profile of India – Mega Disasters of India and Lessons Learnt Disaster Management Act 2005 – Institutional and Financial Mechanism National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national),Non-Government and Inter-Governmental Agencies	10	20
5	**Applications of Science and Technology for Disaster Management & Mitigation** Geo-informatics in Disaster Management (RS, GIS, GPS and RS) Disaster Communication System (Early Warning and Its Dissemination)	12	30

	Land Use Planning and Development Regulations Disaster Safe Designs and Constructions Structural and Non Structural Mitigation of Disasters S&T Institutions for Disaster Management in India		

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	**50**	**30**	**10**	**0**	**0**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1 Coppola D P, 2007. Introduction to International Disaster Management, Elsevier Science (B/H), London.
2. Manual on natural disaster management in India, M C Gupta, NIDM, New Delhi
3. An overview on natural & man-made disasters and their reduction, R K Bhandani, CSIR, New Delhi
4. World Disasters Report, 2009. International Federation of Red Cross and Red Crescent, Switzerland
5. Encyclopedia of disaster management, Vol I, II and IIIL Disaster management policy and administration, S L Goyal, Deep & Deep, New Delhi, 2006
6. Encyclopedia of Disasters – Environmental Catastrophes and Human Tragedies, Vol. 1 & 2,Angus M. Gunn, Greenwood Press, 2008
7 Disasters in India Studies of grim reality, Anu Kapur & others, 2005, 283 pages, Rawat Publishers, Jaipur
8. Management of Natural Disasters in developing countries, H.N. Srivastava & G.D. Gupta, Daya Publishers, Delhi, 2006, 201 pages
9. Natural Disasters, David Alexander, Kluwer Academic London, 1999, 632 pages
10 Disaster Management Act 2005, Publisher by Govt. of India
11 Publications of National Disaster Management Authority (NDMA) on Various Templates and Guidelines for Disaster Management
12 NIDM Publications
13 High Power Committee Report, 2001, J.C. Pant
14 Disaster Mitigation in Asia & Pacific, Asian Development Bank
15 National Disaster Management Policy, 2009, GoI
16 Disaster Preparedness Kit, American Red Cross
17 Bryant Edwards (2005): Natural Hazards, Cambridge University Press, U.K.
18 Carter, W. Nick, 1991: Disaster Management, Asian Development Bank, Manila.
19 Sahni, Pardeep et.al. (eds.) 2002, Disaster Mitigation Experiences and Reflections, Prentice Hall of India, New Delhi.
20 Roy, P.S. (2000): Space Technology for Disaster management: A Remote Sensing & GIS Perspective, Indian Institute of Remote Sensing (NRSA) Dehradun.
21 Sharma, R.K. & Sharma, G. (2005) (ed) Natural Disaster, APH Publishing Corporation, New Delhi.
22 Kasperson, J.X., R.E. Kasperson, and B.L. Turner III (Eds.), 1995, Regions at Risk: Comparisons of Threatened Environments, United Nations University Press, Tokyo
23 Singh Satendra (2003): Disaster Management in the Hills, Concept Publishing Company, New Delhi.
24 Taori, K (2005) Disaster Management through Panchayati Raj, Concept Publishing Company, New Delhi.

Course Outcome:

After learning the course the students should be able to:

(a) Understand disasters, disaster preparedness and mitigation measures

(b) Understand role of IT, remote sensing, GIS and GPS in risk reduction

(c) Understand disaster management acts and guidelines along with role of various stack-holders during disasters

List of Open Source Software/learning website:
www.GIS. Development.net
www.iirs.nrsa.org
http://quake.usgs.gov
www.nidmindia.nic.in

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.

GUJARAT TECHNOLOGICAL UNIVERSITY

CIVIL ENGINEERING (06)
HIGHWAY ENGINEERING
SUBJECT CODE: 2150601
B.E. 5th SEMESTER

Type of course: Compulsory

Prerequisite: Nil

Rationale: For the overall development of any country, road transportation plays an important role. Efficient road network is necessary for safe, economic and timely conveyance of passengers and freight. The study of this subject enables to impart knowledge to the civil engineering students about highway planning; it's geometric and structural design, methods of construction, quality control, traffic parameters, traffic control, accident causes and remedies, maintenance and economy.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		ESE (V)		PA (I)	
					PA	ALA	ESE	OEP		
3	0	2	5	70	20	10	20	10	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Scope of highway engineering, Highway planning and development in India, Classification of rural and urban roads, Road patterns, Planning and alignment surveys.	**4**	**10**
2	Highway geometric design: Cross sectional elements – width, surface, camber, Sight distances – SSD, OSD, ISD, HSD, Design of horizontal and vertical alignment – curves, super-elevation, widening, gradients, summit and valley curves	**9**	**22**
3	Highway materials: subgrade soil, aggregates, binder materials, bituminous materials, bituminous paving mixes, cement and cement concrete – their engineering and physical properties, basic tests.	**7**	**16**
4	Pavement design factors, Design of flexible (GI and CBR method) and rigid pavements (fatigue concept), Construction of earthen, Gravel, WBM, Bituminous, Cement concrete, RCC and Pre-stressed concrete roads, Soil stabilized roads	**7**	**16**
5	Pavement failures, Maintenance, Surface and sub-surface drainage, Hill roads – alignment, construction, drainage and maintenance. Road side development – arboriculture, street lighting. Highway administration, economics and finance, road safety audit	**6**	**16**
6	Traffic engineering: basic elements, road users - vehicles - traffic flow characteristics, speed – volume studies, surveys, parking studies, Accident studies: causes, collision and condition diagrams, preventive measures, Traffic control: markings, signs, signals, intersections, rotaries.	**9**	**20**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15	**20**	**20**	**20**	**15**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. L.R. Kadiyali, "Highway Engineering", Khanna Publishers, New Delhi.
2. L.R. Kadiyali, "Traffic Engineering and Transport Planning," Khanna Publishers, New Delhi.
3. Dr. S.K. Khanna and Dr. C.E. G. Justo, "Highway Engineering", Nem Chand & Bros., Roorkee.
4. S.K. Sharma, "Principles, Practice and Design of Highway Engineering", S. Chand & Co., New Delhi.
5. IRC – 37 "Guidelines for Design of flexible Pavements", IRC, New Delhi, 2001.
6. IRC – 67 "Code of Practice for Road Signs", IRC, New Delhi – 2001.
7. IRC: 58, 2002: "Guidelines for the Design of Plain Jointed Rigid Pavements for Highways", IRC, N. Delhi, December, 2002.

Course Outcome:

After learning the course the students should be able to:

(1) Know about highway planning and its classification
(2) Carryout geometric design of highway
(3) Carryout laboratory tests on aggregates and bituminous materials
(4) Carryout preliminary design of flexible and rigid pavement
(5) Know about pavement failures, its maintenance, importance of drainage, hill roads and their challenges
(6) Carryout survey of classified traffic volume count and spot speed study on highway
(7) Know about importance and working of different traffic control devices.

List of Experiments:

1. Introduction to Highway Engineering Laboratory Equipment.
2. California Bearing Ratio (CBR) Test.
3. Aggregate crushing Test
4. Aggregate Impact Test.
5. Flakiness Index and Elongation Index Test for Aggregate.
6. Los Angeles Abrasion Test / Deval Abrasion Test
7. Marshall stability test on Bitumen mix.
8. Specific gravity and Water Absorption test for Aggregate.
9. Penetration test for Bitumen.
10. Softening point test for Bitumen.
11. Ductility test for Bitumen.
12. Flash and Fire Point test for Bitumen.
13. Specific gravity test for Bitumen
14. Viscosity Test for Bitumen.

Design based Problems (DP)/Open Ended Problem:

Below mentioned problems are for reference only. Similar problems may be developed by individual teachers.

1. Conduct classified traffic volume study and spot speed study on busy rural highway or urban street during peak hour to obtain the peak hour flow and design speed of a selected road section.

Major Equipment:

1. CBR testing machine
2. Los-Angeles abrasion testing machine
3. Aggregate Impact testing machine
4. Marshall stability testing machine
5. Bituminous material's ductility testing machine
6. Standard penetrometer for bituminous materials

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.

GUJARAT TECHNOLOGICAL UNIVERSITY

CIVIL ENGINEERING
HYDROLOGY AND WATER RESOURCES ENGINEERING
SUBJECT CODE: 2150602
B.E. 5TH SEMESTER

Type of course: Water resources engineering

Prerequisite: Knowledge of hydrological cycle and its component, ground water hydrology, Basic ideas about floods, drought, hydropower plants and reservoir

Rationale:

1. To develop basic understanding about precipitation, infiltration, evapotranspiration, hydrograph, capacity of reservoir
2. To enable the students for estimation of runoff, infiltration, evaporation, floods and reservoir capacity
3. To create understanding about features of various types of dam

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		ESE (V)		PA (I)	
					PA	ALA	ESE	OEP		
3	1	0	4	70	20	10	30	0	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	MODULE – I Introduction, Hydrologic cycle, Climate and water availability, Water balances, Precipitation: Forms, Classification, Variability, Measurement, Data analysis, Evaporation and its measurement, Evapotranspiration and its measurement, Penman Monteith method. Infiltration: Factors affecting infiltration, Horton's equation and Green Ampt method.	**8**	20
2	MODULE – II Hyetograph and Hydrograph Analysis: Hyetograph, Runoff: drainage basin characteristics, Hydrograph concepts, assumptions and limitations of unit hydrograph, Derivation of unit hydrograph, S- hydrograph, Flow duration curve Groundwater: Occurrence, Darcy's law, Well hydraulics, Well losses, Yield, Pumping and recuperation test	**10**	20
3	MODULE – III Reservoir: Types, Investigations, Site selection, Zones of storage, Safe yield, Reservoir capacity, Reservoir sedimentation and control. Introduction to Dams	**12**	30

	Introduction and types of dams, spillways and ancillary works, Site assessment and selection of type of dam, Information about major dams and reservoirs of India Hydroelectric Power: Low, Medium and High head plants, Power house components, Hydel schemes.		
4	MODULE – IV Flood Management: Indian rivers and floods, Causes of floods, Alleviation, Leeves and floodwalls, Floodways, Channel improvement, Flood damage analysis. Hydrologic Analysis: Design flood, Flood estimation, Frequency analysis, Flood routing through reservoirs and open channels.	**8**	20
5	MODULE – V Drought Management and Water Harvesting: Definition of drought, Causes of drought, measures for water conservation and augmentation, drought contingency planning. Water harvesting: rainwater collection, small dams, runoff enhancement, runoff collection, ponds, tanks.	**4**	10

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15	**20**	**15**	**20**	**15**	**15**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. K. Subramanya, Engineering Hydrology, Tata McGraw Hill Pub. Co. New Delhi.
2. C.S.P. Ojha, R, Berndtsson and P. Bhunya, Engineering Hydrology, Oxford University Press, New Delhi.
3. R.A. Wurbs and W.P. James, Water Resources Engineering, Prentice Hall of India, New Delhi.
4. R.K. Sharma and T.K. Sharma, Hydrology and Water Resources Engineering, Dhanpat Rai Publications, New Delhi.
5. R.K. Linsley, J.B. Franzini, D.L. Freyberg and G. Tchobanoglous, Water Resources Engineering, McGraw Hill Singapore.
6. V.P. Singh, Elementary Hydrology, Prentice Hall, Englewood Cliffs, New Jersey.
7. Ven Te Chow, D.R. Maidment and L.W Mays, Applied Hydrology, McGraw Hill International Edition, New York

Course Outcome:

After learning the course the students should be able to:

1. Compute mean precipitation from a catchment
2. Compute infiltration rate and capacity
3. Calculate runoff from a catchment
4. Compute peak flood flow
5. Compute reservoir capacity using mass curve
6. Compute dependable flow using flow duration curve for the requirement of irrigation, power generation etc.
7. Basic idea about reservoir sedimentation and its control
8. Compute the capacity of well
9. Estimation of design flood for the design of hydraulic structure
10. Measures of water conservation to battle drought

List of Tutorials:

1. To determine rate of infiltration and infiltration capacity using double ring infiltrometer.
2. Measurement of rainfall
3. Estimation of flood using unit hydrograph
4. Computation of rate of infiltration using infiltrometer
5. Computation of live and dead storage capacity of reservoir
6. Flood routing of reservoir and channel
7. Calculation of dependable flow.
8. Determination of capacity of well.
9. Calculation of power of a hydro-power plant

Major Equipment: Double ring infiltrometer, rainfall simulator, rain gauges, models of various dams

List of Open Source Software/learning website:

http://en.wikipedia.org/wiki/Hydrology

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.

GUJARAT TECHNOLOGICAL UNIVERSITY

CIVIL ENGINEERING
ENVIRONMENTAL ENGINEERING
SUBJECT CODE: 2150603
B.E. 5th SEMESTER

Type of course: Civil Engineering core subject

Prerequisite: The students should have studied the basics of Environmental Engineering

Rationale: The Civil engineer must be aware of the environmental effects of pollutants and should be able to understand the pollutants, their characteristics and manage systems to mitigate them.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		ESE (V)		PA (I)	
					PA	ALA	ESE	OEP		
3	0	2	5	70	20	10	20	10	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Introduction: Components of environment, Types of microbes, their growth and role in environment.	**02**	5
2	Quality and Quantity of Water for supply to towns/Cities: Sources of water, Assessment of domestic and industrial requirement, Impurities in water, Indian standards for drinking water, Water borne diseases and their control. The water (prevention and control of pollution) Act – 1974.	**08**	20
3	Characteristics of Wastewater: Physical, chemical and biological characteristics of domestic and industrial wastewaters. BOD and COD, study of characteristics of several industrial wastewaters like textile, chemical dairy and pharmaceutical wastewaters. Indian Standards for effluent to be disposed in receiving water body like rivers, estuaries, lakes, sea and oceans. Disposal of treated wastewaters (i) into inland surface waters; (ii) into oceans; (iii) into public sewers (iv) into estuaries and (v) onto land. Effect of organic pollution on Stream, river water quality, and self purification, DOSAG Curve.	**08**	20
4	House Drainage: Principles of house drainage, pipes and traps, Classification of traps: nahni trap, gulley trap, interception trap, grease trap, sanitary fitting, system of plumbing, house drainage plan for buildings.	**06**	15
5	Solid Waste Management: Quantity composition and characteristics of solid wastes. Classification of solid wastes. Hazardous solid wastes, Biomedical solid wastes,		

	Typical generation rate for solid wastes, factors affecting the generation rate. Estimation of quantity of solid waste, Onsite handling, storage and processing, collection services, types of collection systems. Determination of vehicle and labor requirements, collection routes, transfer stations, location of transfer stations, transfer means and methods, solid waste processing techniques, Mechanical volume reduction, Thermal volume reduction, manual component separation. Ultimate disposal, land filling with solid waste, Design of landfills.	**10**	20
6	Air Pollution: Definition, Composition of atmospheric air, Classification and sources of air pollutants. Effects of air pollution on human, plant and material, Air pollution control methods, equipment and safety. Salient features of the Air (Prevention and control of pollution) Act – 1981.	**04**	10
7	Noise Pollution: Measurement of sound, Sources, Effects and control of noise pollution.	**02**	5
8	Introduction to: "The environment (Protection) Act – 1986.	**02**	5

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
45	**30**	**10**	**10**	**05**	**00**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. H.S. Peavy, D.R. Rowe and G. Tchbanoglous, Environmental Engineering, McGraw Hill International Edition.
2. M. L. Davis, Water and waste water Engineering, Mc Graw Hill education (India) Pvt. Ltd. 2013 edition.
3. A. P. Sincero and G.A. Sincero, Environmental Engineering, Prentice Hall of India, New Delhi.
4. G. Tchabanoglous, Solid Waste Treatment and Disposal, McGraw Hill Pub.
5. G.S. Birdie and J.S. Birdie, Water Supply and Sanitary Engineering, Dhanpat Rai
6. Publishing Co. New Delhi.
7. H.C. Parkins, Air Pollution, McGraw-Hill Pub.
8. J.A. Salvato, Environmental Sanitation, Wiley Interscience.
9. L.W. Canter, Environmental Impact Assessment, McGraw Hill Pub.
10. M.L. Davis and D.A. Cornwell, Introduction to Environmental Engineering,
11. McGraw Hill International edition.
12. 10. Metcalf and Eddy,(Revised by G. Tchobanoglous Wastewater Engineering:
13. Treatment, disposal Reuse, Tata-McGraw Hill, New Delhi.

Course Outcome:

After learning the course the students should be able to:

1. Understand the role of microorganisms in various components of environments
2. Understand the quality and characteristics of waste water
3. Design and prepare drainage plan of buildings
4. Understand and design solid waste management system
5. Understand various types of pollution
6. Understand various environmental Acts.
7. Determine various water/air quality parameters

List of Experiments:

1. Introduction to Equipment in Environmental Engineering Laboratory
2. Introduction to Standards, Sampling, Collection and Preservation of samples
3. MPN Test
4. Determination of pH and conductivity for water and wastewater
5. Determination of Solids(suspended, dissolved and settleable)
6. Determination of Acidity and Alkalinity
7. Determination of hardness and residual chlorine
8. Determination of fluoride and nitrate
9. Determination of chloride and residual chlorine of water samples
10. Ambient air quality measurement using High Volume sampler
11. Exhaust gas analysis for air pollutants
12. Measurement of noise at different sources using sound meter
13. Characterization of municipal solid waste (physical and chemical)

Design based Problems (DP)/Open Ended Problems:

Below mentioned problems are for reference only. Similar problems may be developed by individual teachers.

1. Design the house drainage system for a plan of proposed buildings and draw drainage plan
2. Write detailed description of decided court cases related to environmental pollution in & Gujarat or any other state.
3. To lay out collection routes for the domestic and commercial area from the map of area and other available data like container size, container utilization factor collection frequency, collection vehicle capacity etc.
4. Develop the design of landfill for a particular Town/Area.
5. Students can drive around his community and identify the principal types of solid waste collection system that are in use.
6. A new residential area composed of five hundred single family dwellings is being developed.
7. Decide truck size and no. of trips must be made for the area from the given data.
8. Decide layout collection routes for the commercial area from given data and map of area.

Major Equipment:

1. pH meter
2. TDS meter
3. High volume sampler
4. Exhaust gas analyzer

5. Ion selective meter for Nitrate, Fluoride and Chloride estimation

List of Open Source Software/learning website:

1. ocw.mit.edu
2. nptel.ac.in

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.

GUJARAT TECHNOLOGICAL UNIVERSITY

CIVIL ENGINEERING
STRUCTURAL ANALYSIS-II
SUBJECT CODE: 2150608
B.E. 5th SEMESTER

Type of course: Applied Mechanics

Prerequisite: Mechanics of Solids, Structural Analysis-I

Rationale: This subject is conceptual applications of principles of mechanics of rigid and deformable bodies in Engineering.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		ESE (V)		PA (I)	
					PA	ALA	ESE	OEP		
4	2	0	6	70	20	10	30	0	20	150

Content:

Sr. No.	Topics	Teaching Hrs.	Weightage %
1	**Energy Principles:** Castigliano's theorems , computation of displacements of statically determinate beams, trusses and frames by unit load method, analysis of indeterminate structures – beams, trusses, frames	10	15
2	**Slope Deflection Method** Analysis of continuous beams for various loading including settlement/ rotation of support, analysis of simple portal frame with sway.	08	15
3	**Moment Distribution Method** Analysis of continuous beams & frames including sway, use of symmetry of structure up to two storeyed / two bay frames.	08	15
4	**Influence line diagrams** ILD for statically determinate beams- I.L.D of support reaction, shear force and moment bending moment for beams subjected to u.d.l and several point loads, criteria for maximum effects, ILD for statically determinate trusses, forces in members for u.d.l and point loads	08	15
	ILD for statically indeterminate beams: Muller-Breslau's principle, steps for obtaining I.L for reaction and internal forces in propped cantilever and continuous beams, qualitative I.L for rigid jointed structures having higher degree of statically indeterminacy.	06	10
5	**Matrix Methods**: Types of skeletal structures, Internal forces and deformations. Introduction and applications of stiffness method to analyze beams, Trusses and plane frames by system approach.	08	15
	Introduction and applications of Flexibility method to analyze beams, Trusses and plane frames by system approach.	08	15

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	**20**	**20**	**25**	**15**	**0**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Junarkar S. B. & Shah H. J.; Mechanics of Structures Vol-II; Charotar publishing house,Anand
2. Wang C. K.; Intermediate Structural Analysis; Tata McGraw Hill book Company, NewDelhi
3. Gere & Weaver; Matrix Analysis of framed structures, CBS Publications
4. Ryder G.H.; Strength of Materials; Mcmillan
5. Gere & Timoshenko; Mechanics of Materials; CBS Publishers & Distributors, Delhi
6. Hibbler R C; Structural Analysis; Pearson Education

Course Outcome:

After learning the course the students should be able to:

1. Apply equilibrium and compatibility equations to determine response of statically determinate and indeterminate structures.
2. Determine displacements and internal forces of statically indeterminate structures by classical, iterative and matrix methods.
3. Determine internal forces and reactions in determinate and indeterminate structures subjected to moving loads.

Term-Work:

The students will have to solve at least five examples and related theory from each topic as an assignment/tutorial. Practical examinations shall consist of oral based on term-work and above course.

List of Tutorials:

1. Prepare working model to understand behavior of portal frame/s with different support condition and different types of joints.
2. Verification of Muller- Breslau's Principle
3. Prepare spread sheet for analyzing structures using matrix method with help of MS-Excel.

List of Open Source Software/learning website:

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

Active learning Assignments (AL) : Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The Power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.

GUJARAT TECHNOLOGICAL UNIVERSITY

CIVIL ENGINEERING
SOIL MECHANICS
SUBJECT CODE: 2150609
B.E. 5thSEMESTER

Type of course:Core

Pre-requisites: Geotechniques & Applied Geology (GTAG) and Strength of Materials and Fluid Mechanics

Rationale: Soil Mechanics is very fundamental subject consisting of determination of various soil parameters theoretically and experimentally based on laws of mechanics. Any civil engineering structure needs strong and stable foundation which depends on proper understanding of soil behaviour, determination and interpretation of soil parameters, determination of stresses in soil. The design of any foundation system is based on understanding of soil parameters and its implication based on through interaction with type of structure. The course on *Soil Mechanics* provides the students basic knowledge on soil properties, testing procedures, suitability of test and analytical solutions necessary for design and behaviour of soil.

Content:

Sr. No.	Topics	Total hours	Module Weightage
1	**Compaction:** Definition, Theory of compaction, Factors affecting compaction, Laboratory compaction tests, Effect of compaction on soil properties, Placement water content, Placement layer thickness, Field control of compaction, Proctor's needle, Methods of compaction used in field.	06	10
2	**Shear Strength of Soil :** Mohr's strength theory, Mohr- coulomb's strength theory, Modified Mohrcoulomb's theory, Shear parameters tests: Direct shear test, Unconfined compression test, lab. Vane shear test, Triaxial compression test, Shear tests based on drainage conditions.	07	20
3	**Consolidation of Soils :** **C**ompressibility of soils, Definitions and mechanism of consolidation, Spring analogy, Void ratio and effective stress relation, Related indices, Assumptions of Terzaghi's one dimensional consolidation theory, Time factor, One dimensional consolidation tests, Laboratory and theoretical time curves, Determination of pre-consolidation pressure, Estimation of consolidation settlement and rate of settlement for uniform pressure increment in a clay layer.	07	15
4	**Stability of Slopes:**	06	15

	Infinite and finite slopes, factor of safety, type of slope failure, stability of infinite slopes, finite slopes, forms of slip surfaces, limit equilibrium method and critical stage instability analysis, effects of tension crack and submergence, C-analysis-method of slices, taylor's stability no., Bishop's method.		
5	**Earth Pressure:** Types of lateral earth pressure, Rankine's and Coulomb's earth pressure, Theory and their application for determination of lateral earth pressure under different conditions,Rebhann's and Culmann's Graphical methods of determination of lateral earth pressures.	07	20
6	**Stress Distribution of Soils:** Causes of stress in soil, geostatic stress,Boussinesque's equation, stress distribution diagrams, New-mark's influence chart Westergard's equation, contact pressure, stresses due to triangular and circular, strip and rectangular loadings.	07	15
7	**Basics of foundation:** Types of foundation, Factors affecting the selection of type of foundations, steps in choosing types of foundation.	02	05

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
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Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1) P. Purushothama Raj; Soil Mechanics and Foundation Engineering; Pearson
2) Education.
3) B.C. Punamia; Soil Mechanics & Foundation Engineering; Laxmi Pub. Pvt. Ltd.,
4) Delhi.
5) Alamsingh; Soil Mechanics & Foundation Engineering; CBS Publishers &
6) Distributors, Delhi
7) Taylor D.W.; Fundamentals of Soil Mechanics; Asia Publishing House, Mumbai
8) V. N. S. Murthy; Soil Mechanics & Foundation Engineering; Sai Kripa Technical
9) Consultants, Banglore
10) Gopal Ranjan, Rao A.S.R.; Basic and applied soil mechanics; New age int. (p) ltd.
11) Arora K.R.; Soil Mechanics & Foundation Engineering; Standard Pub., Delhi
12) Das Braja M; Principles of Geotechnical Engineering; Thomson Asia Pvt. Ltd.

Course Outcome:

After learning the course the students should be able to:

1. This course will provide good understanding of various index (preliminary) and engineering properties of soil, its determination through various methodology and application for design of shallow and deep foundation systems for various civil engineering structures.
2. The course covers various topics like compaction, shear strength, consolidation, earth pressure, stress distribution which gives insight to students to analyise soil parameters based on application and need of project site.
3. The course will also develop understanding about soil testing procedures, experimentation techniques and related issues. Simulation of mechanics on soil as a material to understand its behaviour before failure and estimating its permissible values.
4. The course also discusses details of foundations, its selection procedures as per soil conditions and various modifications available for various degrees of loads.

List of Experiments/Tutorials:

1. Proctor Compaction Test
2. CBR Test
3. Consolidation /Oedometer test
4. Direct Shear Test
5. Unconfined Compression Test
6. Demonstration of Triaxial test
7. Auger boring/sampling
8. Free swill and swell potential

Open Ended Problems:

Apart from above tutorials/experiments a group of students has to undertake one open ended problem using sub-soil profile of their local city . Few examples of the same are given below:
1. Development of spread sheets/computer programmes for the determination of shear parameters using Mohr circle.
2. Power point presentation on any one of the above topic supported with one field application/case study.

List of Open Source Software/learning website:
http://nptel.ac.in/
http://ocw.mit.edu/courses/civil-and-environmental-engineering/

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students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.