
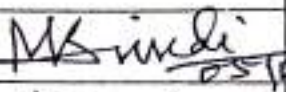
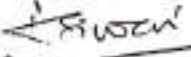
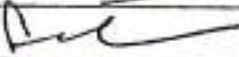
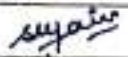

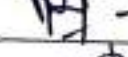
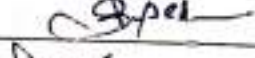
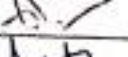


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Civil Engineering Department

BOS Meeting held on 05/04/2019

Attendance

S.No.	Name & Designation		Signature
1	Dr. R.D. Gupta Professor & Head, Civil Engineering Department MNNIT Allahabad- 211004	Subject expert from outside	
2	Dr. M.K. Trivedi	Prof. & Head, Chairman BOS	
3	Prof. A. Tiwari	Member BOS	
4	Dr. R. Kansal	Member BOS	
5	Dr. S.K. Jain	Member BOS	
6	Dr. Sanjay Tiwari	Member BOS	
7	Prof. D. Rastogi	Member BOS	
8	Prof. A.K. Dwivedi	Member BOS	
9	Prof. A.K. Saxena	Member BOS	
10	Prof. Gautam Bhadauria	Member BOS	
11	Prof. Aditya Kumar Agarwal	Member BOS	

DEPARTMENT OF CIVIL ENGINEERING

Minutes of Board of Studies Meeting held on 05th April, 2019

The meeting of Board of Studies of the Civil Engineering department was held on Friday, 05th April, 2019 in the head office of the department. Following members were present:

1. Dr. R. D. Gupta (Subject Expert from outside parent university)
Professor & Head, Civil Engg. Deptt., MNNIT Allahabad
2. Dr. M. K. Trivedi (Chairman & Head of the department)
3. Prof. (Mrs.) Archana Tiwari (Member, BOS)
4. Dr. S. K. Jain (Member, BOS)
5. Dr. R. Kansal (Member, BOS)
6. Dr. S. Tiwari (Member, BOS)
7. Prof. D. Rastogi (Member, BOS)
8. Prof. A. K. Dwivedi (Member, BOS)
9. Prof. A. K. Saxena (Member, BOS)
10. Prof. G. Bhadoriya (Member, BOS)
11. Prof. Aditya K. Agarwal (Member, BOS)

Following agendas were discussed & deliberated upon

Item No. / CE - 1	<p>To frame the syllabi for all Departmental Core (DC) courses to be offered in the V & VI Semester under the flexible curriculum</p> <p>The syllabus for all departmental core courses (DC) which will be offered in the V & VI semester under flexible curriculum were discussed & finalized. The syllabus is attached in Annexure - I and the same has been incorporated in the existing syllabus file which contains the syllabus of I to IV semester.</p>
Item No. / CE - 2	<p>To prepare and recommend the experiment list / Lab manuals for laboratory courses to be offered in V & VI Semester under the flexible curriculum.</p> <p>The list of experiments for laboratory courses which will be offered in V & VI semester under the flexible curriculum were discussed & finalised. The lists of experiments is attached in Annexure - II and the same have been incorporated in the syllabus of corresponding departmental core (DC) courses in which laboratory work has to be performed. Also the course outcomes (CO) for the same have been incorporated. The existing lab manuals for these courses have been discussed and some improvements have been suggested which will be incorporated and then circulated amongst the students before the start of laboratory classes in the upcoming semester.</p>
Item No. / CE - 3	<p>To prepare the syllabi of following Mandatory Courses (MC) of V & VI Semester to be offered under the flexible curriculum.</p> <ul style="list-style-type: none">• Indian Constitution & Traditional Knowledge• Disaster Management <p>(Syllabi for mandatory courses will be framed & finalized at institute level and uniformly adopted by all the departments)</p> <p>This agenda will be finalized at institute level and adopted uniformly by all the departments.</p>

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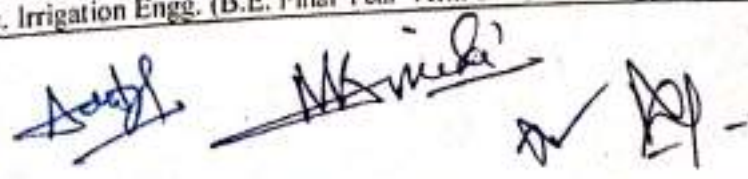
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Item No. / CE - 4	<p>To frame the COs for all Departmental Electives (DEs) and Open Category (OC) courses up to VI Semester, to be offered under the flexible curriculum</p> <p>The course outcomes (COs) for all departmental electives (DEs) and open category (OC) courses which will be offered in VI semester under flexible curriculum have been discussed & finalized. They have been incorporated in the syllabus of corresponding courses as per agenda item CE - 5.</p>
Item No. / CE - 5	<p>To frame and propose the syllabi for all Departmental Electives (DEs) and Open Category (OC) courses up to VI Semester, to be offered under the flexible curriculum</p> <p>While finalising the list of additional courses for award of minor and honours, it was discussed and decided to modify the existing list of departmental elective courses (DEs) and open category (OC) courses which will be offered under the flexible curriculum. Hence the lists of DEs & OCs have been revised in the existing flexible scheme for both 2017 & 2018 batches. The syllabus for all departmental electives (DEs) and open category (OC) courses which will be offered in VI semester under flexible curriculum have been discussed & finalized. They are attached in Annexure - III and the same have been incorporated in the existing syllabus file which contains the syllabus of I to IV semester & also the syllabus of DC courses which will run in V & VI semester (as per agenda item CE - 1).</p>
Item No. / CE - 6	<p>To propose lists of "Additional Courses" which can be opted for getting an (i) 'Honours' (by the students of parent department) (ii) Minor Specialization (by the students of other departments) (These courses will be completed through SWAYAM / NPTEL / MOOC based learning platforms during V & VI Semester).</p> <p>The lists of additional courses which the student of parent department can opt for getting an honours during V semester has been finalised after discussion on various courses on NPTEL platform and courses which will be offered as departmental core (DC) and departmental electives (DEs). The list of courses is attached in Annexure - IV. Similarly the list of additional courses which the student from other departments can opt for getting the minor specialization during V semester has been also finalised after discussion on various existing courses on NPTEL platform and courses which will be offered as open category (OC). The list of courses is attached in Annexure - V.</p>
Item No. / CE - 7	<p>To propose the tentative list of courses which the students can opt from NPTEL platform for Seminar/Self Study Courses in III & V Semester</p> <p>The list of courses which the students can opt from NPTEL platform for seminar/self study in III & V semester has been proposed as in Annexure - VI.</p>
Item No. / CE - 8	<p>To align the overall credit requirement to 170 credits for the Scheme of 2017-18 admitted batch</p> <p>The overall credit for the scheme of 2017 - 18 admitted batch has been aligned to 170 credits with the existing flexible curriculum scheme of 2018 - 19 onwards admitted batch. The scheme as well as syllabus for 2017 - 18 admitted batch & for 2018 - 19 onwards admitted batch have been compiled in two files separately. Both the files are attached along with these minutes.</p>

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<p>Item No. / CE - 9</p>	<p>To identify gaps in CO attainment levels for July-December 2018 session and propose corrective measures for improvement</p> <p>CO attainment calculations were done based upon mathematical model developed by the institute which is followed uniformly by the entire departments. The target for CO attainment level for various courses had been fixed in previous BOS meeting in October, 2018. The gap analysis in CO attainment level for all the courses was carried on the basis of these set targets and the report of the same is attached in Annexure – VII. On the basis of this analysis it is observed that in almost all the courses the CO attainment level was found to achieve the set target, however in the course - BCEL 701, Geotechnical Engg. – II, the CO attainment level was found to be below the set target.</p> <p>Based upon the analysis of result, end sem. mid sem question papers & CO attainment calculations following gaps have been identified:</p> <ol style="list-style-type: none"> 1. Less number of questions were asked pertaining to certain COs in the mid sem & end sem exams. 2. Overall performance of the students in this course is average, hence direct CO attainment is less. <p>Following corrective measures for improvement in CO attainment have been proposed:</p> <ol style="list-style-type: none"> 1. In such type of courses, questions papers of both mid sem exam & end sem exam needs to be prepared by keeping a balance among all COs. 2. Remedial classes for such courses are to be conducted to improve the performance of the students.
<p>Item No. / CE - 10</p>	<p>To propose/ recommend the panel of examiners (UG & PG Level) for conducting practical examination</p> <p>The existing panel of external examiners (UG & PG level) for conducting practical examination was discussed. Some modifications in the existing panel were suggested with addition & deletion of some names of examiners. The proposed list of examiners is attached in Annexure - VIII</p>
<p>Item No. / CE - 11</p>	<p>Other matters:</p> <p>1. Modification in the syllabus of 110304, Surveying</p> <p>The syllabus of 110304, Surveying has been modified by adding hydrographic surveying. This syllabus will be effective for 2018 onwards admitted batches.</p> <p>2. New Experiments are added in 110303 – Building Materials & Construction, 110305 – Strength of Materials, 110306 – Software Lab, 110402 – Geotechnical Engineering, 110403 – Fluid Mechanics – I, 110407 – Survey Practice laboratory courses . These will be effective for 2018 onwards admitted batches.</p> <p>3. Industrial Collaborative Courses</p> <p>Following courses have been identified as Industrial Collaborative course in the upcoming semester July – Dec. 2018.</p> <ol style="list-style-type: none"> a. Surveying (B.Tech 2nd Year IIIrd Sem, Civil Engg.) b. Transportation Engg (B.Tech 3rd Year Vth Sem, Civil Engg.) c. Irrigation Engg. (B.E. Final Year VIIIth Sem, Civil Engg.)




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Meeting ended with vote of thanks to the chair.



(Prof. Aditya K. Agarwal)
Member, B.O.S.



(Prof. G. Bhadoriya)
Member, B.O.S.



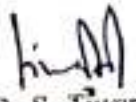
(Prof. A. K. Saxena)
Member, B.O.S.



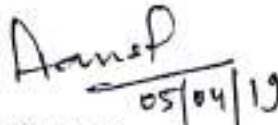
(Prof. A. K. Dwivedi)
Member, B.O.S.



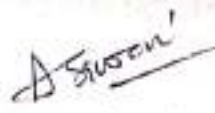
(Prof. D. Rastogi)
Member, B.O.S.



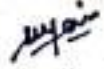
(Dr S. Tiwari)
Member, B.O.S.



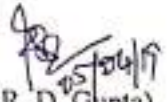
(Dr R. Kansal)
Member, B.O.S.



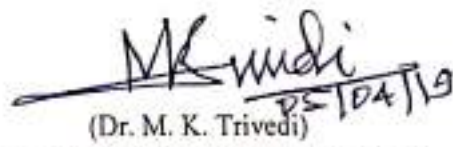
(Prof. (Mrs.) A. Tiwari)
Member, B.O.S.



(Dr. S. K. Jain)
Member, B.O.S.



(Dr. R. D. Gupta)
Outside Subject Expert



(Dr. M. K. Trivedi)
Head of Department & Chairman, B.O.S.

Madhav Institute of Technology & Science, Gwalior

List of MOOCs Courses offered under Flexible Curriculum Scheme

Name of Department	Purpose	Name of Courses	Duration of Course (in Weeks)	Course Registration Last Date	Exam Date	Name of Mentor Faculty (One Regular & one NPIU)	URL link for Registration	
Civil Engineering	Track-1 for Minor Specialization Infrastructure planning & Management	Concrete Technology	12 weeks	05-08-2019	17-11-2019	Prof. A. Tiwari, Dr. Pankaj Kumar	https://swayam.gov.in/nd1_no_c19_c630/preview	
		Sustainable materials & Green Building	12 weeks	05-08-2019	16-11-2019	Prof. A.K. Saxena, Prof. Nishi Gangwar	https://swayam.gov.in/nd1_no_c19_c640/preview	
		Introduction to Environmental Engineering & Science Fundamental & sustainability concepts	12 weeks	05-08-2019	17-11-2019	Prof. D. Bastogi, Prof. Chetan Sharma	https://swayam.gov.in/nd1_no_c19_c612/preview	
	Honors	Integrated waste management for a smart city.	12 weeks	05-08-2019	17-11-2019	NA	https://swayam.gov.in/nd1_no_c19_c631/preview	
		Sustainable materials & Green Building	12 weeks	05-08-2019	16-11-2019		https://swayam.gov.in/nd1_no_c19_c640/preview	
		Matrix method of structural analysis	8 weeks	05-08-2019	29-09-2019		https://swayam.gov.in/nd1_no_c19_c613/preview	
		Design of Masonary Structures	12 weeks	05-08-2019	16-11-2019		https://swayam.gov.in/nd1_no_c19_c611/preview	
	Self Study(III SEM)	Sustainable & affordable sanitation solutions for small towns : Policy planning & practice	Structures	4 weeks	05-08-2019	29-09-2019	Dr. M.K. Trivedi, Prof. Shivam Gupta	https://swayam.gov.in/nd1_no_c19_c634/preview
			Scheduling Techniques in projects	4 weeks	26-08-2019	16-11-2019	Dr. Sanjay Tiwari, Prof. Nupur Verma	https://swayam.gov.in/nd1_no_c19_c634/preview
	Self Study(V SEM)							

Annexure
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ANNEXURE - IV

**LIST OF ADDITIONAL COURSES FOR AWARD OF HONOURS
 DURING V SEMESTER USING NPTEL**

Name of Course	Duration of course in Weeks	Course Registration		Name of the Mentor Faculty	Name of the SME at MITS
		Start Date	End Date		
Matrix Method of Structural Analysis	8 Weeks	29/07/2019	20/09/2019	Prof. Amit Shaw & Prof. Biswanath Banerjee (IIT Kharagpur)	Dr. Sanjay Tiwari
Integrated Waste Management for Smart City	12 Weeks	29/07/2019	18/10/2019	Prof. Brajesh Kumar Dubey (IIT Kharagpur)	Prof. Deepak Rastogi
Noise Management & Control	12 Weeks	29/07/2019	18/10/2019	Prof. Nachiketa Tiwari (IIT Kanpur)	Prof. A. K. Saxena
Sustainable Materials & Green Buildings	12 Weeks	29/07/2019	18/10/2019	Prof. B. Bhattacharjee (IIT Delhi)	Prof. G. Bhadoriya

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ANNEXURE - V

SUGGESTIVE LIST OF ADDITIONAL COURSES FOR AWARD OF
MINORS SPECIALIZATION DURING V SEMESTER USING NPTEL

Name of Course	Duration of course in Weeks	Course Registration		Name of the Mentor Faculty	Name of SME at MITS
		Start Date	End Date		
Principles of Construction Management	8 Weeks	29/07/2019	20/09/2019	Prof. Sudhir Misra (IIT Kanpur)	Dr. M. K. Trivedi
Concrete Technology	12 Weeks	29/07/2019	18/10/2019	Prof. B. Bhattacharjee (IIT Delhi)	Dr. S. K. Jain
Strength of Materials	12 Weeks	29/07/2019	18/10/2019	Prof. Sriman Kumar Bhattacharya (IIT Kharagpur)	Dr. R. Kansal
Introduction to Environmental Engineering & Science – Fundamental & Sustainability Concepts	12 Weeks	29/07/2019	18/10/2019	Prof. Brajesh K. Dubey (IIT Kharagpur)	Prof. Aditya K. Agarwal
Solid Mechanics	12 Weeks	29/07/2019	18/10/2019	Prof. Ajeet Kumar (IIT Delhi)	Prof. Archana Tiwari
Engineering Mechanics	12 Weeks	29/07/2019	18/10/2019	Prof. K. Ramesh (IIT Madras)	Prof. A. K. Dwivedi

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ANNEXURE - VI

**SUGGESTIVE LIST OF COURSES FOR SELF STUDY/SEMINAR
THROUGH NPTEL**

SEMESTER III

1. Water, Society & Sustainability
2. Sustainable & Affordable Sanitation Solutions for Small Towns: Policy, Planning & Practice
3. GPS Surveying
4. Introduction to Learning Analytics

SEMESTER V

1. Structural Dynamics for Civil Engineers – SDOF systems
2. Scheduling Techniques in Projects
3. Reinforced Concrete Road Bridges

ANNEXURE - I

SYLLABUS FOR DEPARTMENTAL CORE COURSES (DCs) TO BE
OFFERED IN V & VI SEMESTER

Course Code: 110501

Course Name: Estimating Costing & Contracting

L	T	P	Credit
2	0	0	2

Course Objectives:

- 1) To work out the quantities of various items of civil works like buildings, culverts including steel girders etc.
- 2) To compute earthwork.
- 3) To understand detailed specifications and carry out analysis of rates.
- 4) To understand various methods of carrying out estimation.
- 5) To understand valuation process & fixation of rent.
- 6) To understand contracting procedures.

Syllabus:

Unit I Introduction of Estimating:

Purpose and importance of estimates, principles of estimating, methods of taking out quantities of items of work. Mode of measurement, measurement sheet and abstract sheet, bill of quantities. Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.

Unit II: Details of Items:

Specifications of materials and works: Types of Specifications, General specifications for Class A, B & C type of building, Detailed specifications of important items of work.

Rate Analysis: Task for average artisan, various factors involved in the rate of item, material and labour requirement for various trades, preparation for rates of important items of work, current schedule of rates (C.S.R)

Unit III: Estimates

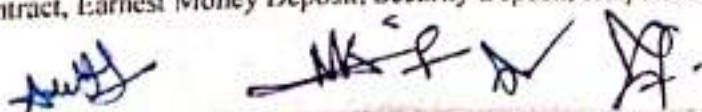
Preparing detailed estimates of various types of buildings, R.C.C Works, Culverts, earth work calculations for roads and Canals, contingencies and work charge establishment, use of computational tools for preparing estimates.

Unit IV: Valuation

Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate of interest, methods of valuation, rent fixation of buildings

Unit V: Contracting

Contract, Types of engineering contract, essentials documents of engineering Contract, Conditions of contract, Earnest Money Deposit, Security Deposit, Responsibility of Engineer, Contractor & Client.



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Course Outcomes:

Upon completion of the course, the students will be able to:


- CO 1: Explain the fundamentals of quantity estimation, costing & contracting.
- CO 2: Illustrate methods to estimate area, volume & cost.
- CO 3: Evaluate mathematical & numerical models for rate & quantity estimation.
- CO 4: Measure rates & value.
- CO 5: Classify different rates of items, contracts & measurement techniques.

Text Books:

1. Estimating & costing in civil engineering, B.N. Dutta, UBS Publishers, 28th revised edition 2016
2. Estimating & Costing, S.C. Rangwala, Charotar Publishing House, 17th edition 2017

Reference Books:

1. Estimating & Costing for Civil Engg., G.S. Birdie, Dhanpat Rai Publications, 6th edition 2014
2. Estimating & Costing specification & valuation in civil engineering, M. Chakraborti, 2006



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Course Code: 110502

Course Name: Structural Design & Drawing (R.C.C.)

L	T	P	Credit
2	1	0	3

Course Objectives:

- 1) To understand the behavior of reinforced concrete components & systems subjected to gravity loads.
- 2) To study the stress strain behavior of steel and concrete.
- 3) To understand the concept of working stress & limit state method.
- 4) To provide knowledge on limit state design of beams, design for flexure, shear, torsion, bond & anchorage as per relevant IS codes.
- 5) To provide knowledge on design of slabs, columns, footings & staircases as per relevant IS codes.

Syllabus:

Unit-I Basic Principles of Structural Design:

Mechanism of load transfer, Introduction to working stress limit state and ultimate load methods of design. Introduction of IS Codes 456, 13920.

Design of Beams: Analysis and design of singly reinforced rectangular beams, Lintel, Cantilever, Simply supported and continuous beams.

Unit-II Design of Beams:

Doubly reinforced and Flanged Beam. Design for Shear and design for bond.

Unit-III Design of Slabs:

Slabs spanning in one direction, (Cantilever, Simply supported and Continuous slabs); Slabs spanning in two directions, Circular slabs.

Unit-IV Columns & Footing:

Short and long columns. Columns subjected to axial loads and bending moments (section with no tension). Isolated and combined footings, Strap footing. Raft foundation.

Unit-V Staircases:

Staircases with waist slab having equal and unequal flights with different support conditions, Tread-riser staircase.

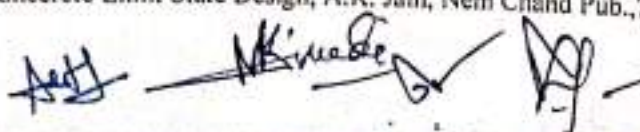
Course Outcomes:

Upon completion of the course, the students will be able to:

- CO 1: Compare various design principles as applicable for design of RCC structures.
- CO 2: Apply the concepts of working stress method & limit state method on RCC structures.
- CO 3: Apply recommendations of SP 34 for detailing
- CO 4: Analyse a given section of RCC structural elements using limit state method.
- CO 5: Design different elements of RCC structures like beam, slab, column, footing, staircase using IS codes.
- CO 6: Design a structure/ component to meet desired needs within realistic constraints such as economy, safety, viable construction & its sustainability as per codal provisions.

Text Books:

1. Reinforced Concrete Limit State Design, A.K. Jain, Nem Chand Pub., 7th edition, 2012

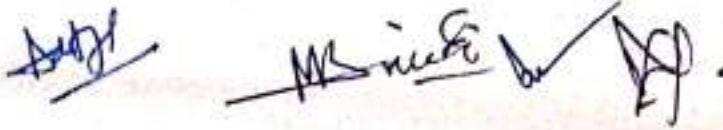


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2. Reinforced Concrete, Pillai & Menon, Tata McGraw Hill, New Delhi, 3rd edition, 2017
3. Limit State Design, P.C. Varghese, Prentice Hall of India, New Delhi, 2nd edition, 2008
4. RCC Design, Neelam Sharma, Katson Publishers, 2014

Reference Books:

1. Reinforced Cement Concrete, P. Dayaratnam, Medtech Publishers, 5th edition, 2017.
2. Reinforced Concrete Design, S.N. Sinha, Tata McGraw Hill, 3rd edition, 2017
3. Plain and Reinforced Concrete, O.P. Jain and Jai Krishna, Nem Chand Pub., 8th edition, 2008
4. Reinforced Cement Concrete, Winter & Nelson, McGraw Hill, 11th edition, 1991

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Course Code: 110503

Course Name: Fluid Mechanics - II

L	T	P	Credit
2	0	2	3

Course Objectives:

- 1) To develop an understanding of fluid flow patterns and learn to use boundary layer theory and drag.
- 2) To apply theories of laminar & turbulent flow to solve typical pipe flow problems in the field.
- 3) To apply boundary layer theory to estimate drag & lift for various shapes of the objects.
- 4) To classify the types of flows in open channel and also to design open channel sections in a most economical fashion with minimum wetted perimeter and learn about critical flows.
- 5) To study about non uniform flows in open channel and longitudinal slopes in open channel and also to learn about the characteristics of hydraulic jump.
- 6) To understand design philosophy of various types of pumps & turbines.

Syllabus:

Unit-I

Turbulent Flow: Laminar and turbulent boundary layers and laminar sub layer, hydro dynamically rough boundaries, velocity distribution in turbulent flow, Resistance of smooth and artificially roughened pipes, Commercial pipes, aging of pipes.

Pipe Flow Problems: Losses due to sudden expansion and contraction, losses in pipe fittings and valves, Concepts of equivalent length, Hydraulic and energy gradient lines, Siphon, Pipes in series, in parallel, Branching of pipes.(Hardy Cross method)

Pipe Network: Water hammer (only quick closure case) transmission of power.

Unit - II Forces on immersed bodies:

Introduction, Force Exerted by a flowing fluid on a stationary body, Expression for Drag & Lift, Drag on a sphere, Terminal velocity of a Body, Drag on a cylinder. Introduction to Development of Lift on a Circular Cylinder and an Airfoil

Unit - III Uniform Flow in open Channels:

Channel geometry and elements of channel section, Velocity distribution, Energy in open channel flow, Specific energy, Types of flow, Critical flow and its computations, Uniform flow and its computations, Chezy's and Manning's formulae, Determination of normal depth and velocity, Normal and critical slopes, Economical sections.

Unit - IV Gradually varied flow

Basic assumptions and dynamic equations of gradually varied flow, characteristics analysis and computations of flow profiles, rapidly varied flow-hydraulic jump in rectangular channels and its basic characteristics, Surges in open channels.

Unit - V Introduction to Fluid Machinery: Turbines & Pumps

Turbines: Classifications, definitions, Similarity laws, Specific speed and unit quantities, Pelton turbine - their construction and settings, Speed regulation, Dimensions of various elements. Action of jet, Torque, Power and efficiency for ideal case, Characteristics curves. Reaction turbines construction & setting, Draft tube theory, Runaway speed, Simple theory of design and characteristic curves, Cavitation.

Pumps: Principle of working & criteria for selection of different types of pump, viz. Centrifugal, Reciprocating.

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Course Outcomes:

Upon completion of the course, the students will be able to:

- CO 1: Differentiate different types of fluid flow & fluid machinery.
- CO 2: Describe principles of analysis of fluid flow problem.
- CO 3: Explain basic principles for measurement of different forces acting on fluid body.
- CO 4: Analyse pipe flow, open channel flow problems & various characteristics of hydraulic machines.
- CO 5: Design open & closed conduit systems.

Text Books:

- 1. Fluid Mechanics, Modi & Seth, Standard Book house, Delhi, 21st edition, 2017
- 2. Open Chanel Flow, K. Subramanya, Tata McGraw Hill, New Delhi, 5th edition, 2019

Reference Books:

- 1. Open Channel Flow, Rangaraju, Tata Mc Graw Hill Publishing Comp. Ltd., New Delhi, 1st edition, 2001
- 2. Fluid Mechanics, A.K. Jain, Khanna Publishers, Delhi, 1988
- 3. Fluid Mechanics, Hydraulics & Hydraulic Mechanics, K.R. Arora, Standard Publishers, 2009
- 4. Open Channel Hydraulics, Chow V.T., McGraw Hill, New York, 57th edition, 2009

List of Experiments:

- 1. To determine the performance characteristics of Pelton Wheel.
- 2. To determine the performance characteristics of Francis Turbine.
- 3. To determine the performance characteristics of Kaplan Turbine.
- 4. Calibration of multistage (Two) Pump & Study of characteristics of variable speed pump.
- 5. To determine the coefficient of discharge for rectangular notches.
- 6. To determine the coefficient of discharge for triangular notches.
- 7. To determine the characteristics of the Reciprocating pump at variable speed.
- 8. To prepare the calibration curve for rotameter.

Upon completion of the course, the students will be able to:

- CO 1: Differentiate between turbines & pumps.
- CO 2: Select the efficient turbines by studying the performance characteristics of various turbines.
- CO 3: Distinguish the performance characteristics of various pumps.

Auty *M. S. Mehta* *A. S. Mehta* *H. S. Mehta*

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Course Code: 110504

Course Name: Environmental Engineering – I

L	T	P	Credit
2	0	2	3

Courses Objectives:

Students will be able to understand

- 1) The structure of drinking water supply systems, including water transport, treatment and distribution.
- 2) Water quantity and water quality criteria and standards, and their relation to public health.
- 3) Operation and maintenance of water supply system components.
- 4) How to estimate water requirement of a city
- 5) How to design water treatment plant for urban & rural areas
- 6) How to design water distribution network including pipe & appurtenances.

Syllabus:

Unit-I

Water demand (types variation, factors affecting it), Design period, population forecasting methods, underground water quality & quantity, Pumping test, recuperation test, Tube wells (Types, development) yield of tube well, Thiem's-formula, Dupuit's formula.

Unit-II

Intake structures (location, types& design), conduits for transporting water, forces on conduits, types of pressure pipe, joints, corrosion of pipe (causes & control), pipe appurtenances (design), pumping of water (numerical problems), pumps character, types of pumps , Economical diameter of rising main (numerical), characteristics of water (laboratory method & effects) , water born diseases, standards for drinking water.

Unit-III

Water treatment flow diagram, design, construction, working of (Aerators, screens, plain sedimentation tank, tube settlers), coagulants & coagulation, flocculation, feeding and mixing of coagulants, optimum dose of coagulants, design & working of clarifloculator, filtration (Theory & types), Design, operation & construction of slow sands & Rapid sand gravity filters, pressure filters.

Unit-IV

Disinfectants (types) & disinfection method of disinfection, chlorine & chlorine compounds, types of chlorination, Hardness (Causes & types), various methods of softening, Recarbonation, calculation of chemical requirements, Removal of colour, odor Taste Iron & manganese, algae removal, fluoridation / de fluoridation, desalination, latest treatment techniques.

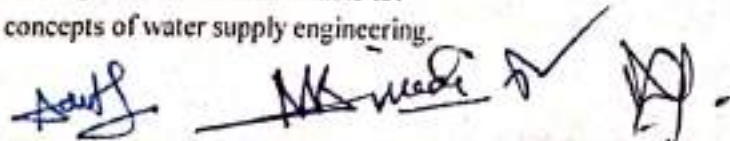
Unit-V

Requirement of good distribution system, layout of distribution, methods of distribution, Distribution reservoir and calculation of its capacity, fixing size of pipe, Analysis of pipe networks (Hardy cross method, Equivalent pipe method), appurtenances used in distribution networks, water supply & plumbing system in building, Rural water supply.

Courses Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the concepts of water supply engineering.



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- CO 2: Determine the requirements for safe supply of water.
CO 3: Apply suitable water treatment technique based upon the available data.
CO 4: Analyse a given water supply scheme.
CO 5: Design a water supply system based upon the needs of society.

Text Books:

1. Water Supply Engg., B. C. Punmia, Laxmi Publication (P) Ltd. New Delhi, 2016
2. Water Supply Engg., S. K. Garg, Khanna Publishers New Delhi, 2017

Reference Books:

1. Water Supply & Sanitary Engg., G.S. Birdie, Dhanpat Rai Publishing Company, 2014
2. Water & Waste Water Technology, Mark J Hammer, Prentice Hall of India, 6th edition, 2008
3. Environmental Engineering, Peavy, Rowe & Tchobanoglous, McGraw Hill Publication, 2017
4. Manual of Water Supply and Treatment by CPHEEO, GOI, 2009

List of Experiments:

1. Determination of pH of a given water sample.
2. Determination of Total Solids, Dissolved Solids and Suspended Solids of water sample.
3. Determination of Chloride concentration in water sample.
4. Determination of turbidity of water sample using turbidity meter.
5. Determination of acidity of the water sample.
6. Determination of alkalinity of the water sample.
7. Determination of Hardness of the water sample.
8. Determination of D.O concentration of a given water sample.
9. Determination of optimum dose of coagulants required for the treatment of a given water sample.
10. Determination of MPN of the given water sample.
11. Determination of Sulphate of a given water sample.
12. Determination of Nitrate of a given water sample.

Upon completion of the course, the students will be able to:

- CO 1: Follow sampling procedure & other guidelines for sampling & analysis of water samples.
CO 2: Check various water quality parameters.
CO 3: Improve the water quality by suggesting suitable corrective measures.
CO 4: Train others on various ways of improving the quality of water.

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Course Code: 110505

Course Name: Transportation Engineering

L	T	P	Credit
2	0	2	3

Course Objectives:

- 1) To study the planning aspects of roads & highway.
- 2) To study the geometric design aspects of highway and road.
- 3) To know about pavement material and design.
- 4) To understand the construction process and methods of roads & highway.
- 5) To study about traffic characteristics and design of intersections.

Syllabus:

Unit – I Highway Development and Planning

Highway Development in India — Necessity for Highway Planning – Different Road Development Plans; Classification of Roads. Road Network Patterns — Highway Alignment-Factors affecting Alignment- Engineering Surveys.

Unit – II Highway Geometric Design

Importance of Geometric Design – Design controls and Criteria – Highway Cross Section Elements – Sight Distance Elements – Stopping Sight Distance, Overtaking Sight Distance and Intermediate Sight Distance – Design of Horizontal Alignment – Design of Super elevation and Extra widening – Design of Transition Curves – Design of Vertical alignment - Gradients-Vertical curves.

Unit – III Traffic Studies

Spot Speed Studies and Volume Studies, Speed and Delay Studies purpose, causes of delay, methods of conducting speed and delay studies, Origin and destination Studies (O & D): Various methods, collection and interpretation of data, Traffic Capacity Studies: Volume, density, basic practical and possible capacities, level of service, Parking Studies: Methods of parking studies, design of intersections at grade & grade separated.

Unit - IV

Highway Construction Materials: Aggregates and their types, physical and engineering properties, Fillers, Bitumen, Characteristics, Emulsions and cutbacks, Basic tests on all materials.
Design of Flexible & Rigid Pavements: Introduction, flexible pavement, factors affecting design and performance, stress in flexible pavement, design of flexible pavement as per IRC, rigid pavements – components & functions, factors affecting design & performance of CC pavements, stress in rigid pavement, type of joints, dowel bar, tie bar and its functionalities.

Unit – V Evaluation and Maintenance of Pavements

Pavement distress in flexible and rigid pavements, Pavement evaluation, structural evaluation, evaluation by deflection measurements, Strengthening of pavements, Types of maintenance. Importance of highway drainage, Surface and sub-surface drainage arrangements.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the principles of highway planning & their geometrical design.

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- CO 2: Evaluate physical properties of suitable highway & railway engineering materials with drainage provisions.
- CO 3: Apply the concepts of traffic engineering in transportation planning.
- CO 4: Design pavements as per regulations.
- CO 5: Construct the layers of pavement along with provisions of its drainage & maintenance.

Text Books:

1. Highway Engineering, S.K. Khanna & C.E.G. Justo, Nemchand Pub., 10th edition, 2018
2. Highway Engineering, Gurucharan Singh, Standard Publishers, 5th edition, 2006
3. Principles & Practices of Highway Engineering, L. R. Kadiyali, N B Lal, Khanna Publishers, 2016

Reference Books:

1. Principles of Pavement Design, E.J. Yoder & M.W. Witzech, Wiley India, 2nd edition, 2011
2. Highway Engineering, O' Flaherty, Butterworth-Heinemann, 4th edition, 2002
3. Principles of Practice of Highway Engg., Sharma & Sharma, Asia Publishing House, 1965
4. Analysis and Design of Pavements, Haung, Pearson, 2nd edition, 2004

List of Experiments:

1. Aggregate Crushing Value Test
2. Determination of Aggregate Impact Value
3. Determination of Los Angeles Abrasion Value
4. Determination of flakiness index and elongation index of aggregates.
5. Determination of California Bearing Ratio Value
6. Determination of Penetration Value of Bitumen
7. Determination of Viscosity of Bituminous Material
8. Determination of Softening Point of Bituminous Material
9. Determination of Ductility of the Bitumen
10. Determination of Flash Point and Fire Point of Bituminous Material
11. Determination of Bitumen Content by Centrifuge Extractor
12. Determination of Stripping Value of Road Aggregate
13. Determination of Marshall Stability Value for Bitumen.

Upon completion of the course, the students will be able to:

- CO 1: Select suitable aggregate material by testing the physical properties.
- CO 2: Determine properties of bitumen and its grade.
- CO 3: Determine CBR value of material for subgrade and subsequent layers of pavement.
- CO 4: Design job mix formula for bituminous surface using Marshall Stability test.

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Course Code: 110506
Course Name: Minor Project - I

L	T	P	Credit
0	0	24	2

Course Objectives:

- 1) To develop an appreciation of civil engineering problems & have a feel of real life situations in planning & execution of projects.
- 2) To impart training of handling various types of civil engineering problems by use of conventional methods as well as software's.
- 3) To utilize the expertise in engineering to solve industry's technological problems.
- 4) To become innovative and professional in technology development, and system implementation.
- 5) To be able to function in their profession with social awareness and responsibility.
- 6) To be able to interact with their peers in industry and society as engineering professionals and leaders & inculcate a habit of working in a group.
- 7) Enable students to prepare professional reports for design projects and data presentation skill and to use computers and some computer graphics.

Syllabus:

Each candidate shall work on an approved project of a public building or any other civil engineering work and shall submit design and a set of drawings.

OR

Shall submit a detailed report of experimental work / software package on any specific problem of importance.

Course Outcomes:

Upon completion of the course, the students will be able to:

- CO 1: Recognize various engineering problems and techniques to solve them.
- CO 2: Reproduce the solution of the problems upon the need of society.
- CO 3: Cooperate to work within group.
- CO 4: Develop the writing and communication skills for various engineering problems.
- CO 5: Display lifelong learning.

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Course Code: 110507

Course Name: Summer Internship Project - II

L	T	P	Credit
0	0	4	2

Course Objectives:

- 1) To encourage students to read, study & understand different topics of civil engineering published in articles, literatures.
- 2) To help in presenting different topics of civil engineering and related subjects to supplement theoretical knowledge gained in class.
- 3) To make student acquire good oral & written communication skills.
- 4) To promote the habit of lifelong learning.
- 5) To prepare students develop adequate soft skills to be able to present their topic effectively to listeners.

Syllabus:

Each candidate shall have to undergo 15 days inhouse summer internship related to soft skills at the institute after the completion of their 4th Semester exams (in summer vacations) and after successful completion of internship they have to submit detailed report.

Course Outcomes:

Upon completion of the course, the students will be able to:

- CO 1: Develop the writing and communication skills for various engineering problems.
- CO 2: Adapt lifelong learning for benefit of society.

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Course Code: 110508

Course Name: Self Learning / Presentation

L	T	P	Credit
0	0	2	1

Course Objectives:

- 1) To encourage students to read, study & understand different topics of civil engineering published in articles, literatures.
- 2) To help in presenting different topics of civil engineering and related subjects to supplement theoretical knowledge gained in class.
- 3) To make student acquire good oral & written communication skills.
- 4) To promote the habit of lifelong learning.
- 5) To prepare students develop adequate soft skills to be able to present their topic effectively to listeners.

Syllabus:

1. Any relevant topic related to civil engineering from within or beyond the syllabus through Swayam / NPTEL / MOOC.

Course Outcomes:

Upon completion of the course, the students will be able to:

- CO 1: Analyze contemporary issues in civil engineering & its allied areas through literature survey.
- CO 2: Distinguish state of art & relevance of the topic in national & international arena.
- CO 3: Demonstrate good oral & written communication skills.
- CO 4: Develop poster and power point presentations for effective communication.
- CO 5: Display lifelong learning.

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Course Code: 110602

Course Name: Environmental Engineering - II

L	T	P	Credit
2	0	2	3

Course Objectives:

- 1) To impart basic knowledge on sewerage system including estimation of sewage quantity & design of sewers.
- 2) To provide a broad knowledge on sewage composition & its characteristics.
- 3) To provide information on disposal standards of effluents & also about various methods of sewage disposal.
- 4) To provide broad knowledge on various techniques of sewage treatment including advanced processes.

Syllabus:

Unit - I

Sewerage schemes & sewerage system and their importance, collection & conveyance of sewage, Estimation of and sewage storm water quantity, fluctuation in sewage flow, Flow through sewer, Design of sewer, Construction & maintenance of sewer, Testing of sewer, Sewer appurtenances, Pumps & pumping stations (numerical problems).

Unit - II

Characteristics and analysis of wastewater (Physical, chemical & biological parameters). Cycles of decomposition, Oxygen demand i.e. BOD & COD, TOC, TOD, ThOD, relative Stability, Population equivalent, Instrumentation involved in analysis, Natural methods of waste water disposal i.e. by land treatment & by dilution, Self-purification capacity of stream, Oxygen sag analysis (numerical problems).

Unit-III

Unit operations for waste water treatment, Preliminary treatment such as screens, grit chamber, floatation tank, sedimentation etc. and chemical clarification, Role of micro-organism in biological treatment, Sewage filtration - theory & design. Trickling filter its design & constructions, modifications in trickling filter.

Unit-IV

Methods of Biological Treatment (Theory & Design) - Activated Sludge Process, Oxidation ditch, Stabilization Ponds, Aerated Lagoon, Anaerobic Lagoons, Septic Tank & Imhoff tank, Rotating Biological contactor Sources & treatment of sludge, sludge thickening and digestion, sludge drying beds, sludge disposal.

Unit-V

Advanced Waste Water treatment - Need of advanced treatment, Diatomaceous earth filters, Ultra filtration. Adsorption by activated carbon, Phosphorus removal, Nitrogen removal. Physico chemical waste water treatment. Sewage treatment plants using MBBR and SBR technology.

Course Outcomes:

Upon completion of the course, the students will be able to:

- CO 1: Explain the concepts of waste water engineering.
- CO 2: Determine the requirements for safe disposal of sewage.
- CO 3: Apply suitable techniques for sewage treatment & disposal based upon the available data.

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CO 4: Analyse a given sewerage system.

CO 5: Design sewage system for safe disposal of sewage

Text Books:

1. Waste Water Engg., B. C. Punmia, Laxmi Publication (P) Ltd. New Delhi, 2016
2. Sewage Disposal and Air Pollution Engineering, S. K. Garg, Khanna Publishers, 2017

Reference Books:

1. Water Supply & Sanitary Engg., G.S. Birdie, Dhanpat Rai Publishing Company, 2014
2. Environmental Engg., M.L. Davis & D.A. Cornwell, Mc Graw Hill Company, 5th edition 2012
3. Environmental Engg., Rowe, Peavy & Tchobanogolous Tata McGraw Hill Publication, 2017
4. Water & Waste Water Technology, Mark J Hammer, Prentice Hall of India, 6th edition 2008
5. Waste Water Engineering, Metcalf & Eddy, Mc Graw Hill Book Company New Delhi, 4th edition 2005
6. CPHEEO Manual on Sewage & Sewage Treatment System, GOI, 2013

List of Experiments:

1. Determination of T.O.N. of a given sewage sample.
2. Determination of pH of a given sewage sample.
3. Determination of Total Solids of sewage sample.
4. Determination of Suspended Solids of sewage sample.
5. Determination of Chloride concentration in sewage sample.
6. Determination of turbidity of sewage sample using turbidity meter.
7. Determination of acidity of the sewage sample.
8. Determination of alkalinity of the sewage sample.
9. Determination of D.O concentration of a given sewage sample.
10. Determination of B.O.D. of a given sewage sample.
11. Determination of C.O.D of a given sewage sample.
12. Determination of MPN value of a given sewage sample.

Upon completion of practical course, the students will be able to:

- CO 1: Follow sampling procedure & other guidelines for sampling & analysis of sewage samples.
- CO 2: Check various sewage quality parameters.
- CO 3: Improve the quality of sewage by suggesting suitable corrective measures.

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Course Code: 110607
Course Name: Minor Project - II

L	T	P	Credit
0	0	4	2

Course Objectives:

- 1) To develop an appreciation of civil engineering problems & have a feel of real life situations in planning & execution of projects.
- 2) To impart training of handling various types of civil engineering problems by use of conventional methods as well as software's.
- 3) To utilize the expertise in engineering to solve industry's technological problems.
- 4) To become innovative and professional in technology development, and system implementation.
- 5) To be able to function in their profession with social awareness and responsibility.
- 6) To be able to interact with their peers in industry and society as engineering professionals and leaders & inculcate a habit of working in a group.
- 7) Enable students to prepare professional reports for design projects and data presentation skill and to use computers and some computer graphics.

Syllabus:

Each candidate shall work on an approved project of a public building or any other civil engineering work and shall submit design and a set of drawings.

OR

Shall submit a detailed report of experimental work / software package on any specific problem of importance.

Course Outcomes:

Upon completion of the course, the students will be able to:

- CO 1: Recognize various engineering problems and techniques to solve them.
- CO 2: Reproduce the solution of the problems upon the need of society.
- CO 3: Cooperate to work within group.
- CO 4: Develop the writing and communication skills for various engineering problems.
- CO 5: Display lifelong learning.

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ANNEXURE - III

SYLLABUS FOR ALL DEPARTMENTAL ELECTIVE COURSES (DEs) &
OPEN CATEGORY COURSE (OCs) UPTO VI SEMESTER

LIST OF DEPARTMENTAL ELECTIVE COURSES TO BE OFFERED BY CIVIL
ENGINEERING DEPARTMENT

SEMESTER - VI		SEMESTER - VII		SEMESTER - VIII
DE - 1	DE - 2	DE - 3	DE - 4	DE - 5
1. Structural Design & Drawing (Steel) - Y	1. Irrigation Engineering - N	1. Advanced Structural Design (RCC) - N	1. Advanced Structural Analysis - Y	1. Advanced Structural Design (Steel) - N
2. Traffic Engineering & Management - Y	2. Railways, Airport & Tunnel Engineering - N	2. Concrete Technology - Y	2. Earthquake Engineering - N	2. Hydraulic Structures - N
3. Repair & Rehabilitation of Structures - N	3. Composite Materials - Y	3. Principles of Construction Management - Y	3. Foundation Engineering - Y	3. Industrial Waste Treatment - N
4. Solid Waste Management - N	4. Building Physics - Y	4. Advanced Surveying - N	4. Environmental Impact Assessment & Ethics - N	4. Project Planning, Scheduling & Control - Y

Y - Available on NPTEL / SWAYAM
N - Not Available on NPTEL / SWAYAM

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SYLLABUS OF DEs UPTO VI SEMESTER

Course Code: 110603

Course Name: Structural Design & Drawing (Steel)

L	T	P	Credit
2	0	0	2

Course Objectives:

- 1) To learn IS 800-2007 code of practice for the design of Compression, Tension and Flexural members using various cross-sections.
- 2) To understand the behavior of steel structural components subjected to gravity loads.
- 3) To study the design of bolted and welded connections.
- 4) To study the behaviour and design of compression and tension members using simple and built-up sections.
- 5) To understand behaviour of flexural members and the design laterally restrained & unrestrained beams.
- 6) To design plate girders & stiffeners.

Syllabus:

Unit-I

Various loads, Partial Load factors, Structural properties of steel, Design of structural connections - Bolted and Welded connections, eccentric connection. Codal provision.

Unit-II

Design of Tension members. Codal provision. Lug angles & Tension splices.

Unit-III

Design of Compression member, Design of columns-simple and compound, Lacing & Battens. Design of footings for steel structures, Slab base, gusseted base. Codal provision.

Unit-IV

Design of built up beams, web buckling and crippling, curtailment of flanges. Design of Laterally supported and unsupported beams, web buckling and crippling. Codal provision.

Unit-V

Design of plate girder. Curtailment of flanges, Design of stiffeners (bearing, Vertical and horizontal), Codal provision.

Course Outcomes:

Upon completion of the course, the students will be able to:

- CO 1: Illustrate the principles of steel structural design using relevant IS Codes.
- CO 2: Evaluate structural behaviour of different steel structural elements.
- CO 3: Analyse a given section of steel structural element using IS codes.
- CO 4: Design different elements of steel structure under various loading conditions using relevant IS codes.
- CO 5: Design a structure/ component to meet desired needs within realistic constraints such as economy, safety, viable construction & its sustainability as per codal provisions.

Text Books:

1. Limit State Design of Steel Structures, S. K. Duggal, McGraw Hill Publication, 3rd edition, 2017

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Reference Books:

1. Design of Steel Structures, S. S. Bhavikatti, International Publishing House, 2014
2. Design of Steel Structures, N. Subramanian, Oxford University Press India, 2008

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Course Code: 110603

Course Name: Traffic Engineering & Management

L	T	P	Credit
2	0	0	2

Course Objectives:

- 1) To introduce the concepts of traffic engineering.
- 2) To provide a broad knowledge on traffic characteristics & various studies conducted in traffic engineering.
- 3) To analyze various requirements of traffic operation & control system & effectively design traffic signal.
- 4) To effectively design street light system.
- 5) To provide knowledge on concepts of accident studies & mass transportation system.

Syllabus:

Unit – I Traffic Characteristics

(i) Road user's characteristics – general human characteristics, physical, mental and emotional factors, factors affecting reaction time, PIEV theory. (ii) Vehicular characteristics: Characteristics affecting road design – width, height, length and other dimensions. Weight, power, speed and braking capacity of a vehicle.

Unit – II Traffic Studies

(i) Spot Speed Studies and Volume Studies. (ii) Speed and Delay Studies-purpose, causes of delay, methods of conducting speed and delay studies (iii) Origin and Destination Studies (O&D): Various methods, collection and interpretation of data, planning and sampling (iv) Traffic capacity Studies: Volume, density, basic practical and possible capacities, level of service (v) Parking Studies: Methods of parking studies cordon counts, space inventories, parking practices.

Unit – III Traffic Operations and Control

(i) Traffic regulations and various means of control. (ii) One-Way streets-advantages and limitations. (iii) Traffic signals-isolated signals coordinated signals, simultaneous, alternate, flexible and progressive signal systems. Types of traffic signals, fixed time signals, traffic actuated signals, speed control signals, pedestrian signals, flashing signals, clearance interval and problems on single isolated traffic signal. Signs, markings and islands channelization of intersections Traffic rotary. Grade separated intersections and fly over and clover leaf function.

Unit- IV Street Lighting

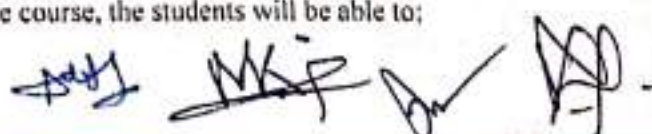
(i) Methods of light distribution (ii) Design of street lighting system (iii) Definitions-Luminaire, foot candle, Lumen, utilization and maintenance factors. (iv) Different types of light sources used for street lighting (v) Fundamental factors of night vision.

Unit-V Accident Studies & Mass Transportation

(i) Accident Studies: Causes of accidents, accident studies and records, condition and collision diagram, preventive measures (ii) Expressways and freeways, problems on mass transportation and remedial measures, brief study of mass transportation available in the country.

Course Outcomes:

Upon completion of the course, the students will be able to;



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- CO 1: Explain the basics of traffic engineering.
CO 2: Illustrate characteristics of traffic & different studies.
CO 3: Explain different theories, principles of traffic system designing.
CO 4: Compare methods to study & operate traffic, signaling & lighting.
CO 5: Evaluate studies & traffic management.

Text Books:

1. Traffic Engineering and transport Planning, L.R. Kadiyali, Khanna Publishers, 2011

Reference Books:

1. Traffic Engineering, Matson, W.S. Smith & F.W. Hurd, McGraw Hill, 1965
2. Traffic Flow Theory, D.R. Drew, Springer New York, 1983
3. Traffic System Analysis for Engineering & Planners, Wohl & Martin, McGraw Hill, 1967
4. Highway Engg., Justo & Khanna, Nem Chandra Publishers, 10th edition 2018

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Course Code: 110603

Course Name: Repair and Rehabilitation of Structures

L	T	P	Credit
2	0	0	2

Course Objectives:

1. To learn various distress and damages to concrete and masonry structures
2. To understand the importance of maintenance of structures
3. To study the various types and properties of repair materials
4. To assess the damage to structures using various tests
5. To learn the importance and methods of substrate preparation
6. To learn various repair techniques of damaged structures, corroded structures

Syllabus:

Unit- I

Introduction - Maintenance, rehabilitation, repair, retrofit and strengthening, need for rehabilitation of structures. Cracks in R.C. buildings - Various cracks in R.C. buildings, causes and effects. Damages to masonry structures - Various damages to masonry structures and causes. Engineered demolition techniques for dilapidated structures - case studies.

Unit- II

Damage diagnosis and assessment - Visual inspection, Non Destructive Testing using Rebound hammer, Ultra sonic pulse velocity, Semi destructive testing, Probe test, Pull out test, Chloride penetration test, Carbonation, Carbonation depth testing, Corrosion activity measurement.

Substrate preparation - Importance of substrate/surface preparation, General surface preparation methods and procedure, Reinforcing steel cleaning.

Unit- III

Repair materials - Various repair materials, Criteria for material selection, Methodology of selection, Health and safety precautions for handling and applications of repair materials. Special mortars and concretes - Polymer Concrete and Mortar, Quick setting compounds. Grouting materials - Gas forming grouts, Sulfaluminate grouts, Polymer grouts, Acrylate and Urethane grouts. Bonding agents - Latex emulsions, Epoxy bonding agents. Protective coatings. FRP sheets.

Unit- IV

Crack repair - Various methods of crack repair, Grouting, Routing and sealing, Stitching, Dry packing, Autogenous healing, Overlays, Repair to active cracks, Repair to dormant cracks.

Corrosion of embedded steel in concrete, Mechanism, Stages of corrosion damage, Repair of various corrosion damaged of structural elements (slab, beam and columns)

Jacketing, Column jacketing, Beam jacketing, Beam Column joint jacketing, Reinforced concrete jacketing, Steel jacketing, FRP jacketing. Strengthening, Beam shear strengthening, Flexural strengthening

Unit -V

Maintenance- Facets of Maintenance, importance of Maintenance various aspects of Inspection, Assessment procedure for evaluating a damaged structure. causes of deterioration

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Course Outcomes:

Upon completion of the course, the students will be able to:

- CO 1: Analyse various distress and damages to concrete and masonry structures.
- CO 2: Explain the importance of maintenance of structures, types and properties of repair materials etc.
- CO 3: Assess damage to structures and various repair techniques.
- CO 4: Apply various repair techniques.
- CO 5: Analyse various aspects of maintenance.

Text Books:

- 1. Repair and protection of concrete structures by Noel P. Mailvaganam, CRC Press, 1991.
- 2. Concrete repair and maintenance Illustrated by Peter. H. Emmons, Galgotia publications Pvt. Ltd., 2001.
- 3. Earthquake resistant design of structures by Pankaj Agarwal, Manish Shrikande, PHI, 2009.

Reference Books:

- 1. Failures and repair of concrete structures by S. Champion, John Wiley and Sons, 1961.
- 2. Diagnosis and treatment of structures in distress by R. N. Raikar Published by R & D Centre of Structural Designers and Consultants Pvt. Ltd, Mumbai, 1994
- 3. Handbook on repair and rehabilitation of RCC buildings, CPWD, Government of India, 2002
- 4. Handbook on seismic retrofit of buildings, A. Chakrabarti et.al., Narosa Publishing House, 2010.

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Course Code: 110603

Course Name: Solid Waste Management

L	T	P	Credit
2	0	0	2

Course Objectives:

- 1) To provide broad knowledge on various aspects of planning & implementation of a solid wastes management system in a city/ town.
- 2) To understand the principles applied in solid waste management.
- 3) To understand various ways to collect, treat & disposal of waste.
- 4) To understand various ways of energy recovery from waste.
- 5) To provide an insight into the principles of hazardous waste management.

Syllabus:

Unit I

Functional Elements of Solid Waste Management , Objective of Solid Waste Management, Principal of Municipal Solid Waste Management, Classification of solid waste, composition, Physical, chemical & biological properties of municipal solid waste, Quantity of solid waste, Sampling & analysis of solid waste.

Unit II

Collection, conveyance, separation & recycling of solid waste: Types of collection system, Collection routes, equipments, transfer station, transport methods, material separation & recycling of MSW.

Unit III

Disposal of solid waste by Land fill method; Classification, type, method, site consideration composition and control of gases, Leachate control inland fills, surface water management, landfill operation & care. Remediation of old landfill sites.

Unit IV

Disposal of solid waste by other methods: Thermal conversion technologies, Incineration, Pyrolysis gasification, environmental control system. Biological & Chemical conversion technologies, aerobic composting, anaerobic digestion, other biological and chemical transformation.

Unit V

Solid waste Management — legislative trend and planning issues: Major legislations, government agencies, future trend in planning. Hazardous solid waste management, handling & Disposal. Disposal of Biomedical Waste, Demolition waste, Rubber & Plastic Waste etc.

Course Outcomes:

Upon completion of the course, the students will be able to:

- CO 1: Explain the principles & concepts of waste management.
- CO 2: Apply various techniques in collecting the waste.
- CO 3: Examine various techniques used in reducing the waste.
- CO 4: Apply various techniques in disposal of waste.
- CO 5: Plan an effective & efficient waste management system.

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Text Books:

1. Text Book of Solid Wastes Management, Iqbal H. Khan and Naved Ahsan, CBS Publishers, 1st edition 2012
2. Integrated Solid Waste Management, Hilary Theisen and Samuel A. Vigil, George Tchobanoglous, Mc Graw Hill Yew York, 1993

Reference Books:

1. Environmental Engineering, Rowe, Peavy & Tchobanogolous, Tata McGraw Hill Publications, 2017
2. CPHEEO, Manual on Municipal Solid Waste management, Central Public Health and Environmental Engineering organization, Government of India, New Delhi, 2016
3. Solid waste Engineering, Vesilind P.A., Worrel H. W. and Reinhard, Thomson Learning Inc, 2003

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Course Code: 110604

Course Name: Irrigation Engineering

L	T	P	Credit
2	0	0	2

Course Objectives:

- 1) To understand the water requirements of various types of crops.
- 2) To understand the different types of irrigation systems.
- 3) To plan the reservoir systems as per the requirements.
- 4) To understand various types of dam.
- 5) To understand the concepts of Khosla's and Bligh's theory & its applications.
- 6) To understand river training.
- 7) To understand the concepts of Lacey's and Kennedy theory for design of canal systems.
- 8) To understand the canal regulations.

Syllabus:

Unit-I Irrigation Water Requirement and Soil Water Crop Relationship:

Irrigation, Definition, Necessity, Advantages and disadvantages, Type and methods, Irrigation development.

Soil: Types and their occurrence, Suitability for irrigation purposes, Wilting, Coefficient and field capacity, Optimum water supply, Consumptive use and its determination. Irrigation methods - surface and subsurface, Sprinkler and drip irrigation.

Duty of water, factors affecting duty and methods to improve duty, Suitability of water for irrigation, Crops and crop seasons, Principal crops and their water requirement, Crop ratio and crop rotation, Intensity of irrigation, Water logging-causes, effects & its prevention.

Unit-II Reservoirs and Storage Works:

Types of reservoirs, Reservoir planning, Various investigations, estimation of storage capacity-by mass curve analysis. Fixing of principal levels in a storage project, Economical height of dam, Reservoir sedimentation, Suitable site for a reservoir project.

Dams: Classification- gravity, earthen, rockfill, arch, buttress, steel & timber dam, Selection of suitable type of dam at a particular location.

Unit-III Diversion Works and River Training Methods:

Purpose, Selection of site, Layout and functions of component parts, Types of weirs and barrages, Weir design for surface and subsurface flows, Bligh's, Lane's and Khosla's theories, Silt excluders and silt ejectors.

River training methods – objectives, Design principles of levees, Guide bunds & launching aprons.

Unit-IV Canal Irrigation:

Types of canals, Alignment, Design of unlined and lined canals, Kennedy's and Lacey's silt theories, Typical canal sections, Canal losses, Linings-objectives, Materials used, Economics.

Unit-V

Introduction to Canal Regulation Structures: Head and cross regulators, Canal falls, Escape and outlets.



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Course Outcomes:

Upon completion of the course, the students will be able to:

- CO 1: Explain the concepts for planning an irrigation project.
- CO 2: Differentiate various theories used in planning of an irrigation project.
- CO 3: Analyse various requirements for an efficient irrigation project.
- CO 4: Design different components of irrigation system using different theories.
- CO 5: Plan an efficient, economical & safe irrigation system.

Text Books:

- 1. Irrigation & Water Power Engg., Dr. B.C. Punmia, Dr. Pane, B.B. Lal, Laxmi Publication, 16th edition, 2016
- 2. Irrigation Engineering & Hydraulic Structures, Santosh Kumar Garg, Khanna Publishers, 2017
- 3. Irrigation, Water Power & Water Resources Engg., K.R. Arora, Standard Publishers Distributors, 2010

Reference Books:

- 1. Irrigation, Water Resources & Water Power, Dr. P.N. Modi, Standard Book House, 9th edition, 2014
- 2. Irrigation Engineering by Varshney & Gupta, Vol I & II, Nem chand Publishers. 2007

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Course Code: 110604

Course Name: Railway, Airport & Tunnel Engineering

L	T	P	Credit
2	0	0	2

Course Objectives:

- 1) To understand the requirements of airport, runway & taxi – way.
- 2) To understand the requirement of lighting & signal & traffic control at airports.
- 3) To understand the geometrical elements of railway track.
- 4) To understand the properties of good ballast.
- 5) To understand the track alignment, super elevation, turnout, yards.
- 6) To understand the principles of signalling & interlocking.
- 7) To understand the construction of tunnels.

Syllabus:

Unit-I Introduction to Railway Engineering

Tractive resistance & Permanent way, Principles of Transportation, Transportation by Road, Railways, Airways, Waterways, their importance and limitations. Route surveys and alignment, railway track, development and gauges. Hauling capacity and tractive effort.

- (i) Rails- types, welding of rails, wear & tear of rails, rail creep ultrasonic Testing of Rails.
- (ii) Rail fastenings- types – Fishplates, spikes bearing plates, chairs, keys, check and guard rails, Elastic Rail Clips (ERC), Vossloh fastening.
- (iii) Sleepers, types & comparison, requirement of a good sleeper, sleeper density, Turnouts.
- (iv) Ballast –Requirement of good ballast, various materials used as ballast, quantity of ballast, Ballast Cleaning.

Different methods of plate laying, material trains, calculation of materials required, relaying of track.

Unit-II

Track alignment, Geometrical Design, Gradient & grade compensation, Super Elevation, Equilibrium, Cant and Cant deficiency, relationship of super elevation, gauge, speed & radius of curves, speed on curves. Limits of super elevation, Cant deficiency, Negative super elevation, curves, transition curves, necessity of points and crossing. Turnouts, Points of switches, Types of switches, crossing, calculation of turnouts, sleepers at points & crossing. Types of Track junctions. Types, locations, general equipments, layouts, marshalling yards. Definition, layout details, designs of simple turnouts.

Stations and Yards: Site selection for a Railway stations, Requirements of railway stations, junction station & terminals, location, layout & details, Types of signals in stations and yards, principles of signaling and inter-locking, Modern development in railways, Modernization of track for high speed, Maintenance of track, Track drainage.

Unit – III Airport Planning, Runway & Taxiway

Airport site selection. air craft characteristic and their effects on runway alignments, wind rose diagrams, basic runway length and corrections, classification of airports. Geometrical elements: taxi ways and runways, pattern of runway capacity.

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Unit - IV Airport, Obstructions, Lightning & Traffic control

Zoning regulations, approach area, approach surface-imaginary, conical, horizontal. Rotating beacon, boundary lights, approach lights, runway and taxiway lighting etc. instrumental landing system, precision approach radar.

Unit-V Tunnels

Selection of route, Engineering surveys, alignment, shape and size of tunnel, bridge action, pressure relief phenomenon, Tunnel approaches, Shafts, pilot shafts. Construction of tunnels in soft soil, hard soil and rock, Different types of lining, methods of lining, Mucking operation, Drainage and ventilation, Examples of existing important tunnels in India and abroad.

Course Outcomes:

Upon completion of the course, the students will be able to:

- CO 1: Explain the elements of airport planning, bridges & tunnels.
- CO 2: Design runway & taxiway system as per regulations.
- CO 3: Explain various elements of railway tracks, signalling, yards, bridges & tunnels.
- CO 4: Illustrate various gauge, signals, fasteners, turnouts, crossing etc.
- CO 5: Apply construction methods of railway tunnels.

Text Books:

1. Airport Planning & Design, S. K. Khanna & M. G. Arora, Nem chand Publishers, 6th edition, 1999
2. Railway Engineering, Arora & Saxena, Dhanpat Rai & Sons, 2010

Reference Books:

1. Airport Planning, Froesch, Charles, Andesite Press, 2017
2. The Planning & Design of Airports, Horonjeff Robert, MHE, 5th edition, 2010
3. Railway Engineering, S.C. Rangwala, Charotar Publication House, Anand, 2012
4. Railway Tack, K.F. Antia, New Book Company, 5th edition, 1960



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Course Code: 110604

Course Name: Composite Materials

L	T	P	Credit
2	0	0	2

Course Objectives:

1. To understand various matrices and reinforcements used in composites
2. To know about polymer matrix composites, metal matrix composites, ceramic matrix composites and its manufacturing and applications
3. To introduce post processing operations and micromechanics of composites

Syllabus:

Unit-I

Introduction: Definitions, Composites, Reinforcements and matrices, Types of reinforcements, Types of matrices, Types of composites, Carbon Fibre composites, Properties of composites in comparison with standard materials, Applications of metal, ceramic and polymer matrix composites.

Unit- II

Manufacturing methods: Hand and spray lay - up, injection molding, resin injection, filament winding, pultrusion, centrifugal casting and prepregs. Fibre/Matrix Interface, mechanical. Measurement of interface strength. Characterization of systems; carbon fibre/epoxy, glass fibre/polyester, etc.

Unit- III

Mechanical Properties -Stiffness and Strength: Geometrical aspects – volume and weight fraction. Unidirectional continuous fibre, discontinuous fibers, Short fiber systems, woven reinforcements – Mechanical Testing: Determination of stiffness and strengths of unidirectional composites; tension, compression, flexure and shear.

Unit- IV

Laminates: Plate Stiffness and Compliance, Assumptions, Strains, Stress Resultants, Plate Stiffness and Compliance, Computation of Stresses, Types of Laminates - Symmetric Laminates, Antisymmetric Laminate, Balanced Laminate, Quasi-isotropic Laminates, Cross-ply Laminate, Angleply Laminate, Orthotropic Laminate, Laminate Moduli, Hygrothermal Stresses.

Unit -V

Joining Methods and Failure Theories: Joining –Advantages and disadvantages of adhesive and mechanically fastened joints. Typical bond strengths and test procedures.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain various forms of composite materials.

CO 2: Apply different material to design composites.

CO 3: Apply different techniques to process different types of composites and know the limitations of each process

CO 4: Apply mathematical techniques to predict the macroscopic properties of different Laminates.

CO 5: Explain various methods of joining & theories of failure.

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Text Books:

1. Composite materials, K.K. Chawala, 2nd ed., (1987) Springer-Verlag, New York.

Reference Books:

1. Mechanics and Analysis of Composite Materials, V.V. Vasiliev and E.V. Morozov, (2001), Elsevier Science Ltd, The Boulevard, Langford Lane, Kidlington, Oxford OX51GB, UK.
2. Ceramic matrix composites, K.K. Chawala, 1st ed., (1993) Chapman & Hall, London.
3. Advances in composite materials, G. Piatti, (1978) Applied Science Publishers Ltd., London.

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Course Code: 110604

Course Name: Building Physics

L	T	P	Credit
2	0	0	2

Course Objectives:

1. To emphasize on green systems and the environment, energy technology and efficiency, and sustainability and society.
2. To introduce concepts of Eco Friendly building materials and alternative methods of building construction and energy efficient construction.
3. To know about the basics of acoustics in building, and protection against noise.
4. To understand the response of building to thermal environment.
5. To learn about the day lighting of buildings and their design principles.
6. To know about the energy policy and planning.
7. To learn about the environmental impact of building materials and energy efficient materials.
8. To expose the students to the concepts functional design of building for thermal aspects and energy efficiency; especially in tropical climates i.e. in Indian context.
9. To perform fenestration design for natural ventilation and day lighting & design of space for external and internal noise control.

Syllabus:

Unit-I Energy Efficiency in buildings:

Need of energy in buildings. Role of building design and building services to evaluate the energy performance in buildings. Study of Climate and its influence in building design for energy requirement, Principles of energy conscious design of buildings, Building Envelope, Orientation, Building Configuration, Structural control and design for energy efficiency: Selection of envelope elements, Orientations, shape, Glasses and shading devices;

Response of building to thermal environment: Processes of heat exchange of building with environment; Effect of solar radiation; Thermal properties of material and sections and their influence; Natural ventilation: Purpose of ventilation, Mechanisms, Fenestration Design for natural ventilation.

Unit-II Acoustics of a building:

Basic requirements for good acoustics, Reverberation, Absorption and transmission of sound, Factors affecting the architectural acoustics

Noise and Building: Basic acoustics and noise, Planning, Sound in free field, protection against external noise; Internal noise sources and protection against air borne & structure borne noise

Unit-III Energy Efficient Materials:

Environmental impact of building materials, Eco Friendly building materials, their composition, production and recycling, physical properties etc. Embodied energy of materials like bamboo, soil blocks, thatch, steel, fly-ash bricks, gypsum, eco-boards etc, Life Cycle assessment of materials

Need of Alternative materials, Green Materials, Biomaterials, Natural and synthetic Polymers. Photovoltaic (PV) thin films for solar cells; Organic Solar Cells; dye sensitized solar cells; Lithium batteries: Current technologies and future trends. Thermoelectric materials for conversion of heat to electricity.

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Unit-IV Day-lighting in buildings:

Basic Principles of Day-lighting and fundamentals; Sky, Indian sky, daylight prediction and design of fenestration; Embodied Energy of Building Materials, design guidelines, Commercial Buildings, Industrial buildings, Residential buildings, integration of emerging technologies. Study of thermal environment and visual environment. Novel illumination sources for efficient lighting, Energy saving in buildings, Materials and techniques for energy harvesting.

Unit-V Energy Policy & Planning:

Energy and Environment Basic Issues: Criteria for Economic Growth; Energy-Economy-Environment Linkages; Emissions Inventories: Assessment and Policy Relevance. Issues for Developing Countries: Energy and Environment Policies from Urban and Rural perspectives. Analysis Methodologies: Scenarios and Models, Global and Local Environmental Issues: Climate Change Negotiations Technological Options: Energy-Efficiency and New Energy Technologies; Renewable Energy: Issues, Prospects and Policies.

Course Outcomes:

Upon completion of the course, the students will be able to:

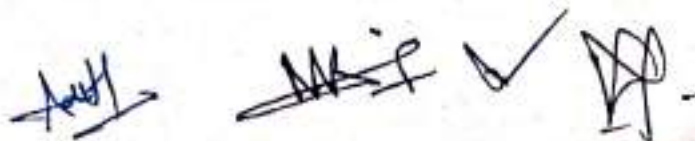
- CO 1: Explain the significance of saving energy while designing and planning the building.
- CO 2: Illustrate the principles of day lighting while designing a building
- CO 3: Analyse different types of energy efficient and eco friendly materials available in building construction to reduce the energy consumption.
- CO 4: Analyse the thermal impact on buildings due to changing environment and their remedial measures
- CO 5: Explain the policies incorporated for energy in planning.

Text Books:

1. Energy Efficient building in India, Mili Majumdar, TERI, 2009
2. Building Climate And Energy, Markus T. A. & Morris E.N., Pitman publishing limited, 1980
3. Air conditioning And Ventilation of Buildings Vol-1., Croome J. D. & Roberts B. M., Pergamon press.
4. Noise Building And People, Croome J.D., Pergamon press.

Reference Books:

1. Handbook on Energy Conscious Buildings, J.K. Nayak & J.A. Prajapati, 1st edition, 2006
2. Energy Economic, Parag Diwan, Pentagon Press, 2008
3. Energy Sources & Policies in India, Rishi Muni Dwivedi, New Century Publications, 2011
4. Bureau of Indian Standards, "Hand Book of Functional Requirements Of Buildings, (SP-41 & SP-32)", BIS 1987 and 1989
5. Manual of Tropical Housing And Building Part-I Climatic Design, Koenigsberger, O.H. et al, Orient Longman. 1973
6. Energy Simulation In List of reference materials/books/ Optional use of open source free software such as "eQUEST", Energy plus etc. 2 building Design, Clarke, J.A., Adam Hilger Ltd. 1985
7. Sound Analysis and Noise Control, Foreman, J.E.K., Van Nostrand Reinhold. 1990
8. Environmental and Architectural Acoustics, Maekawa Z. and Lord, P., E & F N Spon. 1994



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LIST OF OPEN CATEGORY COURSES OFFERED BY CIVIL ENGINEERING DEPARTMENT

SEMESTER - VI	SEMESTER - VII		SEMESTER - VIII	
OC - 1	OC - 2	OC - 3	OC - 4	OC - 5
1. Remote Sensing & GIS - N Prerequisites- NONE	1. Quantitative Methods in Engineering Problems - Y Prerequisites- NONE	1. Sustainable Engineering Concept & Life Cycle Analysis - Y Prerequisites- NONE	1. Project Management - Y Prerequisites- NONE	1. Principles & Application of Building Science - Y Prerequisites- NONE
2. Air & Noise Pollution - N Prerequisites- NONE	2. Energy Planning & Management - N Prerequisites- NONE	2. Integrated Waste Management - Y Prerequisites- NONE	2. Environmental Monitoring - N Prerequisites- NONE	2. Contract Management - N Prerequisites- NONE

Y - Available on NPTEL / SWAYAM
 N - Not Available on NPTEL / SWAYAM

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SYLLABUS OF OC& UPTO VI SEMESTER

Course Code: 110605

**Course Name: Remote Sensing and Geographic
Information System (RS &GIS)**

L	T	P	Credit
2	0	0	2

Course Objectives:

1. To understand the basic concepts of remote sensing and geospatial techniques.
2. To develop an understanding of the characteristics of remote sensing sensors, platforms and tracking system.
3. To learn the digital image processing techniques.
4. To understand the basics of geographic information system (GIS), global positioning system (GPS), map projections and projection systems.
5. To know about the applications of remote sensing for earth resources management.
6. To apply acquired knowledge and critical thinking skills to solve a real-world problem with appropriate remote sensing data and processing methods.

Syllabus:

Unit- I

Introduction and Concepts of Remote Sensing: Introduction to Remote Sensing - Definition and Concepts of Remote Sensing, History of Remote sensing and GIS, Modern Remote Sensing Technology Versus Conventional Aerial Photography, Remote Sensing Processes; Energy Sources and Interaction- Sources of Energy, Energy Interaction with Atmosphere, Data Acquisition and Interpretation, Advantages of Remote Sensing, Limitations of Remote Sensing; Remote Sensing Applications- Introduction, Applications of Remote Sensing Technology.

Unit- II

Sensors, Platforms and Tracking System: Sensors Characteristics - Remote Sensing Sensors, Classification of Remote Sensing Sensors, Sensors Parameters and Resolutions; Remote Sensing Platforms - Types of Platforms.

Unit- III

Digital Image Processing: Digital Image - Introduction to Digital Image, Image Rectification and Resolution; Pre Processing Techniques - Image Reduction and Image Magnification, Color Compositing, Image Enhancement; Image Classification - Supervised Classification, Unsupervised Classification, Classification Accuracy Assessment - Classification Accuracy and Classification Error Matrix, GIS Integration.

Unit- IV

Geographical Information Systems (GIS) and Fundamentals of Global Positioning System (GPS): Introduction to GIS - Definition, Components, Architecture; Contributing Disciplines, Applications of GIS; Map Projections - Introduction, Describing and Measuring the Earth; Coordinate and Datum System- Introduction, Coordinate Systems, Datum; Projection System; Components of GPS - Working Principles, Timing and Ranging, Application of GPS - GPS Error, Sources of Error, Accuracy, Application of Global Positioning System.

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Unit -V

Applications of Remote Sensing for Earth Resources Management: Mapping of Agriculture and Forestry, Land Use and Land Cover Mapping and Change Detection, Soil Mapping and Soil Erosion Estimation Practices, Mapping of Water Resources and Flood Damage Assessment.

Course Outcomes:

Upon completion of the course, the students will be able to:

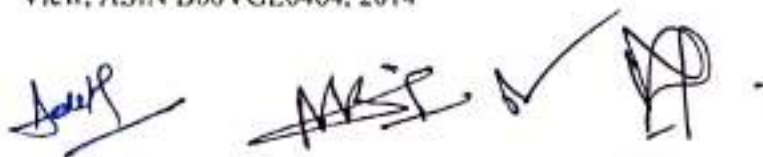
- CO 1: Explain the significance, sensors, platforms and tracking systems of the remote sensing techniques.
- CO 2: Explain the GIS and GPS technologies, maps, projections and datum of satellite imageries and the importance of the reference coordinate system.
- CO 3: Apply the digital image processing of the imageries.
- CO 4: Know about the applications of remote sensing and GIS in their respective discipline.
- CO 5: Apply different satellite imageries and software available in research.

Text Books:

1. Remote sensing and image interpretation, Lillesand, T. M., Wiley Publishers, 6th edition, 2014
2. Introduction to Geographic Information Systems, MHE, 4th edition, 2017
3. Introduction to Remote Sensing, Campbell, James B., New York 5th edition 2011.

Reference Books:

1. Fundamentals of Remote Sensing, Joseph, G., Universities Press, 2nd edition 2005
2. Remote Sensing Analysis in an ArcMap Environment, Parece, Campbell, and McGee. Virginia View, ASIN B00VGE0464, 2014

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Course Code: 110605

Course Name: Air & Noise Pollution

L	T	P	Credit
2	0	0	2

Course Objectives:

- 1) To provide a broad knowledge on various sources & effects of air pollution, air pollutants, existing air quality standards in India, various techniques to reduce the air pollutants in atmosphere.
- 2) To provide a basic knowledge on sources, effects of noise pollution & also how to reduce the pollution.
- 3) To provide an insight into various existing laws on air & noise in India.

Syllabus:

Unit I

Atmosphere as a place of disposal of pollutants – Air Pollution – Definition – Air Pollution and Global Climate – Units of measurements of pollutants – Air quality criteria – emission standards – National ambient air quality standards – Air pollution indices – Air quality management in India.

Unit II Sources, Classification & Effects

Sources and classification of air pollutants – Man made – Natural sources – Type of air pollutants – Pollution due to automobiles – Analysis of air pollutants – Chemical, Instrumental and biological methods. Air pollution and its effects on human beings, plants and animals – Economic effects of air pollution – Effect of air pollution on meteorological conditions – Changes on the Meso scale, Micro scale and Macro scale.

Unit III Sampling, Meteorology and Air Quality Modeling

Sampling and measurement of particulate and gaseous pollutants – Ambient air sampling – Stack sampling. Environmental factors – Meteorology – temperature lapse rate and stability – Adiabatic lapse rate – Wind Rose – Inversion – Wind velocity and turbulence – Plume behavior – Dispersion of air pollutants- Air Quality Modeling.

Unit IV Air Pollution Control Measures

Control – Source correction methods – Control equipments – Particulate control methods – Bag house filter – Settling chamber – cyclone separators – inertial devices – Electrostatic precipitator – scrubbers – Control of gaseous emissions – Absorption – Absorption equipments – adsorption and combustion devices (Theory and working of equipments only).

Unit V Noise Pollution & its Control

Sources of noise – Units and Measurements of Noise – Characterization of Noise from Construction, Mining, Transportation and Industrial Activities, Airport Noise – General Control Measures – Effects of noise pollution – auditory effects, non - auditory effects. Noise Menace- Prevention and Control of Noise Pollution – Control of noise at source, control of transmission, protection of exposed person – Control of other types of Noise Sound Absorbent

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the concepts of air & noise pollution.

CO 2: Illustrate the effects of pollution on environment.

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CO 3: Solve air and noise pollution problems by devising solutions to the identified problems.

CO 4: Examine various techniques used in reducing the environmental pollution.

CO 5: Plan an effective & efficient environmental management system.

Text Books:

1. Air pollution & Control, M. N. Rao & H. V. N Rao, Tata McGraw Hill Publications., 2017
2. Air Pollution and Control Technologies, Dr. Y. Anjaneyulu, Allied publishers Pvt. Ltd., 2002.

Reference Books:

1. Sewage Disposal & Air Pollution Engineering, S.K. Garg, Khanna Publishers, 31st edition, 2008
2. Environmental Pollution Control Engineering, C. S. Rao, New Age Intl Pub., 3rd edition, 2018
3. Environmental Engineering, Rowe, Peavy & Tchobanoglous, Tata McGraw Hill Publication, 2017

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ANNEXURE – VII

CO Gap Analysis for Session July - Dec 2018

Course Code & Name	CO	CO Attainment			Target Attainment %	Gap in Attainment %
		Direct Attainment %	Indirect Attainment %	Total Attainment %		
100205: Basic Civil Engineering & Mechanics (CSE)	CO 1	78.00	87.50	79.90	60.00	---
	CO 2	78.20	88.00	80.16	60.00	---
	CO 3	77.20	82.50	78.26	60.00	---
	CO 4	76.80	86.50	78.74	60.00	---
	CO 5	66.80	86.00	70.64	60.00	---
100205: Basic Civil Engineering & Mechanics (EE)	CO 1	68.20	85.00	71.56	60.00	---
	CO 2	66.00	86.50	70.10	60.00	---
	CO 3	73.60	81.00	75.08	60.00	---
	CO 4	68.60	85.50	71.98	60.00	---
	CO 5	64.80	83.50	68.54	60.00	---
100205: Basic Civil Engineering & Mechanics (EC)	CO 1	73.20	84.00	75.36	60.00	---
	CO 2	66.00	85.50	69.90	60.00	---
	CO 3	64.40	82.00	67.92	60.00	---
	CO 4	71.60	86.00	74.48	60.00	---
	CO 5	77.00	84.00	78.40	60.00	---
100205: Basic Civil Engineering & Mechanics (ET)	CO 1	68.40	85.50	71.82	60.00	---
	CO 2	68.40	84.50	71.62	60.00	---
	CO 3	74.00	82.50	75.70	60.00	---
	CO 4	82.00	84.00	82.40	60.00	---
	CO 5	61.20	83.00	65.56	60.00	---
100205: Basic Civil Engineering & Mechanics (IT)	CO 1	71.60	85.50	74.38	60.00	---
	CO 2	65.40	86.50	69.62	60.00	---
	CO 3	58.20	82.00	62.96	60.00	---
	CO 4	68.20	84.00	71.36	60.00	---
	CO 5	65.20	84.00	68.96	60.00	---

110302: Building Planning & Design	CO 1	67.20	87.50	71.26	60.00	---
	CO 2	60.60	86.00	65.68	60.00	---
	CO 3	64.20	85.00	68.36	60.00	---
	CO 4	61.80	80.00	65.44	60.00	---
	CO 5	67.00	80.50	69.70	60.00	---
110303: Building Material & Construction	CO 1	76.40	86.50	78.42	60.00	---
	CO 2	68.80	84.50	71.94	60.00	---
	CO 3	71.20	84.00	73.76	60.00	---
	CO 4	48.00	79.00	54.20	60.00	5.80
	CO 5	53.40	79.00	58.52	60.00	1.48
110304: Surveying	CO 1	65.20	83.00	68.76	60.00	---
	CO 2	55.40	77.50	59.82	60.00	0.18
	CO 3	69.60	76.50	70.98	60.00	---
	CO 4	61.60	85.00	66.28	60.00	---
	CO 5	61.40	80.00	65.12	60.00	---
110305: Strength of Materials	CO 1	67.00	88.50	71.30	60.00	---
	CO 2	69.80	83.00	72.44	60.00	---
	CO 3	66.20	80.00	68.96	60.00	---
	CO 4	62.40	77.50	65.42	60.00	---
	CO 5	57.80	79.50	62.14	60.00	---
BCEL - 501: Construction Planning & Management	CO 1	70.00	92.97	74.59	60.00	---
	CO 2	71.40	88.65	74.85	60.00	---
	CO 3	68.00	87.57	71.91	60.00	---
	CO 4	64.80	81.62	68.16	60.00	---
	CO 5	63.60	84.86	67.85	60.00	---
	CO 6	61.20	85.95	66.15	60.00	---
BCEL - 503: Water Resource Engineering	CO 1	84.60	90.81	85.84	60.00	---
	CO 2	82.40	88.65	83.65	60.00	---
	CO 3	72.00	87.57	75.11	60.00	---
	CO 4	68.00	89.19	72.23	60.00	---
	CO 5	64.00	83.24	67.84	60.00	---
	CO 6	70.20	81.08	72.37	60.00	---
BCEL - 504: Fluid Mechanics - II	CO 1	69.40	95.68	74.65	60.00	---
	CO 2	74.40	93.51	78.22	60.00	---
	CO 3	73.80	92.97	77.63	60.00	---
	CO 4	65.80	90.27	70.69	60.00	---
	CO 5	60.60	86.49	65.78	60.00	---

BCEL – 505: Structural Design & Drawing – I (R.C.C.)	CO 1	47.80	91.89	56.62	60.00	3.38
	CO 2	72.00	86.49	74.89	60.00	---
	CO 3	56.40	77.30	60.58	60.00	---
	CO 4	62.40	83.24	66.56	60.00	---
	CO 5	54.40	84.32	60.38	60.00	---
	CO 6	59.00	81.08	63.41	60.00	---
BCEL – 506: Theory of Structures – I	CO 1	72.80	91.89	76.61	65.00	---
	CO 2	62.60	88.11	67.70	65.00	---
	CO 3	73.80	88.65	76.77	65.00	---
	CO 4	71.60	87.57	74.79	65.00	---
	CO 5	68.60	88.11	72.50	65.00	---
BCEL – 701: Geotechnical Engineering – II	CO 1	64.00	86.50	68.50	65.00	---
	CO 2	55.40	84.00	61.12	65.00	3.88
	CO 3	58.60	76.00	62.08	65.00	2.92
	CO 4	55.40	74.50	59.22	65.00	5.78
	CO 5	53.60	77.50	58.38	65.00	6.62
BCEL – 702: Environmental Engineering – II	CO 1	64.00	86.00	68.40	60.00	---
	CO 2	69.60	87.00	73.08	60.00	---
	CO 3	64.20	83.00	67.96	60.00	---
	CO 4	71.20	83.50	73.66	60.00	---
	CO 5	61.00	79.50	64.70	60.00	---
BCEL – 703: Advanced Structural Design- I (RCC)	CO 1	72.40	82.50	74.42	65.00	---
	CO 2	72.60	76.50	73.38	65.00	---
	CO 3	56.40	78.00	60.72	65.00	4.28
	CO 4	57.60	84.00	62.88	65.00	2.12
	CO 5	58.60	79.00	62.68	65.00	2.32
BCEL – 704: Railway Bridge and Tunnel Engineering	CO 1	75.40	84.50	77.22	60.00	---
	CO 2	79.20	84.50	80.26	60.00	---
	CO 3	68.00	81.00	70.60	60.00	---
	CO 4	72.60	82.00	74.48	60.00	---
	CO 5	74.00	83.50	75.90	60.00	---
BCEL – 705: Irrigation Engineering	CO 1	77.80	79.50	78.14	60.00	---
	CO 2	66.00	74.50	67.70	60.00	---
	CO 3	69.60	74.00	70.48	60.00	---
	CO 4	66.60	76.00	68.48	60.00	---
	CO 5	62.20	76.50	65.06	60.00	---

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ANNEXURE - II

**LIST OF EXPERIMENTS FOR LAB COURSES TO BE OFFERED IN V &
VI SEMESTER**

Course Code: 110503

Course Name: Fluid Mechanics - II

List of Experiments:

1. To determine the performance characteristics of Pelton Wheel.
2. To determine the performance characteristics of Francis Turbine.
3. To determine the performance characteristics of Kaplan Turbine.
4. Calibration of multistage (Two) Pump & Study of characteristics of variable speed pump.
5. To determine the coefficient of discharge for rectangular notches.
6. To determine the coefficient of discharge for triangular notches.
7. To determine the characteristics of the Reciprocating pump at variable speed.
8. To prepare the calibration curve for rotameter.

Course Code: 110504

Course Name: Environmental Engineering - I

List of Experiments:

1. Determination of pH of a given water sample.
2. Determination of Total Solids, Dissolved Solids and Suspended Solids of water sample.
3. Determination of Chloride concentration in water sample.
4. Determination of turbidity of water sample using turbidity meter.
5. Determination of acidity of the water sample.
6. Determination of alkalinity of the water sample.
7. Determination of Hardness of the water sample.
8. Determination of D.O concentration of a given water sample.
9. Determination of optimum dose of coagulants required for the treatment of a given water sample.
10. Determination of MPN of the given water sample.
11. Determination of Sulphate of a given water sample.
12. Determination of Nitrate of a given water sample.

Course Code: 110505

Course Name: Transportation Engineering

List of Experiments:

1. Aggregate Crushing Value Test
2. Determination of Aggregate Impact Value

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3. Determination of Los Angeles Abrasion Value
4. Determination of flakiness index and elongation index of aggregates.
5. Determination of California Bearing Ratio Value
6. Determination of Penetration Value of Bitumen
7. Determination of Viscosity of Bituminous Material
8. Determination of Softening Point of Bituminous Material
9. Determination of Ductility of the Bitumen
10. Determination of Flash Point and Fire Point of Bituminous Material
11. Determination of Bitumen Content by Centrifuge Extractor
12. Determination of Stripping Value of Road Aggregate
13. Determination of Marshall Stability Value for Bitumen.

Course Code: 110602

Course Name: Environmental Engineering - II

List of Experiments:

1. Determination of T.O.N. of a given sewage sample.
2. Determination of pH of a given sewage sample.
3. Determination of Total Solids of sewage sample.
4. Determination of Suspended Solids of sewage sample.
5. Determination of Chloride concentration in sewage sample.
6. Determination of turbidity of sewage sample using turbidity meter.
7. Determination of acidity of the sewage sample.
8. Determination of alkalinity of the sewage sample.
9. Determination of D.O concentration of a given sewage sample.
10. Determination of B.O.D. of a given sewage sample.
11. Determination of C.O.D of a given sewage sample.
12. Determination of MPN value of a given sewage sample.

100006: Indian Constitution and Traditional Knowledge

100006	Indian Constitution and Traditional Knowledge	Theory	Midterm	Quiz/Assignment	TOTAL	L	T	P	C
		70	20	10	100	3	-	-	-

Course Objectives:

- The course aims to provide students with the continuous, comprehensive and cumulative understanding of Indian Knowledge Tradition (Philosophy, Language, Art) and its modern interpretation and analysis.
- It intends to connect the students' modern advanced knowledge system with the roots of Indian Knowledge Tradition for their development and better understanding of the essentials of thought process, intellection and inference.
- To impart the knowledge of the Yogic Science and an insight into Sanskrit Literature which will promote interest among students in discerning the significance of health and wisdom with an Indian perspective.
- The objective of the syllabus is to familiarize students with the essential features and basic principles of the constitution of India.
- It will acquaint them with the concept of government, its organs and various types.
- It will provide students with a comprehensive and clear understanding of the basic fundamental rights and duties.

Unit-1

- Introduction to Basic Structure of Indian Knowledge System
- Homogeneity of modern science and Indian Knowledge Tradition
- Yoga: Promoting positive health and personality
- Case Studies

Unit-2

- Indian Philosophy or Darshanas: Jainism, Buddhism, Yoga, Śaiva and Vedānta
- Indian Linguistic Tradition: Panini's Aṣṭādhyāyī
- Indian Art: Mauryan art, Buddhist art, Gupta art, Muslim Art & Culture Contemporary art
- Case Studies

Unit 3 Introduction to Political Science

- Nature and scope of political science
- Definition, elements and theories of origin of State (Social Contract and Evolutionary)
- Meaning and features of Civil Society
- Indian Political Thought: Raja Ram Mohan Roy, Swami Vivekanand, Gandhi, Ambedkar

Unit 4 Concept of Government and Its Organs

- Government: Definition and its characteristics
- Types and meaning of Legislature: Composition, Function and Role of the Parliament (Lok Sabha and Rajya Sabha)
- The Powers, Position and Role of the President, Prime Minister and the Cabinet
- The Powers, Position and Role of the Governor and the Chief Minister; Composition and the role of Supreme Court, Judicial Review and Judicial Activism

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Unit 5 Salient features of Indian Constitution

- Preamble, Conventions, Sovereignty of the Constitution and the Rule of Law
- Parliamentary Democracy, Federalism, Secularism and Socialism
- Fundamental Rights, Directive Principles of State Policies and Fundamental Duties
- Election Commission and Electoral Reforms

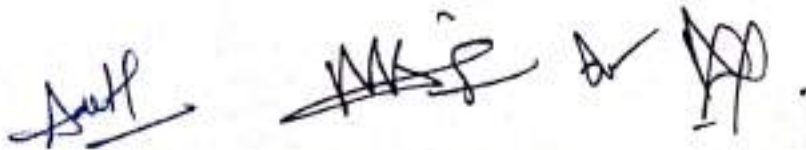
Basic Readings:

1. O.P. Gauba, *Political Theory*, Macmillan, (latest edition).
2. D.D. Basu, *Introduction to the Constitution of India*, (Latest Edition).
3. N.G. Jayal & Pratap Bhanu Mehta, *The Oxford Companion of Politics in India*, 2000.
4. W.H. Morris-Jones, *The Government and Politics of India*.
5. Swami Jitamanand, *Holistic Science and Vedam*, Bhartiya Vidyabhawan
6. V. Shivramakrishnan (Ed.), *Cultural Heritage of India*, Bhartiya Vidyabhawan, Mumbai Fifth Edition, 2014.
7. Yoga sutra of Patanjali, Ramakrishnan Mission, Kolkata.
8. Panini Shiksha, Motilal Banarsidas
9. VN Jh, *Language, Thought and Reality*
10. Krishna Chaitanya, *Arts of India*, Abhinav Publications, 1987.
11. SC Chatterjee and DM Datta, *An Introduction to Indian Philosophy*, university of Calcutta, 1984
12. A L Basham, *The Wonder That was India*

Course Outcomes:

After successful completion of the course, the students will be able to

1. Know the rich Indian traditions and the Indian constitution.
2. Appraise the utility and significance of tradition and its applicability in present times.
3. Employ the knowledge of the constitutional norms as laid in the constitution and abide by the practices stated therein.
4. Create a better society and living standards for themselves as well as for others.
5. Recognize the basic concepts of ethics and morality pertaining to Indian culture and tradition.
6. Connect traditional Indian philosophy with their everyday conduct and practices.



Disaster Management

100007	Disaster Management (MC)	Theory	Midterm	Quiz/Assignment	Total	L	T	P	C
		70	20	10	100	3	-	-	03

Course objectives:

- i) To understand basic concepts in Disaster Management
- ii) To understand Definitions and Terminologies used in Disaster Management
- iii) To understand Types and Categories of Disasters
- iv) To understand the Challenges posed by Disaster
- v) To understand Impact of Disasters key skills

Syllabus

Unit 1: Introduction to disaster management, concepts and definitions: disaster, vulnerability, risk severity, frequency and details, capacity impact, prevention, mitigation.

Unit 2: Disasters – Disasters classification, demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends, hazard and vulnerability profile of India.

Unit 3: Disaster Impacts – Disaster impact (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues, impact of natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides etc.), impact of manmade disasters (industrial pollution, artificial flooding in urban areas, urban disasters, transportation accidents etc.).

Unit 4: Disaster Risk Reduction (DRR) - Disaster management cycle- its phases: prevention, mitigation, preparedness, relief and recovery; structural and non- structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post disaster environmental response, Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders: Policies and legislation for disaster management. DRR programmes in India and the activities of National Disaster Management Authority.

Unit 5: Disasters, Environment and Development – Factors affecting vulnerability such as impact of development projects and environmental modifications (including of dams, land use changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction and development methods.

Course Outcomes:

After successful completion of the course, the students will be able to

1. Identify disaster prevention and mitigation approaches.
2. Classify global and national disasters, their trends and profiles.
3. Determine the impacts of various disasters.
4. Apply Disaster Risk Reduction in management.
5. Infer the linkage between disasters, environment and development.

Test Books:

1. Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.
2. Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation
3. Srivastava H.H. & Gupta G.D., Management of Natural Disasters in developing countries, Daya Publishers Delhi, 2006.



Reference Books:

1. <http://ndma.gov.in> (Home page of National Disaster Management Authority)
2. <http://www.ndmindia.nic.in/> (National Disaster Management in India)
3. Singh B.K., 2008, Handbook of Disaster Management: Techniques & Guidelines, Rajat Publication.
4. National Disaster Management Policy, 2009, GOI.
5. Inter Agency Standing Committee (IASC) (Feb. 2007), IASC Guidelines on Mental Health and Psychosocial Support in Emergency Setting, Geneva: IASC

