



RBU

RAMDEOBABA UNIVERSITY, NAGPUR

Formerly Shri Ramdeobaba College of Engineering & Management (RCOEM) Est. 1984

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**RAMDEOBABA UNIVERSITY
NAGPUR-440013**

School of Engineering Sciences

PROGRAMME SCHEME & SYLLABI

2025 –2026 I Year

2026-2027 II Year

B.Tech. (CIVIL ENGINEERING)

Ramdeobaba University, Nagpur.
Department of Civil Engineering
Teaching and Evaluation Scheme B.Tech (Civil Engineering) NEP-2020 based
To be implemented from Session: 2025-26

Semester – I

Course Code	Category	Name of Course	Lecture (Hours)	Practical (Hours)	Credits	CA	ESE/Internal Evaluation	Total	ESE Duration
25HS01TP0101	BSC-T&P	Engineering Chemistry for Civil Engineers	3	2	4	100	50	150	3
25HS03TH0101	BSC-T	Calculus, Probability and Statistics	3	0	3	50	50	100	3
25ES01TH0101	ESC-T	Engineering Mechanics	3	0	3	50	50	100	3
25ES01TP0102	ESC-T&P	Application of python in Civil Engineering	2	2	3	100	50	150	2
25ES01TH0103	ESC-T	Building Materials & Components	1	0	1	50	-	50	-
25ES01PR0104	VSEC-P	Engineering Drawing and Drafting (AutoCAD)	0	4	2	50	-	50	-
25HS02TP0101	AEC-T&P	English for Professional Communication	2	2	3	100	50	150	2
	CC-P	*Liberal/Performing Art	0	2	1	50	-	50	-
25HS02TH0103-2	VEC	Foundational Course in Universal Human Values	1	0	1	50	-	50	-
			15	12	21	600	250	850	13

*List of Liberal/Performing Art courses are enclosed

Ramdeobaba University, Nagpur.
Department of Civil Engineering
Teaching and Evaluation Scheme B.Tech (Civil Engineering) NEP-2020 based
To be implemented from Session: 2025-26
Syllabus and Scheme for Liberal/Performing Arts Basket

Sr. no.	Course Code	Course Title	Lecture	Practical	Credits	Continuous Evaluation	End Sem Exam/ Internal Evaluation	Total	ESE Duration
1	25HS02PR0102-2	Fundamentals of Indian Classical Dance: Bharatnatayam	0	2	1	25	25	50	N/A
2	25HS02PR0102-3	Fundamentals of Indian Classical Dance: Kathak	0	2	1	25	25	50	N/A
3	25HS02PR0102-4	Introduction to Digital Photography	0	2	1	25	25	50	N/A
4	25HS02PR0102-5	Introduction to Basic Japanese Language	0	2	1	25	25	50	N/A
5	25HS02PR0102-6	Art of Theatre	0	2	1	25	25	50	N/A
6	25HS02PR0102-7	Introduction to French Language	0	2	1	25	25	50	N/A
7	25HS02PR0102-8	Introduction to Spanish Language	0	2	1	25	25	50	N/A
8	25HS02PR0102-9	Art of Painting	0	2	1	25	25	50	N/A
9	25HS02PR0102-10	Art of Drawing	0	2	1	25	25	50	N/A
10	25HS02PR0102-11	Nature Camp	0	2	1	25	25	50	N/A
11	25HS02PR0102-12	Developing Self-awareness	0	2	1	25	25	50	N/A
12	25HS02PR0102-13	Art of Poetry	0	2	1	25	25	50	N/A
13	25HS02PR0102-14	Creative and Content Writing	0	2	1	25	25	50	N/A

14	25HS02PR0102-15	Science of life through Bhagwad Gita	0	2	1	25	25	50	N/A
15	25HS02PR0102-16	Sanskrit Sambhashan-Spoken Sanskrit	0	2	1	25	25	50	N/A
16	25HS02PR0102-17	Kirtan Kala	0	2	1	25	25	50	N/A
17	25HS02PR0102-18	Introduction to German Language and Culture	0	2	1	25	25	50	N/A
18	25HS04PR0102-1	Adventure Sports	0	2	1	25	25	50	N/A
19	25HS04PR0102-2	Introduction to Défense Forces & Obstacle Training	0	2	1	25	25	50	N/A
20	25HS04PR0102-3	First Aid & Disaster Management	0	2	1	25	25	50	N/A
21	25HS04PR0102-4	Basic Nutritional Course	0	2	1	25	25	50	N/A
22	25HS04PR0102-5	Stress Management Through Yoga & Meditation	0	2	1	25	25	50	N/A

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Semester-II

Course Code	Category	Name of Course	Lecture (Hours)	Practical (Hours)	Credits	CA	ESE/Internal Evaluation	Total	ESE Duration
25HS05TP0201	BSC-T&P	Physics for Civil Engineering	3	2	4	100	50	150	3
25HS03TH0211	BSC-T	Linear Algebra and Multivariate Calculus	3	0	3	50	50	100	3
25ES01TP0201	ESC-T&P	Basics of Geotechnical Engineering	3	2	4	100	50	150	3
25ES01TP0202	PCC-T&P	Solid Mechanics	3	2	4	100	50	150	3
25ES01TH0203	VSEC-T	Building Services	3	0	3	50	50	100	3
25HS02TH0205	IKS-T	Foundational literature for Indian civilization	2	0	2	50	50	100	2
25HS04PR0201	CC-P	Health-Fitness Wellbeing (HFW)	0	2	1	50	-	50	-
			17	08	21	500	300	800	17

Exit Option

Option 1	Infrastructure/Real Estate/Industry Internship (1 Month)	0	0	8	Industry Internship completion certificate along with report
Option 2	Mini Project with report(1 Month)	0	0	8	Mini project report to be assessed by supervisor

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Semester-III

Course Code	Category	Name of Course	Lecture	Practical	Credits	CA	ESE	TOTAL	ESE Duration
25ES01TP0301	PCC-T&P	Fluid Mechanics	3	2	4	100	50	150	3
25ES01TP0302	PCC-T&P	Concrete Technology	3	2	4	100	50	150	3
25ES01TP0303	PCC-T&P	Structural Analysis	3	2	4	100	50	150	3
25ES01TH0304	VEC-T	Technical Report Writing	1	0	1	50	-	50	-
25ES01TH0305	MDM-T	List attached	3	0	3	50	50	100	3
25ESOEC01TH0308	OE-T	Open Elective - I	2	0	2	50	50	100	2
25ES01TH0306	MGMT-T	Finance Management for Civil Engg. projects	2	0	2	50	50	100	2
25ES01PR0307	FP-P	Field visit	0	4	2	50	-	50	-
			17	10	22	550	300	850	16

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Semester-IV

Course Code	Category	Name of Course	Lecture	Practical	Credits	CA	ESE	TOTAL	ESE Duration
25ES01TP0401	PCC-T&P	Water Supply Engineering	3	2	4	100	50	150	3
25ES01TH0402	PCC-T	Reinforced Concrete Structures	3	0	3	100	50	150	3
25ES01TP0403	PCC-T&P	Basics of Surveying	3	2	4	100	50	150	3
25ES01TH0404	MDM-T	List attached	3	0	3	50	50	100	3
	OE-T	Open Elective - II	3	0	3	100	50	150	3
25ES01TH0405	MGMT-T	Construction Engineering & Management	3	0	3	100	50	150	3
25ES01PR0406	VSEC	Computational Tools for Civil Engineering	0	2	1	50	-	50	-
			18	6	21	600	300	900	18

Option 1	Infrastructure/Real Estate/Industry Internship (1 Month)	0	0	8	Industry Internship completion certificate along with report
Option 2	Mini Project with report (1 Month)	0	0	8	Mini project report to be assessed by supervisor

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Department of Civil Engineering
Teaching and Evaluation Scheme B.Tech (Civil Engineering)NEP-2020 based
To be implemented from Session: 2027-28

Semester-V

Course Code	Category	Name of Course	Lecture	Practical	Credits	CA	ESE	TOTAL	ESE Duration
25ES01TP0501	PCC-T&P	Transportation Engineering	3	2	4	100	50	150	3
25ES01TP0502	PCC-T&P	Sanitary Engineering	3	2	4	100	50	150	3
25ES01TH0503	PCC-T	Estimating & Costing	3	0	3	50	50	100	3
25ES01TH0504	PCC-T	Advanced Concrete Structures	3	0	3	50	50	100	3
25ES01TH0505	PEC-T	Program Elective-T	4	0	4	50	50	100	3
25ES01TH0506	MDM-T	List attached	3	0	3	50	50	100	3
	OE-T	Open Elective - III	2	0	2	50	50	100	2
			21	4	23	450	350	800	20

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Semester-VI

Course Code	Category	Name of Course	Lecture	Practical	Credits	CA	ESE	TOTAL	ESE Duration
25ES01TP0601	PCC-T&P	Design of Steel Structures	3	2	4	100	50	150	3
25ES01TH0602	PCC-T	Foundation Engineering	3	0	3	50	50	100	3
25ES01TP0603	PCC-T&P	Flow through pipes & channels	2	2	3	100	50	150	3
25ES01TP0604	PEC-T&P	Program Elective - II	3	2	4	100	50	150	3
25ES01TH0605	PEC-T	Program Elective - III	3	0	3	50	50	100	3
25ES01TH0606	MDM-T	List Attached	3	0	3	50	50	100	3
25ES01PR0607	VSEC-P	Quality control in construction processes	0	2	1	50	-	50	-
25ES01PR0608	CCA-P	Simulation in Civil Engineering	0	2	1	50	-	50	-
			17	10	22	550	300	850	18

Exit Option

Option 1	Infrastructure/Real Estate/Industry Internship (1 Month)	0	0	8	Industry Internship completion certificate along with report
Option	Minor Project with report	0	0	8	Mini project report to be assessed by

2	(1 Month)				supervisor
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Semester-VII

Course Code	Category	Name of Course	Lecture	Practical	Credits	CA	ESE	TOTAL	ESE Duration
25ES01TP0701	PEC-T&P	Program Elective - IV	3	2	4	100	50	150	3
25ES01TH0702	PEC-T	Program Elective - V	4	0	4	50	50	100	3
25ES01TH0703	PEC-T	Program Elective - VI	3	0	3	50	50	100	3
25ES01TH0704	PCC-T	Hydrology and Water Resources Engineering	3	0	3	50	50	100	3
25ES01PR0705	Project-P	Minor Project	0	8	4	100	100	200	
25ES01TH0706	CCA	Participative Learning	1	0	1				
25ES01TH0707	CCA	Property Documentation for Civil Engineers	1	0	1	50	-	50	
			15	10	20	400	300	700	12

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Semester-VIII

Course Code	Category	Name of Course	Lecture		Practical	Cre dits	Theory Course				Practical Course	
							CA	ESE	TOT AL	ESE Duration	CA	ESE
Option 1 - Project												
25ES01PR0801	VEC/ Project-P	Major Project	0		12	6			200		100	100
25ES01TH0802	PCC-T	Contracts Account and Work Management	3		0	3	50	50	100			
25ES01TH0803	PCC-T	Irrigation Engineering	3		0	3	50	50	100			
			6		12	12						
Option 2 – Industry Internship												
25ES01PR0801	II-P	Industry Internship	0		24	12					100	100
Option 3 - Research Internship												
25ES01PR0801	RI-P	Research Internship	0		18	9					100	100
25ES01TH0802	PCC	Research Methodology	3		0	3	50	50				
			3		18	12						
Option 4 - TBI Internship												
25ES01PR0801	TBI	TBI Internship	0		24	12					100	100

Breakup of Semester wise Credits*

Semester	Lecture	Practical	Credits
1	15	12	21
2	17	08	21
3	17	10	22
4	18	6	21
5	21	4	23
6	17	10	22
7	15	10	20
8	6	12	12
Total	126	72	162

***The Course Code & Course name may be changed based on the approval of the Board of Studies experts & committee**

Program Elective courses basket

Semester		Construction Management	Environmental Engineering	Structural Engineering	Geotechnical Engineering	Transportation Engineering	General
V	(PE-I)(T)	Advanced Concrete Technology	Environmental Impact Assessment	Advanced Structural Analysis	Geotechnical Explorations	Railway Engineering	Engineering Geology
VI	(PE-II)(T&P)	Advanced Construction Techniques	Climate Change & Mitigation	Retrofitting & Rehabilitation of Civil Infrastructure	Ground Improvement	Traffic Engineering and Management	Computer Aided Design and Drafting (CADD)
	(PE-III)(T)	Urban Infrastructure	Solid Waste Management	Prestressed Concrete Structures	Advanced Geotechnical Engineering	Pavement Design	Infrastructure Planning and Management
VII	(PE-IV)(T&P)	Advance construction Materials	Industrial Waste Water Treatment	Earthquake Resistant Design of RCC Structures	Reinforced Earth	Urban Transportation Planning	BIM
	(PE-V)(T)	Contracts Management	Air Pollution & Control	Bridge Engineering	Special Geotechnical Constructions	Airport Planning and Design	Numerical Method for Civil Engineers
	(PE-VI)(T)	Digital Technologies for Civil Engineers	Environmental System Modeling	Advanced Steel Structures	Earth and Rockfill Dams	Highway Construction And Management	Remote sensing and GIS

Sr. No	Semester	Open Electives
1	III	Formwork for Concreting Specialization 1) Formwork Systems (10 Hours) 2) Design of Formwork System (11 Hours) 3) Construction Aspects of Formwork (10 Hours)
2	IV	1) Introduction to Programming with MATLAB 2) Linear Regression and Modeling
3	V	1) Construction Cost Estimating and Cost Control 2) Construction of Metro Rail Systems 3) Planning of Metro Rail Systems
3	VI	1) Sustainable Construction in a Circular Economy 2) Precast & Advanced Pile Foundation 3) Transportation, Sustainable Buildings, Green Construction 4) Urban Nature: Connecting Cities, Sustainability and Innovation
4	VII	1) Foundation Systems, Monitoring and Erection Methods 18 hours 2) Concrete Multi Storey Building – System Design Specialization 2a) Design Basics of RCC Buildings Course 1 10hours 2b) Structural scheme setting and ETABS Analysis of RCC Building Course 2 12 hours 2c) Design and Detailing of RCC elements Course 3 10 hours Total Hours (50 hours)

Participative Learning 1 Credit (12-14 Hours minimum)

Short Course, Workshop, Hands-on-training, Training Program, MOOC Courses of 1 Credit (contents are beyond regular curriculum), Participation in competitions, Laboratory based Experimental Learning, Modelling of prototype, Filing/Grant of Design Patent/Copyright, any other work relevant to program certified by concerned faculty.

MDM (Multi Disciplinary Minor) courses

1) **Understanding Civil Infrastructure:** This course focuses on explaining the fundamental elements of infrastructure such as roads, bridges, buildings, dams, and utilities, and their roles in society.

2) **Construction materials and technology:** Understanding construction materials and technology for civil engineers to design, construct, and maintain infrastructure that meets quality, safety, and sustainability requirements.

3) **Green Building and Vastu application in Civil Engineering:** Vastu principles into the design, construction, and operation of buildings and infrastructure projects and green building principles entails using environmentally friendly materials, optimizing energy efficiency, implementing renewable energy systems, and managing water resources efficiently.

4) **Construction Engineering & Processes:** Construction Engineering & Processes involves efficient project planning, sanctioning execution, and management to deliver structures that meet quality standards within budget and time constraints.

MDM (Multi-Disciplinary Minor) courses Scheme

Track: Civil Engineering for Sustainable Development

Sr. No.	Sem	Course Code	Course Title	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)
				L	T	P		Continuous	End Sem Exam	Total	
1	III	24ES01TH0305	Fundamentals of Civil Infrastructure and Construction	3	0	0	3	50	50	100	3
2	IV	24ES01TH0404	Construction Materials and Technology	3	0	0	3	50	50	100	3
3	V	24ES01TH0506	Green Building Construction and Environmental Systems	3	0	0	3	50	50	100	3
4	VI	24ES01TH0607	Building Construction Methods and Management	3	0	0	3	50	50	100	3
			TOTAL	12	0	0	12				

**NPTEL courses provision for Fast Learners
(any 5 courses to be completed, to earn 15 credits)**

Discipline	Course Name	SME Name	Institute	Co-ordinating Institute
Civil Engineering	Air Pollution and Control	Prof. Bhola Ram Gurjar	IITR	IITR
Civil Engineering	Engineering Hydrology	Prof. Sreeja Pekkatt	IITG	IITG
Civil Engineering	Bridge Engineering	By Prof. Piyali Sengupta	IIT (ISM) Dhanbad	(ISM) Dhanbad
Civil Engineering	Geotechnical Engineering II Foundation Engineering	Prof. Dilip Kumar Baidya	IITKGP	IITKGP
Civil Engineering	Urban Transportation Systems Planning	Prof. Bhargab Maitra	IITKGP	IITKGP
Civil Engineering	Analysis and Design of Bituminous Pavements	M. R. Nivitha (MRN) Neethu Roy (NR) A. Padmarekha (APR) J. Murali Krishnan (JMK)	IITM	IITM
Civil Engineering	Energy Efficiency, Acoustics and Daylighting in Building	Prof. B. Bhattacharjee	IITD	IITD
Earth Sciences	Remote Sensing and GIS for rural development	Prof. Pennan Chinnasamy	IITB	IITB
Architecture, Civil and Design	Strategies for Sustainable Design	Prof. Shiva Ji	IIT Hyderabad	IITM
Multidisciplinary	Multi-Criteria Decision Making and Applications	Prof. Raghu Nandan Sengupta	IITK	IITK

Ramdeobaba University, Nagpur

Department of Civil Engineering
B.Tech (Civil Engineering) NEP-2020 based
To be implemented from Session: 2024-25
Honors Teaching and Evaluation Scheme

Course Code	Name of Course	Lecture	Practical	Credits	CA	ESE	TOTAL	ESE Duration
25ES01HT0301	Construction Technology	3	0	3	50	50	100	3
25ES01HT0401	Fire fighting system	3	0	3	50	50	100	3
25ES01HT0501	Geotechnical Design	3	0	3	50	50	100	3
25ES01HP0501	Geotechnical Design Lab	0	2	1	25	25	50	-
25ES01HT0601	Foundation Design	3	0	3	50	50	100	3
25ES01HP0601	Foundation Design Lab	0	2	1	25	25	50	-
25ES01HP0701	Project	0	8	4	0	0	0	0
	Total	12	10	18	250	250	500	12

Minor Teaching and Evaluation Scheme

Course Code	Name of Course	Lecture	Practical	Credits				
					CA	ESE	TOTAL	ESE Duration
25ES01MT0301	Sustainable Engineering	3	0	3	50	50	100	3
25ES01MT0401	Disaster Management	3	0	3	50	50	100	3
25ES01MT0501	Engineering Ethics and Professional Practice	3	0	3	50	50	100	3
25ES01MP0501	Engineering Ethics and Professional Practice Lab	0	2	1	25	25	50	
25ES01MT0601	Basics of Civil Engineering	3	0	3	50	50	100	3
25ES01MP0601	Basics of Civil Engineering Lab	0	2	1	25	25	50	
25ES01MT0701	Project	0	8	4	0	0	0	0
	Total	12	12	18	250	250	500	

"Titles of Certificates or Degrees upon Completion of Each Year in Bachelor of Technology (B.Tech) Civil Engineering"

- 1) After 1st year exit :Certificate course in Civil Engineering
- 2) After 2nd year exit : Advanced Certificate course in Civil Engineering
- 3) After 3rd year exit : Diploma in Civil Engineering
- 4) After 4th year exit :B.Tech in Civil Engineering

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech I

Course Code :25HS01TP0101

Course Name: Engineering Chemistry for Civil Engineers

L :3 Hrs., T-0, P :2 Hrs., Per Week Credits: 4

Course outcomes:

After completing the course, the students will be able to

CO1: Apply the knowledge of chemistry in water and wastewater technology and suggest the method of its treatment.

CO2: Develop first-hand knowledge of the cement production process and properties of cements and their types as modern material for constructions.

CO3: Understand of effect of various additives and admixtures on the behavior aspect of concrete.

CO4: Explain the principles of nanomaterials and its possible applications in various fields including the construction industry as well as uses of steel and its deterioration due to atmospheric reactions.

Unit 1: Water Technology

(6 Hrs)

Introduction, types of water and impurities, Hardness of water, Alkalinity of Water, Conductivity, Characteristics of water, Indian Standard Codes for Potable, Irrigation, Industrial water, Process for Potable water, Desalination of seawater by reverse osmosis, Softening of Water for Boiler Feed Water using lime-soda and resins,

Unit 2: Waste water technology

(4 Hrs)

Sources, characteristics and criterion for disposal of treated water, Primary, secondary and tertiary water treatment technique.

Unit 3: Portland Cement

(6 Hrs)

General; Cement and lime; Chemical composition of ordinary Portland cement; Functions of cement ingredients; Water requirements for hydration; Types of cement and its properties; Setting and Hardening of Cement, Manufacturing of Cement, Dry Process and Wet Process, Grades of cement as per IS specifications, Various Types of Cement, Geopolymer bricks, etc.

Unit 4: Additives and Admixtures for Concrete and Construction materials

(6 Hrs)

Additives and admixtures, types, necessity and benefit, Chemistry of different additives and admixtures

Mineral admixture - Fly ash, silica fume, blast furnace slag, and other pozzolanic materials.

Chemical admixtures - Accelerator, retarder, water reducing elements, plasticizer and super-plasticizer, other admixtures, their functions and dosage

Unit 5: Engineering Materials and Corrosion Science

(8 Hrs)

Steels for structural designs: Metallurgy of Steels, Mechanical properties, Manufacturing of steel.

Nanomaterials: applications of nanomaterial in Construction Industries.

Corrosion: Cause of corrosion, types of Corrosion, factors affecting corrosion, Prevention of Corrosion, Effect of corrosion of steel on concrete.

Textbooks:

1. *Text Book of Engineering Chemistry*, S. S. Dara, S. Chand and Company Ltd., New Delhi.
2. *Textbook of Engineering Chemistry*, P. C. Jain and Monica Jain, Dhanpat Rai and Sons, New Delhi.
3. *Text Book of Environmental Chemistry and Pollution Control*, S. S. Dara; S. Chand and Company Ltd., New Delhi.
4. *Textbook of Engineering Chemistry*, S. N. Narkhede, R. T. Jadhav, A. B. Bhake, A. U. Zadgaonkar, Das GanuPrakashan, Nagpur.
5. *Applied Chemistry*, A. V. Bharati and Walekar, Tech Max Publications, Pune.
6. Shikha Agrawal, *Engineering Chemistry : Fundamentals and Applications*, Cambridge University Press.
7. Dr. Rajshree Khare, *A Textbook of Engineering Chemistry(AICTE)*, S.K. Kataria& Sons

Reference Books

1. *Engineering Chemistry by Gyngeell*, McGraw Hill Publishing Company, New Delhi.
2. *Engineering Chemistry (Vol I)*, Rajaram and Curiacose, Tata McGraw Hill Publishing Company, New Delhi.
3. *Engineering Chemistry (Vol II)*, Rajaram and Curiacose, Tata McGraw Hill Publishing Company, New Delhi.
4. *Engineering Chemistry*, Saraswat and Thakur, Vikas Publication, New Delhi.
5. *Engineering Chemistry*, B. S. Sivasankar, Tata Mcgraw Hill Publishing Company, New Delhi.
6. *Engineering Chemistry*, O. G. Palanna, Tata Mcgraw Hill Publishing Company, New Delhi.
7. *Engineering Chemistry*, R. Shivakumar, Tata Mcgraw Hill Publishing Company, New Delhi.
8. *Chemistry of Cement*, J. D. Lee, McGraw Hill Publishing Company, New Delhi.
9. *Advanced steel design of structures*, Srinivasan Chandrasekaran. 2019. CRC Press, Florida.
8. *The Chemistry of Nanomaterials: Synthesis, Properties and Applications*, C. N. R. Rao, A. Muller and A. K. Cheetham, Wiley-VCH, 2004.

Course Name: Engineering Chemistry for Civil Engineers Lab

Course outcomes:

After completing the course, the students will be able to

CO1: Identify the various impurities present in water and wastewater samples and quantitatively estimate their amount.

CO2: Apply the knowledge of chemical principles for safe handling and uses of hazardous chemicals, and liquids fuels on the basis of their physical and chemical properties.

CO3: Demonstrate various analytical/spectroscopic tools for qualitative and quantitative analysis.

List of Experiments: (Any eight experiments)

1. Handling of various glassware, apparatus and Materials safety data sheets (MSDS) of hazardous materials.
2. To determine the types and extent of alkalinity in water/wastewater samples.
3. To estimate the water sample's temporary, permanent, and total hardness.
4. Estimation of copper in brass (Cu metal alloy) sample by using iodometry principles.
5. Determination of viscosities of lubricating oil using Redwood-Viscometer.
6. Determination of pH, turbidity and suspended solids in water/wastewater samples.
7. Estimation of Calcium in cement.
8. Quantitative analysis using Lambert-Beer's law using electronic spectroscopy.
9. Estimation of Ferrous and Ferric ions by Redox titration method.
10. Synthesis of Nano-material and determination of lambda max.
11. Determination of the Acid value of an oil.
12. Determination of the Saponification value of an oil.

Text Books

- 1) *A Textbook on Experiments and Calculations in Engineering Chemistry* by S. S. Dara, S. Chand Publications.
- 2) *Advanced Practical Physical Chemistry* by J. B. Yadav, Krishna's Prakashan Media(P)Limited.

Reference Books:

- 3) *Collection of Interesting General Chemistry Experiments*, A by A. J. Elias, Universities Press Publications.
- 4) *College Practical Chemistry* by V. K. Ahluwalia, S. Dhingra and A. Gulati, Universities Press Publications.
- 5) *Standard Methods for the Examination of Water and Wastewater*, American Public Health Association, American Water works Association, Water Environment Federation.

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech I

Course Code : 25HS03TH0101

Course Name: Calculus, Probability, and Statistics

L :3 Hrs., T:, P : 0 Hrs., Per Week

Credits: 3

Course Objective:

The objective of this course is to familiarize the prospective engineers with techniques in Ordinary differential equation, statistics, probability and differential calculus. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

Course Outcomes

On successful completion of the course, the students will able to:

1. Recognize first order ordinary differential equations that can be solved by each of the four methods – Linear DE, exact DE, reducible to linear DE and reducible to exact differential equations and use the appropriate method to solve them.
2. Solve higher order ordinary differential equations with constant and variable coefficients.
3. Find best fit curve by method of least square method and calculate correlation, regressions.
4. Internalize multivariable calculus and apply it find Jacobean, maxima and minima of function
5. Recognize and understand discrete, continuous probability distributions and apply Binomial distribution, Poisson distribution and Normal distribution to appropriate problems.

Syllabus

Module 1: *First order ordinary differential equations* (7 hours)

Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree, equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type, Applications of First order Differential Equations.

Module 2: *Ordinary differential equations of higher orders* (8 hours)

Second order linear differential equations with constant and variable coefficients, method of variation of parameters, Cauchy-Euler equation. Applications of Higher order Differential Equations.

Module 3: *Statistics*: (7 hours)

Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves, correlation and regression – Rank correlation, Multiple regression and correlation and its application in Engineering.

Module 4: *Differential Calculus* (10 hours)

Taylor's and Maclaurin's series expansions, radius of curvature (Cartesian form), Limit and continuity of functions of several variables and their partial derivatives, Euler's Theorem, chain rule, total derivative, Jacobians, Maxima, minima and saddle points; Method of Lagrange multipliers.

Module 5: Probability: (8 hours)

Probability spaces, conditional probability, independence, Bay's Theorem, Discrete random variables, Binomial distribution, Poisson distribution, Normal distribution. Relation between binomial, Poisson and Normal distributions.

Textbooks/References:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edition, Wiley India, 2009.
3. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
4. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
5. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
6. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
7. Theory and Problems of probability and statistics : 2nd ed : J. R. Spiegel, *Schaum series*
8. A text book of Applied Mathematics Volume I & II, by P. N. Wartikar and J. N. Wartikar, Pune Vidhyarthi Griha Prakashan, Pune-411030 (India).
9. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.

Ramdeobaba University, Nagpur
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Syllabus for Semester B.Tech I

Course Code : 25ES01TH0101

Course Name: Engineering Mechanics

L : 3 Hrs., T:, P : 0 Hrs., Per Week

Credits: 3

Course Outcomes:

1. Apply the knowledge of force system and movement to determine resultants of various force system
2. Apply the knowledge of equilibrium of force system and friction to analyzed simple problems
3. Able to locate Centroid and evaluated Moment of Inertia for standard shape and composites areas.
4. Analyze simple determinate trusses for its forces in members.
5. Analyze the connected the systems of particles using knowledge of dynamics equilibrium

UNIT-I

Basics Concepts and equilibrium of force systems.

Introduction to Engineering Mechanics: Force Systems, Basic concepts, Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant Moment of Forces and its Applications; Couples and Resultant of Force System. **(6)**

Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems. Simple beams and support reactions. Diagram of Statically Determinate Beams. **(6)**

Friction: (4)

Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, wedge friction.

UNIT-II

Centroid and Moment of Inertia: (8)

Centroid and Centre of Gravity, Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications; Area moment of inertia Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections.

UNIT-III

Analysis of structures- Trusses (6)

Analysis of simple trusses by method of joints & method of sections, Zero force members.

UNIT-IV

Kinetics of Particles (10)

Kinetics of particles D'Alemberts principle and its application in connected system of particles, Impulse Momentum, Collision of bodies, Work Energy Method.

Textbooks

1. *Engineering Mechanics: Statics and Dynamics- Hibbler. R.C., Prentice Hall*
2. *Fundamentals of Engineering Mechanics: A.K.Sharma, Sai Publication*

Reference books

1. *Irving H. Shames (2006), Engineering Mechanics, 4th Edition, Prentice Hall*
2. *Vector Mechanics for Engineers: Statics and Dynamics – Johnston. R.E., Beer. F., Eisenberg. E. R, & Mazurek. D., McGraw Hill*
3. *R. C. Hibbler (2006), Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press.*
4. *Shanes and Rao (2006), Engineering Mechanics, Pearson Education,*
5. *Hibler and Gupta (2010), Engineering Mechanics (Statics, Dynamics) by Pearson Education.*

Ramdeobaba University, Nagpur
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Syllabus for Semester B.Tech I

Course Code : 25ES01TP0102

Course Name: Application of Python in Civil Engineering

L : 2 Hrs., P : 2 Hrs., Per Week Credits: 3

Course Outcomes:

1. The student should be able to apply the basic python language constructs to solve problems
2. The student should be able to apply decision making concept in programming to get diversified output.
3. The student should be able to implement looping techniques within the program.
4. The student should be able to organize multi-dimensional data and efficiently manipulate it.
5. The student should be able to design and implement functions to promote code reusability.
6. The student should be able to understand the concept of graphical output.

Course Content

Unit 1: Fundamentals

Constants & Variables, input and output functions, mathematical operators, sample programs, importing inbuilt libraries.

Unit 2: Decision Making

Conditional operators, logical operators, if, if-else, if-not, if-elif-else, try-except, nested if else,

Unit 3: Looping

For loop, in-range, while loop.

Unit 4: Arrays

Types of arrays, Defining 1D and 2D arrays, numpy, using numpy for arrays operations such as arranges, linspace, mathematical operations, etc, file handling.

Unit 5: Functions

Defining functions, function calling.

Unit 6: Introduction to Graphics

Introduction to matplotlib.pyplot, plotting text, values, lines, markers, axes, circles, polygons, arrows.

Text Books

1. Python Programming Using Problem Solving Approach: Reema Thareja, Oxford University, Press; First edition.
2. Learning Python: Powerful object-oriented programming, Mark Lutz, O'REILLY publications 5th addition.
3. Introduction to Computing & Problem Solving with Python Jeeva Jose and P Sojan Lal Ascher.
4. Problem Solving with Algorithms and Data Structures using Python by Brad Miller and David Ranum, 2nd addition.

Reference Books

1. Allen Downey, Jeffrey Elkner, Chris Meyers, Learning with Python, Dreamtech Press
2. David M. Baezly "Python Cookbook" O'Reilly Media; Third edition, 2013.

Google Books

1. Python in a Nutshell, Alex Martelli, O'Reilly, 2nd Edition.

Course Name: Computer Programming for Civil Engineers lab

Course Outcomes:

7. The student should be able to apply the basic python language constructs to solve problems
8. The student should be able to apply decision making concept in programming to get diversified output.
9. The student should be able to implement looping techniques within the program.
10. The student should be able to organize multi-dimensional data and efficiently manipulate it.
11. The student should be able to design and implement functions to promote code reusability.
12. The student should be able to understand the concept of graphical output.

Course Content

Unit 1: Fundamentals

Constants & Variables, input and output functions, mathematical operators, sample programs, importing inbuilt libraries.

Unit 2: Decision Making

Conditional operators, logical operators, if, if-else, if-not, if-elif-else, try-except, nested if else,

Unit 3: Looping

For loop, in-range, while loop.

Unit 4: Arrays

Types of arrays, Defining 1D and 2D arrays, numpy, using numpy for arrays operations such as arranges, linspace, mathematical operations, etc, file handling.

Unit 5: Functions

Defining functions, function calling.

Unit 6: Introduction to Graphics

Introduction to matplotlib.pyplot, plotting text, values, lines, markers, axes, circles, polygons, arrows.

Text Books

5. Python Programming Using Problem Solving Approach: Reema Thareja, Oxford University, Press; First edition.

6. Learning Python: Powerful object-oriented programming, Mark Lutz, O'REILLY publications 5th addition.
7. Introduction to Computing & Problem Solving with Python Jeeva Jose and P Sojan Lal Ascher.
8. Problem Solving with Algorithms and Data Structures using Python by Brad Miller and David Ranum, 2nd addition.

Reference Books

3. Allen Downey, Jeffrey Elkner, Chris Meyers, Learning with Python, Dreamtech Press
4. David M. Baezly "Python Cookbook" O'Reilly Media; Third edition, 2013.

Google Books

2. Python in a Nutshell, Alex Martelli, O'Reilly, 2nd Edition.

Ramdeobaba University, Nagpur
Syllabus for Semester B.Tech I
Department of Civil Engineering

Course Code :25ES01TH0103

Course Name: Building Materials & Components

L :1 Hrs., P : 0 Hrs., Per Week

Credits: 1

Course Outcomes:

After completion of course students will be able to:

1. Understand the various Civil Engineering Materials
2. Understand the role of different agencies in infrastructure development
3. Understand the functions of structural Element of building.
4. Understand the various masonry units and its suitability
5. Understand the various building Components and their utility.

Unit I

Introduction to Infrastructure: Classification of infrastructure. Types of building as per National Building Code (NBC). Role of Government, Municipality, Architect, Civil Engineers, Contractors etc. in infrastructure development.

Building elements: Foundations, Sub Structure and Super Structural element such as Plinth, Column, Beam, Lintel, Chajja

Stairs: functions and terminologies used suitability and types of stairs.

Roof: Types and functions of Roof

Flooring: Types and utility of Flooring

Unit II

Construction materials

Introduction to Construction materials like Tiles, Timber, plywood, facade, paints, and their Application.

Unit III

Non-structural elements Types of Walls. Masonry construction uses various building units such as Mud bricks, Stone, Red bricks, Fly bricks, AAC, and hollow concrete blocks with suitability and constraints.

Unit IV

Openings in a Building

Doors: Purpose, location, definition of technical terms, Size of doors, and various materials of construction and types.

Windows and ventilators: Necessity and types of windows.

Text Books:

1. Building Construction: B. C. Punmia, Laxmi publication Pvt. Ltd. New Delhi and distributor, 10th edition 1984 & later 2008
2. Building construction by Sushil Kumar, 16th Edition, Standard Publishers Distributors, 2006.
3. S. P. Bindra, S. P. Arora, Building Construction, Dhanpat Rai Publication, New delhi, Fourth Edition, 1988.
4. Building Construction Material by S.K. Duggal, 4th edition, New Age International, Reprint Nov. 2014.

Reference Books:

1. National Building Code of India
2. Building Construction and Materials by Singh Gurcharan, Standard Publisher and Distributor, Standard Publishers Distributors, 2003
3. Alternative building Materials and Technologies: K. S. Jagdish & B. V. Venkatarama Reddy, New age international Publishers, 2007.

Ramdeobaba University, Nagpur
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Syllabus for Semester B.Tech I

Course Code : 25ES01PR0104

Course Name: Engineering Drawing and Drafting (AutoCAD)

L : Hrs., P : 4 Hrs., Per Week Credits: 2

COURSE OUTCOMES:

After completion of course students will be able to:

1. Implement principles of planning of buildings
2. Design and draw various constructional drawing of the buildings.
3. Create, analyze, and produce 2D drawings.
4. Draw the plan, section and elevation of a building

Principles of Planning:

Concept of built environment and Principles of planning, Basic terminologies in submission drawing as per building bylaws.

Planning of residential building, Preparation of constructional details and drawings-plan, elevation, section, site plan, foundation plan, terrace plan.

AutoCad

Introduction of Auto CAD - Limits, units, Grid, Snap, Osnap. Mtext line Standard tool bars: Match properties, pan, zoom. Draw: Line, Pline, mline, Rectangle, polygard, Arc, Circle, Donut, Spline, Ellipse, Boundary, Hatch, Text, mtext. Modify/Edit: Erase, copy, Mirror, offset, array, move, rotate, scale, stretch, and lengthen, trim, Extend, Break, Chamfer, fillet, Explode. Dimensioning: linear, aligned, Baseline, Continue, Radius, diameter, Angular, Style. Layer: New layer, current layer, freeze, lock, colour, line type, line weight, delete.

Drawings in AutoCAD

1. Single line plan of building components
2. Development of double plan for residential building
3. Plans, elevations, and section al elevation of residential building
4. Preparation of submission and working Drawing
5. Typical detailing of beams, columns, and foundations.

Text Books

1. *M.G.Shah, Kale, Patki, Building Drawing with an integrated approach to built environment Tata McGraw Hill, 2002*
2. *Y.S.Sane, Building Drawing, Allied Book Stall & Engineering Book Publishing Co, 4th edition Green Home, BDS Publisher*
3. *Patil S. M., Building Services, 2008*

Reference Books

1. *National Building Code of India, 2005*
2. *AutoCAD Software Latest Version.*

Ramdeobaba University, Nagpur
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Syllabus for Semester B.Tech I

Course Code : 25HS02TP0101

Course Name: English for Professional Communication

L : 2 Hrs., P :2 Hrs., Per Week Credits: 3

Course Objectives

The main objective of this course is to enhance the employability skills of students as well as prepare them for effective work place communication.

Course outcomes:

On successful completion of the course the students will be able to achieve the following:

CO1. Demonstrate effective use of word power in written as well as oral communication.

CO2. Understand the techniques of listening and apply the techniques of reading comprehension

CO3. Apply the principles of functional grammar in everyday as well as professional communication.

CO4. Effectively implement the comprehensive principles of written communication by applying various writing styles.

CO5. Understand strategies of precise and accurate professional communication

Unit-1: Vocabulary Building

1.1 Importance of using appropriate vocabulary

1.2 Techniques of vocabulary development

1.3 Commonly used power verbs, power adjectives and power adverbs.

1.4 Synonyms, antonyms, phrases & idioms, one-word substitutions and standard abbreviations

Unit -2: Listening and Reading Comprehension

2.1 Listening Comprehension: active listening, reasons for poor listening, traits of a good listener, and barriers to effective listening

2.2 Reading Comprehension: types and strategies.

Unit -3: Functional Grammar and Usage

3.1 Identifying Common Errors in use of: articles, prepositions, modifiers, modal auxiliaries, redundancies, and clichés

3.2 Tenses

3.3 Subject-verb agreement, noun-pronoun agreement

3.4 Voice

Unit-4: Writing Skills

4.1 Sentence Structures

4.2 Sentence Types

4.3 Paragraph Writing: Principles, Techniques, and Styles

Unit-5: Professional Communication

5.1 Art of Condensation: Précis and Note Making

5.2 Correspondence writing techniques and etiquettes – academic writing

5.3 Group discussion, Résumé writing

Books

1. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
2. Practical English Usage. Michael Swan. OUP. 1995.
3. Remedial English Grammar. F.T. Wood. Macmillan.2007
4. On Writing Well. William Zinsser. Harper Resource Book. 2001
5. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.

Course Name: English for Professional Communication Lab

Course Objective

To enhance competency of communication in English among learners

Course Outcomes

On completion of English Lab course, students will be able to achieve the following:

CO1: Apply effective speaking skills

CO2: Apply effective listening and reading skills

CO3: Demonstrate the techniques of effective public speaking and presentation skills

CO4: Evaluate and apply the effective strategies for Group Discussions

Syllabus

List of practicals

Computer Assisted + Activity Based Language Learning

Practical 1: Everyday Situations: Conversations and Dialogues – Speaking Skills

Practical 2: Pronunciation, Intonation, Stress, and Rhythm

Practical 3: Everyday Situations: Conversations and Dialogues – Listening Skills

Practical 4: Reading Skills

Activity Based Language Learning

Practical 5: Public Speaking

Practical 6: Presentation Skills: Orientation

Practical 7: Presentation Skills: Mock

Practical 8: Group Discussions: Practice

Practical 9: Group Discussions: Mock

Reference Books

1. Communication Skills. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
2. Practical English Usage. Michael Swan. OUP. 1995.

Ramdeobaba University, Nagpur

Department of Civil Engineering

Syllabus for Semester B.Tech I

Course Code: 25HS02PR0105-01

1 Course Name: Fundamentals of Indian classical dance: Bharatnatyam

L :0 Hrs., 0: 0 hr P : 2 Hrs., Per Week Credits: 1

Course objective

The course aims to introduce the students to Bharatnatyam, an important element of Indian traditional knowledge system. The course will not only provide the learning and skill to perform this art but would also enhance many mental and physical aspects of the students such as strength, flexibility, discipline, self-confidence, creativity, focus, coordination, etc.

Course Outcomes

On completion of the course, students will be able to achieve the following:

CO1: Understand the importance of dance and Bharatnataym as an Indian dance form

CO2: Develop skills to perform the dance form at its basic level.

CO3: Evaluate their strengths and interest to take bridge course to give Pratham (1st level formal exam of Bharatnatayam).

Syllabus

Practical -1: Orientation in Bharatnatayam

Practical-2: Tattu Adavu till 8, Naatta Adavu 4 Steps, Pakka Adavu 1 step, Metta Adavu 1 Step, Kuditta Metta Adavu 4 Steps,

Practical -3: Practice sessions

Practical-4: Tatta Kuditta Adavu (Metta), Tatta Kuditta Adavu (Metta) 2 Steps, Tirmanam Adavu 3 Steps, Kattu Adav - 3 Steps, Kattu Adav - 3 Steps

Practical-5: Practice sessions

Practical-6: Tiramanam (front) 3 Steps, Repeat of Tiramanam (Overhead) 3 Steps,

Practical-7: practice sessions

Practical- 8: final practice sessions and performances.

Recommended reading

1. Introduction to Bharata's Natyasastra, Adya Rangacharya, 2011
2. The Natyasastra and the Body in Performance: Essays on the Ancient Text, edited by Sreenath Nair, 2015
3. Bharatanatyam How to ... : A Step-by-step Approach to Learn the Classical Form, Eshwar Jayalakshmi, 2011

Ramdeobaba University, Nagpur

Department of Civil Engineering

Syllabus for Semester B.Tech I

Course Code: 25HS02PR0105-02

Course Name: Fundamentals of Indian Classical Dance:Kathak

L :0 Hrs., 0: 0 hr P : 2 Hrs., Per Week Credits: 1

Course objective

The course aims to introduce the students to Kathak, an important element of Indian traditional knowledge system. The course will not only provide the learning and skill to perform this art but would also enhance many mental and physical aspects of the students such as strength, flexibility, discipline, self-confidence, creativity, focus, coordination, etc.

Course Outcomes

On completion of the course, students will be able to achieve the following:

CO1: Understand the importance of dance and Kathak as an Indian dance form

CO2: Develop skills to perform the dance form at its basic level.

CO3: Evaluate their strengths and interest to take bridge course to give *Prarambhik* (1st level formal exam of Kathak).

Syllabus

Practical -1: Orientation in Kathak. Correct posture of kathak, Basic Movements and exercise Stepping, Chakkar of 5 count (Bhramari),

Practical -2: practice sessions of practical 1

Practical -3: Hastaks, Hastaks and Steppings, Reciting asamyukta Mudra shloka, Hastak and steppings

Practical -4: practice sessions of practical 3

Practical -5: Todas and Asamyukta hasta mudra shlok, Vandana of Shlok, 2 Todas and Vandana, Ghante Ki Tihai,

Practical -6: practice sessions of practical 5

Practical -7: 2 1 Chakkardar Toda and Ginnti Ki Tihai, 2 Todas and 1 Chakkardar Toda, practice sessions

Practical -8: Final performances.

Recommended reading

1. Kathak Volume1 A "Theoretical & Practical Guide" (Kathak Dance Book), Marami Medhi & Debasish Talukdar, 2022, Anshika Publication (13 September 2022)

Ramdeobaba University, Nagpur

Department of Civil Engineering

Syllabus for Semester B.Tech I

Course Code :25HS02PR0105-03

Course Name: Introduction to Digital Photography

L :0 Hrs., 0: 0 hr P : 2 Hrs., Per Week Credits: 1

Course objective

The course aims to develop basic skills of students in digital photography to lay a foundation for them as a hobby and/or a profession.

Course outcome:

At the end of the course the students will be able to achieve the following:

CO1: Develop an understanding of the technical aspects and aesthetics of Photography.

CO2: Apply the rules of digital photography for creating photographs.

CO3: Develop skills to enhance photographs through post processing.

CO4: Create a portfolio of their photographs in selected genre.

Syllabus

Practical 1: **Orientation in digital photography:** Genres, camera handling and settings

Practical 2: **Rules of Composition**

Practical 3: **Rules of Composition:** practice sessions

Practical 4: **Understanding Exposure and Art of Pre-Visualization**

Practical 5: **Rules of Composition and Art of Pre-Visualization:** practice sessions

Practical 6: **Post Processing Photographs and Portfolio creation**

Practical 7: **Post Processing Photographs:** practice sessions

Practical 8: **Portfolio finalization and presentation in selected genre.**

Reference material

1. Scott Kelby (2020) *The Digital Photography Book: The Step-by-Step Secrets for how to Make Your Photos Look Like the Pros*, Rocky Nook, USA
2. Larry Hall (2014) *Digital Photography Guide: From Beginner to Intermediate: A Compilation of Important Information in Digital Photography*, Speedy Publishing LLC, Newark
3. J Miotke (2010) *BetterPhoto Basics: The Absolute Beginner's Guide to Taking Photos Like a Pro*, AMPHOTO Books, Crown Publishing Group, USA

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Syllabus for Semester B.Tech I

Course Code :25HS02PR0105-04

Course Name: Introduction to Basic Japanese Language

L :0 Hrs., 0: 0 hr P : 2 Hrs., Per Week Credits: 1

Course objective

The course aims to develop basic communication skills in Japanese Language and help develop a basic understanding of Japanese culture for effective cross-cultural communication.

Course outcome

After the completion of the course the students will be able to achieve the following:

CO1: Basic understanding about Japan as a country and Japanese culture.

CO2: Ability to use vocabulary required for basic level communication in Japanese language.

CO3: Able to frame simple sentences in Japanese for everyday conversations

Syllabus

Practical-1: Orientation about Japan, its language, and its culture

Practical-2: Communication Skills 1: Vocabulary for basic Japanese language

Practical -3: Practice sessions

Practical-4: Basic day to day greetings in Japanese language and their usage through role-play

Practical-5: Practice sessions

Practical- 6: Communication Skills 2: framing sentences

Practical- 7: Practice sessions

Practical- 8: Introduction of Japanese Culture, Arts, Traditions, Etiquettes and Manners etc.

Recommended reading

1. Marugoto Starter (A1) Rikai - Course Book for Communicative Language Competences, by The Japan

Foundation, Goyal Publishers & Distributors Pvt. Ltd (ISBN: 9788183078047)

2. Japanese Kana Script Practice Book – Vol. 1 Hiragana, by Ameya Patki, Daiichi Japanese Language

Solutions (ISBN: 9788194562900)

Ramdeobaba University, Nagpur

Department of Civil Engineering

Syllabus for Semester B.Tech I

Course Code :25HS02PR0105-05

Course Name: ArtofTheatre

L :0 Hrs., 0: 0 hr P : 2 Hrs., Per Week Credits: 1

Course objectives:

The course aims to develop in the students, an actor's craft through physical and mental training.

Course Outcomes:

On completion of the course, students will be able to achieve the following:

CO1: Understand and synthesize the working of the prominent genres of theatre across the world.

CO2: Apply the skill of voice and speech in theatre and public speaking

CO3: Apply the art of acting and also develop generic skills such as confidence, communication skills, self-responsibility, motivation, commitment, interpersonal skills, problem solving, and self-discipline.

CO4: Apply skills acquired related to technical/production aspects of theatre and also develop problem solving and interpersonal skills.

Syllabus:

Syllabus

Practical 1: **Orientation in theatre**

Practical 2: **Voice and Speech training**

Practical 3: **Voice and Speech training:** practice sessions

Practical 4: **Art of acting**

Practical 5: **Art of acting:** practice sessions

Practical 6: **Art of script writing**

Practical 7: **Art of script writing:** practice sessions

Practical 8: **Final performances**

Reference books:

1. Boleslavsky, R. (2022). *Acting: The First Six Lessons* (1st ed., pp. 1-92). Delhi Open Books.

2. Shakthi, C. (2017). *No Drama Just Theatre* (1st ed., pp. 1-171). Partridge.

3. Bruder, M., Cohn, L. M., Olnek, M., Pollack, N., Previto, R., & Zigler, S. (1986). *A Practical Handbook for the Actor* (1st ed.). Vinatge Books New York.

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Syllabus for Semester B.Tech I

Course Code :25HS02PR0105-06

Course Name: IntroductiontoFrenchLanguage

L :0 Hrs., 0: 0 hr P : 2 Hrs., Per Week Credits: 1

Course objective:

To help build a foundation and interest in French language so that the students can pursue the proficiency levels of the language in higher semesters.

Course outcomes:

On successful completion of the course the students will be able to achieve the following:

- CO1. Demonstrate basic knowledge about France, the culture and similarities/differences between India and France
- CO2. Learn to use simple language structures in everyday communication.
- CO3. Develop ability to write in basic French about themselves and others.
- CO4. Develop ability to understand beginner level texts in French

Syllabus

List of Practicals

Practical-1: Orientation about France, the language, and culture

Practical-2: Communication Skills 1: Vocabulary building for everyday conversations

Practical -3: Practice sessions

Practical-4: Reading and writing Skills : Reading and writing simple text in French

Practical-5: Practice sessions

Practical-6: Communication Skills 2: listening comprehension

Practical-7: Practice sessions

Practical-8: Writing Skills: Write basic French and practice

Recommended reading

1. 15-minute French by Caroline Lemoine
2. Cours de Langue et de Civilisation Françaises by G. Mauger Vol. 1.1
3. Cosmopolite I by Natalie Hirschsprung, Tony Tricot

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Syllabus for Semester B.Tech I

Course Code :25HS02PR0105-7

Course Name: Introduction to Spanish Language

L :0 Hrs., 0: 0 hr P : 2 Hrs., Per Week Credits: 1

Course objective:

To help build a foundation and interest in Spanish language so that the students can pursue the proficiency levels of the language in higher semesters.

Course outcomes:

On successful completion of the course the students will be able to achieve the following:

- CO1. Demonstrate basic knowledge about Spain, the culture and similarities/differences between India and France
- CO2. Learn to use simple language structures in everyday communication.
- CO3. Develop ability to write in basic Spanish about themselves and others.
- CO4. Develop ability to read and understand beginner level texts in Spanish

Syllabus

List of Practicals

Practical-1: Orientation about Spain, the language, and culture

Practical-2: Communication Skills 1: Vocabulary building for everyday conversations

Practical -3: Practice sessions

Practical-4: Reading and writing Skills : Reading and writing simple text in Spanish

Practical-5: Practice sessions

Practical-6: Communication Skills 2: listening comprehension

Practical-7: Practice sessions

Practical-8: Writing Skills: Write basic Spanish and practice

Recommended reading

1. 15-Minute Spanish by Ana Bremon
2. Aula Internacional 1 by Jaime Corpas ,Eva Garcia, Agustin Garmendia.
3. Chicos Chicas Libro del Alumno by María Ángeles Palomino

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Syllabus for Semester B.Tech I

Course Code25HS02PR0105-08

Course Name: Art of Painting

L :0 Hrs., 0: 0 hr P : 2 Hrs., Per Week Credits: 1

Course objective

Painting is fundamentally about learning to see, and to transport that vision onto paper through a variety of mark making techniques. This course aims to develop basic skills of students in painting to lay a foundation for them as a hobby and/or a profession.

Course outcome:

At the end of the course the students will be able to achieve the following:

CO1: Become familiar with the basic methods, techniques & tools of painting.

CO2: Train the eye and hand to develop sense of balance, proportion and rhythm.

CO3: Develop the ability to observe and render simple natural forms.

CO4: Enjoy the challenging and nuanced process of painting.

Syllabus

Practical 1: Orientation in Painting tools & basics of lines, shapes, light, shadows and textures

Practical 2: The art of observation - how to see shapes in drawing

Practical 3: Introduction Water color - how to handle water paints

Practical 4: Introduction to acrylic colors - how to handle acrylic paints

Practical 5: Explore layering paint and capturing the quality of light with paint.

Practical 6: Create landscape painting

Practical 7: Create Abstract painting

Practical 8: Paint on Canvas (try to recreate any famous painting)

Reference material

1. Drawing made easy by Navneet Gala; 2015th edition
2. Alla Prima II Everything I Know about Painting--And More by Richard Schmid with Katie Swatland
3. Daily Painting: Paint Small and Often To Become a More Creative, Productive, and Successful Artist by Carol Marine

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech I

Course Code :25HS02PR0105-09

Course Name: Art of Drawing

L :0 Hrs., 0: 0 hr P : 2 Hrs., Per Week Credits: 1

Course objective

Drawing is fundamentally about learning to see, and to transport that vision onto paper through a variety of mark making techniques. This course aims to develop basic skills of students in drawing to lay a foundation for them as a hobby and/or a profession.

Course outcome:

At the end of the course the students will be able to achieve the following:

CO1: Become familiar with the basic methods, techniques & tools of drawing.

CO2: Train the eye and hand to develop sense of balance, proportion and rhythm.

CO3: Develop the ability to observe and render simple natural forms.

CO4: Enjoy the challenging and nuanced process of drawing.

Syllabus

Practical 1: Orientation in Drawing tools & basics of lines, shapes, light, shadows and textures

Practical 2: The art of observation how to see shapes in drawing

Practical 3: One/two-point basic linear perspective

Practical 4: Nature drawing and landscapes

Practical 5: Gestalt principles of visual composition

Practical 6: Figure drawing: structure and proportions of human body

Practical 7: Gesture drawing: expression and compositions of human figures

Practical 8: Memory drawing: an exercise to combine the techniques learnt

Reference material

1. Drawing made easy by Navneet Gala; 2015th edition
2. Perspective Made Easy (Dover Art Instruction) by Ernest R. Norling

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech I

Course Code: 25HS02PR0105-10

Course Name: Nature camp

L : 0 Hrs., 0 : 0 hr P : 2 Hrs., Per Week Credits: 1

Course Objective: To create an opportunity for the students to develop affinity with nature and thus subsequently impact their ability to contribute towards sustainability of nature.

Course outcome:

After the completion of the course the students will be able to do the following:

CO1: Develop an affinity with nature by observing and understanding it marvels with guidance from experts

CO2: Develop an understanding of the challenges and solutions associated with nature and its conservation.

Course content

In collaboration with the Forest Department and/or a local NGO working in the field of environment conservation, this course would be conducted in 24 hours. Students will be taken to a tiger reserve in Central Indian region or Forest fringe villages or work with an NGO from Central Indian region working on natural resource management. The camps (for 2 days) will cover any one of the following topics as decided by the course coordinator:

1. Awareness about each element of biodiversity (camps on moths, butterflies, birds, other wildlife etc)
2. Environment management (water, forest, wildlife) – practices of Forest Department in managing a tiger reserve, and other aspects of water and forest conservation.
3. Sustainable natural resource management - initiatives by rural communities and local NGOs
4. Man-animal conflict and solutions (socio-economic and technical) – role of local communities and Forest Department
5. Traditional practices in environment conservation – role of local communities and local NGOs

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech I

Course Code:25HS02PR0105-11

Course Name: Developing Self-awareness

L :0 Hrs., 0: 0 hr P : 2 Hrs., Per Week Credits: 1

Course objectives:

The course aims to develop students in their personal as well as professional life by means of graphotherapy, NLP, and Neurobics

Course Outcomes:

On completion of the course, students will be able to achieve the following:

CO1: Gain foundational understanding of graphology and through self-analysis will achieve greater awareness about their strengths and weaknesses & areas for personal growth

CO2: students will be equipped with tools and techniques for continuous self-improvement, using signature analysis and graphotherapy as part of their personal development journey

CO3: understand how to use Neuro Linguistic Programming (NLP) strategies to set and achieve goals effectively, overcoming mental blocks and limiting beliefs.

CO4: Enhance ability to absorb, retain, and recall information, which can benefit academic and professional performance.

Syllabus:

Practical 1: **The Power of Handwriting (Handwriting is Brainwriting)**

Practical 2: **Know yourself through handwriting**

Practical 3: **The Role of Signature in your life**

Practical 4: **Graphotherapy to enhance yourself in all ways**

Practical 5: **Neurolinguistic Programming , S.M.A.R.T Goal**

Practical 6: **Effective Communication Model, Rapport Building and Anchor**

Practical 7: **Brain Directives & Linguistic Presuppositions**

Practical 8: **Neurobics**

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech I

Course Code: 25HS02PR0105-12

Course Name: Art of Poetry

L : 0 Hrs., 0: 0 hr P : 2 Hrs., Per Week Credits: 1

Course Outcomes:

To familiarize the students with the art of poetry and develop a sense of appreciation for the art

At the end of the course the student will be able to achieve the following:

CO1: Understand the origin and development of poetry

CO2: Appreciate the art of poetry in life

CO3: Develop aesthetic sense

CO4: Develop holistic perspective to their personality

Syllabus

Practical 1: **Art of poetry – orientation**

Practical 2: **Forms of poetry – orientation**

Practical 3: **Forms of poetry – recitation**

Practical 4: **Application of poetry – orientation**

Practical 5: **Application of poetry – practical session**

Practical 6: **Poetry and aesthetics**

Practical 7: **Writing poetry – orientation**

Practical 8: **Writing poetry – writing sessions**

Reading material

I. The Art of Poetry

1. Fry, S. (2005). The ode less travelled: Unlocking the poetic mind. HarperCollins.
2. Addonizio, K., & Laux, D. (1997). The poet's companion: A guide to the pleasures of writing poetry. W.W. Norton & Company.
3. Lucy, J. (Ed.). (2001). The art of poetry. Penguin Books.

II. Understanding and Interpretation of Poetry

1. Hirsch, E. (1999). How to read a poem: And fall in love with poetry. Harcourt Brace & Company.
2. Pinsky, R. (1998). The sounds of poetry: A brief history. Farrar, Straus and Giroux.
3. Meyer, M. (2005). Poetry: An introduction. Bedford/St. Martin's.

III. Writing Poetry

1. Hugo, R. (1979). The triggering town: Lectures and essays on poetry and writing. W.W. Norton & Company.
2. Bradbury, R. (1990). Zen in the art of writing: Releasing the creative genius within you. Bantam Books.
3. Behn, R., & Twichell, C. (Eds.). (1992). The practice of poetry: Writing exercises from poets who teach. HarperCollins.

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech I

Course Code:25HS02PR0105-13

Course Name: Creative and content writing

L :0 Hrs., 0: 0 hr P : 2 Hrs., Per Week Credits: 1

Course objective:

The objective of the course is to equip students with comprehensive skills in creative and content writing through experiential learning and real-world applications.

Course outcomes:

On completion of the course, student will be able to achieve the following:

CO1: Understand and apply fundamental concepts and techniques of creative writing.

CO2: Apply storytelling techniques to create engaging narratives.

CO3: Develop and implement effective SEO and digital content strategies

CO4: Create and refine content using various tools and applying diverse writing styles and formats.

CO5: Utilize digital tools to craft multimedia narratives and create a professional portfolio.

Syllabus

Creative Writing

Practical 1: **Introduction to Creative and Content Writing**

Practical 2: **Character and Story Development**

Practical 3: **Crafting Compelling Narratives**

Content Writing

Practical 4: **SEO and Digital Content Strategies**

Practical 5: **Writing for Media**

Practical 6: **Tools**

Content Creation

Practical 7: **Digital Storytelling**

Practical 8: **Creative Portfolio Launch**

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech I

Course Code:25HS02PR0105-14

Course Name: Science of life through Bhagwad Gita

L :0 Hrs., 0: 0 hr P : 2 Hrs., Per Week Credits: 1

Course Objective

The objective of the course is to seek directions from the Bhagwad Gita to garner life skills for a successful and happy life

Course Outcome

CO1: To understand the methodology to correctly interpret and analysis the scripture

CO2: To understand the application of various teaching of the Bhagwad Gita

CO3: Use meditation and breathing techniques for healthy mind and body.

Syllabus

Practical 1: Introduction to Bhagwad Gita - methodology

Practical 2: Real life application of chapter 1-3

Practical 3: Real life application of chapter 4-6

Practical 4: Real life application of chapter 7-9

Practical 5: Real life application of chapter 10-12

Practical 6: Real life application of chapter 13-15

Practical 7: Real life application of chapter 16-18

Practical 8: Meditation and breathing techniques

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech I

Course Code:25HS02PR0105-15

Course Name: Sanskrit Sambhashan- Spoken Sanskrit

L :0 Hrs., 0: 0 hr P : 2 Hrs., Per Week Credits: 1

Course objectives:

The objective of the course is to enhance the communication skills of the students in Sanskrit

Course outcome

At the end of the course, the students will be able to achieve the following:

CO1: Enhanced writing skills in Sanskrit

CO2: Enhanced speaking skills in Sanskrit

CO3: Enhanced listening skills in Sanskrit

CO4: Enhanced writing skills in Sanskrit

Syllabus:

संस्कृतसम्भाषणशिविरस्य पाठ्यक्रमः

प्रथमं दिनम्

- ❖ गीतम् - पठत संस्कृतम्..... ।
- ❖ मम नाम -भवतः नाम किम्? भवत्याः नाम किम्?
द्वयोः मध्ये परिचयः । परस्परं 5 जनान् ।
- ❖ सः कः? सा का? तत् किम्?
- ❖ एषः, एषा, एतत् ।
- ❖ अहम्, भवान्, भवती..... अभिनयः ।
- ❖ आम्, न, वा/किम्..... अभिनयः ।
- ❖ अस्ति x नास्ति..... अभिनयः ।
- ❖ अत्र, तत्र, कुत्र, सर्वत्र, अन्यत्र, एकत्र - अभिनयः ।
- ❖ षष्ठी - तस्य, एतस्य, कस्य, तस्याः, एतस्याः, कस्याः, मम, भवतः, भवत्याः..... अभिनयः ।
मम नासिका, भवतः नासिका, भवत्याः नासिका ।
एतत् कस्य? अङ्गानि प्रदर्श्य प्रश्नः ।
- ❖ दशरथस्य...., सीतायाः...., लेखन्याः...., पुस्तकस्य...., ।
स्फोरकपत्रस्य (Flash Card) उपयोगः करणीयः ।
'पुत्रः' 'पतिः' इत्यादीनां वाक्यपत्राणाम् (Charts)
उपयोगः करणीयः ।
- ❖ गीतम् - मनसा सततं स्मरणीयम् ।
- ❖ आवश्यकम्, मास्तु, पर्याप्तम्, धन्यवादः, स्वागतम् ।
- ❖ पूर्वनिश्चितसम्भाषणप्रदर्शनम् ।
- ❖ क्रियापदानां पाठनम् -
गच्छति । आगच्छति । पठति । लिखति । खादति । पिबति ।
क्रीडति । वदति । उत्तिष्ठति । उपविशति ।
- ❖ गच्छामि । आगच्छामि..... ।
- ❖ गच्छतु । आगच्छतु..... ।
- ❖ सङ्ख्याः - (अ) 1, 2, 3, 4.....10 ।
(आ) 10, 20, 30.....100 ।
- ❖ समयः - 5.00, 5.15, 5.30, 4.45 ।
- ❖ कथा - गतानुगतिको लोकः । (काचित् कथा सरलया भाषया वक्तव्या) ।
- ❖ रटनाभ्यासः (पूर्वमेव लिखितानि पठितानि च कानिचित् वाक्यानि वाचनीयानि) ।
- ❖ एकं वाक्यम् (प्रत्येक छात्रः एकं वाक्यं वदेत् ।)
- ❖ सूचना ।
- ❖ ऐक्यमन्त्रः ।

द्वितीयं दिनम्

- ❖ गीतम् ।
- ❖ पुनस्स्मरणम् ।
- ❖ शब्देषु लिङ्गभेदज्ञापनम् - यथा -सः सुधाखण्डः, सा कुञ्चिका, तत् पुष्पम् ।
- ❖ बहुवचनपाठनम् -
बालकाः...., बालिकाः...., लेखन्यः...., पुस्तकानि.... ।
- ❖ ते, के, ताः, काः, तानि, कानि, एते, एताः, एतानि,
भवन्तः, भवत्यः, वयम् । (चित्राणि उपयोक्तव्यानि ।)
- ❖ वचनपरिवर्तनाभ्यासः । यथा - सः बालकः - ते बालकाः ।
अस्ति - सन्ति ।
- ❖ कति?
- ❖ सप्तमी - हस्ते । उत्पीठिकायाम् । लेखन्याम् । पुस्तके ।
(स्फोरकपत्रस्य प्रयोगः करणीयः ।)
वाक्यपत्रस्य उपयोगेन वाक्यानि वाचनीयानि ।
- ❖ कदा?
- ❖ उत्तराणां प्रश्नाः । (शिक्षकः आरम्भे उत्तरं वदेत्, अनन्तरं छात्राः तस्य प्रश्नं पृच्छेयुः ।)
यथा - रामः प्रातःकाले शालां गच्छति ।
रामः कदा शालां गच्छति?
- ❖ अद्य, श्वः, परश्वः, प्रपरश्वः, ह्यः, परह्यः, प्रपरह्यः, इदानीम् ।
- ❖ गीतम् ।
- ❖ गच्छन्ति । गच्छामः । गच्छन्तु ।
- ❖ शिष्टाचारः - सुप्रभातम्/नमस्कारः/शुभरात्रिः/हरिः
ओम्/क्षम्यताम्/चिन्ता मास्तु ।
- ❖ प्रातर्विधिः - दन्तधावनम् इत्यादयः शब्दाः पाठनीयाः ।
- ❖ सङ्ख्या - 1-50 ।
- ❖ समयः - 6.05, 6.10, 5.55, 5.50
- ❖ स्वागतसम्भाषणम् । (शिक्षकः सहशिक्षकेण सह कृत्वा प्रदर्शयेत्)
- ❖ कथा ।
- ❖ रटनाभ्यासः ।
- ❖ वाक्यद्वयम् (प्रत्येकम् अपि छात्रः वाक्यद्वयं वदेत् ।)
- ❖ सूचनाः ।
- ❖ ऐक्यमन्त्रः ।

तृतीयं दिनम्

- ❖ गीतम् ।
- ❖ पुनस्स्मरणम् ।
- ❖ क्रियापदानां बहुवचनरूपाणि ।
गच्छन्ति - गच्छामः - गच्छन्तु (Chart दर्शनीयम्)
पिबन्ति - पिबामः - पिबन्तु ।
लिखन्ति - लिखामः - लिखन्तु ।
इत्यादिपरिवर्तनाभ्यासः करणीयः ।
- ❖ द्वितीयाविभक्तिः - स्फोरकपत्राणाम् उपयोगः ।
(वाक्यपत्राणि उपयुज्य वाक्यानि वाचनीयानि ।)
- ❖ कृपया ददातु - वस्तुनि प्रदर्श्य ।
शिक्षकः एकैकं वस्तु प्रदर्शयति ।
उदा. - ग्रन्थः, घटी,.....
छात्राः - कृपया ग्रन्थं ददातु, कृपया घटीं ददातु इत्यादि
वदेयुः । (स्फोरकपत्रस्य उपयोगः)
- ❖ पुरतः, पृष्ठतः, वामतः, दक्षिणतः, उपरि, अधः ।
(चित्रं दर्शनीयम्)
- ❖ इतः, ततः,तः, गृहतः, कुतः?
(स्फोरकपत्राणाम् उपयोगः)
वाक्यपत्राणि उपयुज्य वाक्यानि वाचनीयानि ।
- ❖ गीतम् ।
- ❖ कथम्? सम्यक् ।
- ❖ शीघ्रम् × मन्दम् । उच्चैः × शनैः ।
- ❖ पठनार्थम्, किमर्थम्?
- ❖ सप्तकाराः - किम्, कुत्र, कति, कदा, कुतः, कथम्,
किमर्थम् (Chart प्रदर्शनीयम्) ।
एकैकम् उपयुज्य परस्परं प्रश्नाः ।
- ❖ अपि ।
- ❖ अस्तु ।
- ❖ अहं न जानामि । - कानिचन वाक्यानि ।
- ❖ भूतकालीनक्रियापदानां पाठनम् ।
गतवान् - पठितवान् - लिखितवान् ।
गतवती - पठितवती - लिखितवती ।
- ❖ क्रियापदकोष्ठकस्य प्रथमपृष्ठस्य अभ्यासः ।
- ❖ द्वितीयपृष्ठस्य सर्वाणि क्रियापदानि उपयुज्य छात्राः
वर्तमानकाले वाक्यानि वदन्ति । (ए.व - ब.व.)
- ❖ विशिष्टक्रियापदानाम् अभ्यासः -
करोमि - कुर्मः । करोति - कुर्वन्ति ।
ददामि - दद्यः । ददाति - ददति ।

शृणोमि - शृणुमः । शृणोति - शृण्वन्ति ।

जानामि - जानीमः । जानाति - जानन्ति ।

- ❖ सम्बोधनम् - भोः !, श्रीमन् !, मान्ये !, भगिनि!, मित्र !,
.....महोदय!, राम !, सीते ! इत्यादि ।
- ❖ सङ्ख्या- 1-100 ।
- ❖ समयः - 1.00, 2.00, 3.00, 4.00 ।
- ❖ सम्भाषणप्रदर्शनम् (मित्रसंलापः) ।
- ❖ कथा ।
- ❖ वाक्यत्रयम् एकैकोऽपि छात्रः वदेत् ।
- ❖ सूचना ।
- ❖ ऐक्यमन्त्रः ।

चतुर्थं दिनम्

- ❖ गीतम् ।
- ❖ पुनःस्मरणम् ।
- ❖ च
- ❖ अतः
- ❖ एव
- ❖ इति
- ❖ अस्मि
- ❖ यदि -तर्हि
- ❖ यथा - तथा
- ❖ तः - पर्यन्तम् (वाक्यपत्रस्य उपयोगेन वाक्यानि
वाचनीयानि ।)
- ❖ अद्य आरभ्य
- ❖ कृते (वाक्यपत्रस्य उपयोगः करणीयः)
- ❖ क्तवतुप्रत्ययान्तानाम् अभ्यासः
गतवान् - पठितवान् - लिखितवान् (ए.व. पुलिङ्गे) ।
गतवती - पठितवती - लिखितवती (ए.व. स्त्रीलिङ्गे) ।
गतवन्तः - पठितवन्तः - लिखितवन्तः (ब.व. पुलिङ्गे) ।
गतवत्यः - पठितवत्यः - लिखितवत्यः (ब.व. स्त्रीलिङ्गे) ।
- ❖ सः गतवान् - सा गतवती - लिङ्गपरिवर्तनाभ्यासः ।
- ❖ अहं गतवान् - अहं गतवती - लिङ्गपरिवर्तनाभ्यासः ।
- ❖ क्रियापदानां कालपरिवर्तनाभ्यासः ।
यथा - गच्छति - गतवान्, गतवती ।
- ❖ गीतम् ।
- ❖ विशेषपाठनम् - आसीत्, आसन्, आसम् ।
- ❖ एकः, एका, एकम् - लिङ्गभेदः ज्ञापनीयः ।
(स्फोरकपत्रस्य उपयोगः)

- ♦ भोजनसम्बन्धिशब्दाः यथा - सूपः, शाकम्, इत्यदयः ।
- ♦ सङ्ख्या ।
- ♦ समयः ।
- ♦ ॐ - सङ्ख्याक्रीडा ।
- ♦ कथा ।
- ♦ सम्भाषणप्रदर्शनम् ।
- ♦ चत्वारि वाक्यानि ।
- ♦ सूचना ।
- ♦ ऐक्यमथः ।

पञ्चमं दिनम्

- ♦ गीतम् ।
- ♦ पुनःस्मरणम् ।
- ♦ वाहनानां नामानि ।
- ♦ तृतीयाविभक्तिः - दण्डेन, मापिकया, लेखन्या, पुष्पेण ।
(वाक्यप्रत्ययस्य आधारेण वाक्यानि वाचनीयानि ।)
- ♦ सह, विना ।
- ♦ अद्यतन, ह्यस्तन, श्वस्तन, पूर्वतन, इदानीन्तन ।
- ♦ भविष्यत्कालीनक्रियापदानां पाठनम् ।
गमिष्यति, पठिष्यति, लेखिष्यति । (कोष्ठकस्य साहाय्येन)
- ♦ गत, आगतम् ।
- ♦ गीतम् ।
- ♦ स्म ।
- ♦ अभवत् ।
- ♦ क्त्वाप्रयोगः (कोष्ठकस्य साहाय्येन) ।
- ♦ यदा - तदा ।
- ♦ वस्तुवाचकशब्दाः ।
- ♦ वेशभूषणानां नामानि ।
- ♦ वर्णाः ।
- ♦ रुचयः ।
- ♦ क्रीडा - एकस्त्रासेन सङ्ख्याकथनम् ।
- ♦ कथा ।
- ♦ पञ्च वाक्यानि ।
- ♦ सूचना ।
- ♦ ऐक्यमथः ।

षष्ठं दिनम्

- ♦ गीतम् ।
- ♦ पुनःस्मरणम् ।
- ♦ नूतनम् x पुरातनम्,

- ♦ बहु x किञ्चित्,
- ♦ दीर्घः x ह्रस्वः ।
- ♦ उन्नतः x बामनः ।
- ♦ स्थूलः x कृशः ।
- ♦ एतादृश, तादृश, कीदृश?
- ♦ तुमुन् (कोष्ठकस्य साहाय्येन) ।
- ♦ किन्तु ।
- ♦ निश्चयेन ।
- ♦ बहुशः / प्रायशः ।
- ♦ किल / खलु ।
- ♦ शक्नोति ।
- ♦ गीतम् ।
- ♦ विशेषणविशेष्यभावस्य अभ्यासः । (प्रथमाविभक्तौ)
सः उत्तमः बालकः ।
सा उत्तमा बालिका ।
तत् उत्तमं पुस्तकम् ।
- ♦ इव । विनोदकणिका । (गतवान् 'इव' अभिनये कृतवान्!)
- ♦ अपेक्षया ।
- ♦ पशूनां नामानि ।
- ♦ अवयवानां नामानि ।
- ♦ वाक्यविस्तारणाभ्यासः ।
(सः मम पुस्तकं प्रातःकाले पञ्चबादने पठितवान् ।)
- ♦ इतः पूर्वम् - इतः परम् ।
- ♦ 'रामकृष्ण' सङ्ख्याक्रीडा ।
- ♦ कथा ।
- ♦ षट् वाक्यानि ।
- ♦ सूचना ।
- ♦ ऐक्यमथः ।

सप्तमं दिनम्

- ♦ गीतम् ।
- ♦ पुनःस्मरणम् ।
- ♦ क्त्वा - तुमुन् - परिवर्तनाभ्यासः ।
- ♦ बहिः x अन्तः ।
- ♦ रिक्तम् x पूर्णम् ।
- ♦ इतोऽपि ।
- ♦ इत्युक्ते ।
- ♦ अन्ते ।
- ♦ चेत् - नो चेत् ।

- ❖ गीतम् ।
- ❖ आरोग्यसम्बन्धिशब्दाः – वैद्यरोगिसम्भाषणम् ।
- ❖ प्रश्नोत्तरस्पर्धा ।
- ❖ ऋषीणां नामानि ।
- ❖ कथा - शिक्षकः एकां कथां वदति । अनन्तरं छात्रेषु एकैकः तस्याः कथायाः एकैकं वाक्यम् उक्त्वा कथां सम्पूर्णां करोति ।
- ❖ सङ्ख्या - दीर्घसङ्ख्यापाठनम् ।
- ❖ प्रश्नोत्तरम् ।
- ❖ क्रीडा - (गणद्वये नामस्मरणक्रीडा)
- ❖ कथा ।
- ❖ पुस्तकानां परिचयः ।
- ❖ सप्त वाक्यानि ।
- ❖ सूचना ।
- ❖ ऐक्यमन्त्रः ।

अष्टमं दिनम्

- ❖ गीतम् ।
- ❖ पुनःस्मरणम् ।
- ❖ वारम् ।
- ❖ अतः - यतः परिवर्तनाभ्यासः ।
- ❖ यद्यपि – तथापि ।
- ❖ यत्र – तत्र ।
- ❖ कति - कियत् - एतयोः भेदज्ञापनम् ।
- ❖ यावत् – तावत् ।
- ❖ यत् – तत् ।
- ❖ यः - सः ।
- ❖ या – सा ।
- ❖ गीतम् ।
- ❖ अस्माकम् ।
- ❖ चर्चा ।
- ❖ सङ्ख्या - 'शतायुः - गतायुः' क्रीडा ।
- ❖ विनोदकणिकाकथनम् ।
- ❖ कथा ।
- ❖ अष्ट वाक्यानि ।
- ❖ समाजनिधिविषये सूचना ।
- ❖ ऐक्यमन्त्रः ।

नवमं दिनम्

- ❖ गीतम् ।
- ❖ पुनःस्मरणम् ।
- ❖ चित् ।
- ❖द्वयम् ।
- ❖ सङ्ख्यासु लिङ्गभेदः ।
एकः - एका - एकम्
द्वयम् - द्वयम् - द्वयम्
त्रयः - तिस्रः - त्रीणि
चत्वारः - चतस्रः - चत्वारि
- ❖ शिक्षकः - अहं वैद्यः - मम नाम सुरेशः
(छात्राः तमुद्दिश्य प्रश्नान् पृच्छेयुः ।)
- ❖ अर्थम् (समाजार्थम्, संस्कृतकार्यार्थम्...) ।
- ❖ गीतम् ।
- ❖ तव्यत् – अनीयर् ।
- ❖ अनन्त्यकथारचना ।
- ❖ सङ्ख्यान्वेषणम् (क्रीडा) ।
- ❖ छात्रैः सह प्रश्नोत्तरम् ।
- ❖ समाजनिधिविषये पुनःस्मरणम् ।
- ❖ ऐक्यमन्त्रः ।

दशमं दिनम्

- ❖ गीतम् ।
- ❖ पुनःस्मरणम् ।
- ❖ पत्रलेखनम् ।
- ❖ दूरवाणीसम्भाषणम् ।
- ❖ मार्गनिर्देशः – कुत्र गन्तव्यम् इत्यादि ।
- ❖ तव्यत् अभ्यासार्थम् – अद्य किं किं करणीयम् ?
- ❖ सान्दर्भिकभाषणम् –
1. प्रवासात् प्रतिनिवर्तनस्य ।
2. आपणिकस्य इत्यादि ।
- ❖ क्रीडा – सङ्ख्यायोजनम् (गणद्वये) ।
- ❖ शुभाशयाः ।
- ❖ असत्यकथनम् / कल्पनाकथनम् ।
- ❖ समारोपः (सर्वैः शिक्षार्थिभिः भारतमातुः पूजां कृत्वा निधिसमर्पणं करणीयम् ।)
- ❖ पत्राचारप्रगतशिक्षणादिविषये सूचना ।
- ❖ ऐक्यमन्त्रः ।

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech I

Course Code:25HS02PR0105-16

Course Name: Kirtan Kala

L :0 Hrs., 0: 0 hr P : 2 Hrs., Per Week Credits: 1

Course objectives:

The objective of the course is to provide the students with a spiritual experience as well as its benefits to them in the form of better abilities to concentrate and develop the ability to create a peaceful mind.

Course outcome

At the end of the course, the students will be able to achieve the following:

CO1: Learn from the inspiring spiritual journey of the saints and the history of Kirtan tradition

CO2: Learn about the musical instruments used in the art of Kirtan

CO3: Develop communication skills

- कीर्तन परंपरेचा इतिहास आणि अखिल भारतातील कीर्तन परंपरांचा परिचय
- चार महिन्यात वीस संतचरित्रांचा परिचय अधिक त्याविषयी प्रवचन
- वीस संतांचा वाङ्मयीन परिचय
- प्रमुख पाच कीर्तन पद्धतींचे मांडणी तंत्र.
- पूर्वरंग - उत्तररंग सहित कीर्तनप्रक्रियेतील सर्व महत्वाचे टप्पे.
- कीर्तनासाठी आवश्यक असणारी कंठ संगीतात्मक माहिती
- ठळ, मृदंग, वीणा, तबला, पेटी या वाद्यांची ओळख.
- प्रवचनांसाठी अभ्यासग्रंथांचे मार्गदर्शन.
- वक्तृत्व कला, संभाषण कला, संवाद कौशल्य, कथाकथन यांची रहस्ये
- कीर्तनाचे अनुषंगाने संस्कृत मराठी श्लोक, सुभाषिते व प्रमाणाधार अशी ओव्या अभंगांची शिंदोरी.

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech I

Course Code:25HS02PR0105-17

Course Name: Introduction to German Language and culture

L :0 Hrs., 0: 0 hr P : 2 Hrs., Per Week Credits: 1

Course objective:

To help build a foundation and interest in German language so that the students can pursue the proficiency levels of the language in higher semesters.

Course outcomes:

On successful completion of the course the students will be able to achieve the following:

CO1. Demonstrate basic knowledge about Germany, the culture and similarities/differences between India and Germany

CO2. Learn to use simple language structures in everyday communication.

CO3. Develop ability to write in basic German about themselves and others.

CO4. Develop ability to read and understand beginner level texts in German.

Syllabus

List of Practicals

Practical-1: Orientation about Germany, the language, and culture

Practical-2: Vocabulary building for everyday conversations

Practical -3: Numbers, days and time

Practical-4: Introducing Oneself & Others

Practical-5: Reading Skills: Reading simple text in German language

Practical-6: Basic Verbs & Sentence Construction

Practical-7: Food & Dining, Giving Directions & Transportation

Practical-8: Writing Skills: Write basic German and practice

Recommended reading

1. German Made Easy by Diego A. Agundez
2. Teach Yourself Complete German: Learn to Read, write, Speak and Understand A new Language by Paul Coggle, Heiner Schenke
3. Netzwerk A1 by Helen Smitz, Stefanie Dengler and Paul Rusch
4. Deutsche Welle (DW) – www.dw.com/learngerman
5. BBC Languages – German – www.bbc.co.uk/languages/german
6. Goethe-Institut – www.goethe.de

Ramdeobaba University, Nagpur
Syllabus for Semester B.Tech I
Department of Civil Engineering

Course Code : 25HS02TH0104

Course Name: Foundation Course in Universal Human Values

L : 1 Hrs., P : 0 Hrs., Per Week Credits: 01

Course Objectives:

- To help the student see the need for developing a holistic perspective of life
- To sensitize the student about the scope of life – individual, family (inter-personal relationship), society and nature/existence
- To strengthen self-reflection
- To develop more confidence and commitment to understand, learn and act accordingly

Course outcome:

On completion of course, students will be able to achieve the following:

CO1: Develop a holistic perspective of life

CO2: Better understanding of inter-personal relationships and relationship with society and nature.

CO3: An ability to strengthen self-reflection

Syllabus

Unit1:-Aspirations and concerns

Need for Value Education: Guidelines and content of value education.

Exploring our aspirations and concerns: Knowing yourself, Basic human aspirations, Need for a holistic perspective, Role of UHV; Self-Management: harmony in human being

Unit2:-Health

Harmony of the Self and Body, Mental and physical health; Health for family, friends and society.

Unit3:-Relationships and Society

Harmony in relationships, Foundational values: Trust, Respect, Reverence for excellence, Gratitude and love; harmony in society; harmony with nature.

Reference Material

The primary resource material for teaching this course consists of

1. Text book: R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174-46781-2

4. Reference books:

- a) B L Bajpai, 2004, *Indian Ethos and Modern Management*, New Royal Book Co., Lucknow. Reprinted 2008.
- b) P L Dhar, R R Gaur, 1990, *Science and Humanism*, Commonwealth Publishers.
- c) Susan George, 1976, *How the Other Half Dies*, Penguin Press. Reprinted 1986, 1991
- d) Ivan Illich, 1974, *Energy & Equity*, The Trinity Press, Worcester, and Harper Collins, USA
- e) Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, *Limits to Growth*, Club of Rome's Report, Universe Books.
- f) Subhas Palekar, 2000, *How to practice Natural Farming*, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.
- g) A Nagraj, 1998, *Jeevan Vidya ek Parichay*, Divya Path Sansthan, Amarkantak.
- h) E. F. Schumacher, 1973, *Small is Beautiful: a study of economics as if people mattered*, Blond & Briggs, Britain.
- i) A. N. Tripathy, 2003, *Human Values*, New Age International Publishers.

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech II

Course Code : 25HS05TP0201

Course Name: Physics for Civil Engineering

L :3 Hrs., T: hr P :2 Hrs., Per Week 3

Credits: 4

Course Objectives:

1. To develop the ability to apply concepts of elementary physics to applications in civil engineering.
2. To introduce more advanced physics concepts, which form the basis of modern engineering.
3. To provide a sound foundation in mathematical formulation of concepts learnt and their cross-disciplinary applications.

Course Outcomes:

After successful completion of the course students will be able to

- CO 1. Analyse the effect of oscillations on civil structures.
- CO 2. Apply fundamental principles of acoustics to calculate reverberation time and sound absorption coefficients of construction materials.
- CO 3. Apply the principles of ultrasonics for non-destructive testing of concrete, steel materials.
- CO 4. Understand the use of laser and optical fibre sensors in civil engineering.
- CO 5. Understand the use nanomaterials to enhance the properties of materials used in civil engineering.

Module 1: Oscillations

Fundamentals of forces, Particle Dynamics in One Dimension: Velocity Dependent Force, Position Dependent Force, One-dimensional harmonic oscillator, damped oscillator, over, critical and under damping; Forced oscillator, undamped and damped cases; Examples, resonance and Q factor; Structural stability during earthquakes.

Module 2: Architectural Acoustics

Basics of acoustics of civil structures, Sound waves Properties, characteristics, Sound intensity level-Decibel, Reverberation time, Sound absorption, Reverberation theory, Determination of sound absorption coefficients, Materials used for sound absorption, Factors affecting acoustics of building and their remedies, acoustic design of hall.

Module 3: Ultrasonics and Non-destructive testing

Ultrasonic waves, Piezoelectric Effect, Production and detection of Ultrasonic Waves, Properties and types of Ultrasonic Waves, Cavitations, Determination of Velocity of Ultrasonic Waves, Non-Destructive testing methods, Ultrasonic Testing Methods

Use of Ultrasonic waves in Civil Engineering: Non-destructive testing of Concrete, Steel. Prediction of concrete strength, Inspection of concrete structure using ultrasonic scanner.

Module 4 :Fibre Optics Sensors

Introduction to Optical Fibre, Total Internal Reflection, Numerical Aperture, Modes of Propagation, Classification of Optical Fibres, Materials, V-Number, Losses in Optical Fibre, Fibre Optic Communication, Sensors: Stress, Strain and Temperature Sensors,

Applications of Fibre Optic Sensors in Civil Engineering: Crack Monitoring, Cable and FRP Monitoring, Bridge Monitoring, Moisture Monitoring

Module 5: Laser

Fundamentals of lasers, Components of Laser, metastable state, population inversion, Pumping Methods; three level and four level laser, Modes of the Laser Beam, Types of laser: Ruby laser, He-Neon laser, Semiconductor laser, Laser Beam Characteristics, Applications of laser in Civil Engineering : 3D Laser Survey in Construction, Surveying and highways engineering,

Module 6: Nanotechnology and Nanomaterials

Introduction to nanotechnology, classification of nanomaterials, properties. Use of nanomaterials in Civil Engineering: construction materials concrete, steel, coating, glass, insulating materials. Fullerenes and nanoparticles; Outline of methods of preparation of nanomaterials; Elements of electron microscopy; Characterization techniques for nanomaterials, Outline of properties of nanomaterials - physical, thermal, optical, electrical, magnetic; Quantum size-effects; Carbon Nanotubes.

Text Books:

1. The Physics of vibrations and waves by H.J. Pain Sixth edition, John wiley and Sons, Ltd.
2. Engineering Physics by M.N. Avadhanulu and Kshirsagar S. Chand Publication

Reference Books:

1. Engineering Physics by Sanjay Jain and Girish Sahasrabudhe, Universities Press

Assignments

- Case Study : How to improve acoustics of given building space
- Case Study : Effect of oscillations on the stability of building
- Case Study : Use of sensors in real estate / Industry / Infrastructure
- Case Study : Use of Laser technology in Civil Engineering
- Case Study : Use of Nanomaterials in Civil Engineering Projects

Course Name: Physics for Civil Engineering Lab

The Physics Laboratory course will consist of experiments illustrating the principles of physics relevant to the study of science and engineering. Students will show that they have learnt laboratory skills that will enable them to properly acquire and analyze the data in physics laboratory and draw valid conclusions.

Course Outcomes

At the end of the Course the students will be able to:

1. Develop the skills of error analysis and proper graph plotting.
2. Analyze the behavior and characteristics of Oscillatory motion.
3. Compute velocity of sound in different medium.
4. Understand the properties of laser and optical fibre.
5. Prepare laboratory reports on interpretation of experimental results.

List of Experiments

A. General Physics Lab Experiments

1. Measuring Scales and Error analysis using Vernier Caliper, Screw Gauge, Travelling Microscope, spherometer
2. Determination of volume, area and density of given materials
3. Plotting of linear and non-linear graphs using linear least square fitting.
4. Understanding characteristics of SHM, damped oscillations and forced oscillations
5. Determination of force Constant and effective mass of the helical spring system.
6. Determination of sound absorption coefficient of given materials.
7. Determination of adiabatic compressibility of liquid using Ultrasonic Interferometer
8. Determination of Velocity of sound in solids by Kund's Tube
9. Determination of wavelength of monochromatic light by laser diffraction method
10. Measuring the volume and areas of classrooms and labs using laser distance meter.
11. Moment of Inertia of a Flywheel.
12. Modulus of rigidity of wire using torsional pendulum
- 13.

B. Open ended experiment on Virtual Lab

Suggested References:

1. Physics Lab Manual written by the Teaching Faculty of Physics Department, RCOEM.
2. Engineering Physics by S. Jain and G. G. Sahasrabudhe, Universities press, 2013.

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech II

Course Code :25HS03TH0211

Course Name: Linear Algebra and Multivariate Calculus

L :3 Hrs., T: , P : 0 Hrs., Per Week

Credits: 03

Course Objective:

The objective of this course is to familiarize the prospective engineers with techniques in Calculus and multivariate analysis. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

Course Outcomes

On successful completion of the course, the students will able to:

1. Interpret the solutions of system of linear equations and use the concepts of Eigen values, Eigen vectors to find diagonalization of matrices, reduction of quadratic form to canonical form.
 2. Evaluate definite and improper integrals using Beta, Gamma functions. Also trace Cartesian curves.
 3. Solve multiple integration by change of order, change of variable methods and apply it to find area, volume, mass and center of gravity.
 4. Understand geometric meaning of gradient, curl, divergence
 5. Perform line, surface and volume integrals of vector-valued functions
-

Syllabus

Module 1: *Matrices*: (8 hours)

Algebra of matrices, Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Eigen values and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, Orthogonal transformation and quadratic to canonical forms, Introduction to n-dimensional space.

Module 2: *Integral Calculus*: (8hours)

Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Tracing of curves(Cartesian form)

Module 3: *Multiple Integrals* (10 hours)

Multiple Integration: Double and triple integrals (Cartesian and polar), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: area, mass and volume by double integration, Center of mass and Gravity (basic concepts).

Module 4 : *Vector Calculus (Differentiation)*(7hours)

Scalar point function, Vector point function, vector differentiation, gradient, divergence and curl, directional derivatives with their physical interpretations, solenoidal and irrotational motions, Scalar potential function.

Module 5 : Vector Calculus (Integration)(7 hours)

Vector integration: Line integrals, work done, conservative fields, surface integrals and volume integrals, Stoke's theorem, Gauss divergence theorem, Green's theorem and their simple applications.

Topics for self learning

Rolle's theorem, Mean value theorems, Indeterminate forms, Applications of definite integrals to evaluate perimeter, area, surface areas and volumes of revolutions.

Textbooks/References:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. P. N. Wartikar and J. N. Wartikar, A text book of Applied Mathematics Volume I & II, Pune Vidhyarthi Griha Prakashan, Pune-411030 (India).
6. Biomedical Statistics -Shantikumar Yadav, Sompal Singh, Ruchika Gupta
7. Theory and Problems of Probability and Statistics - M.R. Spiegel (Mc Graw Hill) Schaum Series

Ramdeobaba College of Engineering and Management
Department of Civil Engineering
Syllabus for Semester B.Tech II

Course Code: 25ES01TP0201

Course Name: Basics of Geotechnical Engineering

L : 3 Hrs., P : 2 Hrs., Per Week

Credits: 4

Course Outcomes

On successful completion of the course students will be able to;

1. Understand interrelationship between various properties of soil.
2. Formation and soils classification on the basis of Index properties
3. Identify the Permeability property and its effect on Seepage determination in soil.
4. Evaluate compressibility characteristics of soil
5. Evaluate in-situ & induced stresses in soils.
6. Evaluate Shear strength parameter of soil and its determination.

Syllabus

Unit-I [5 hours]

7. Introduction: formation of soil, Major deposits found in India. Various type of soil.
8. Phases of soil: Various soil weight & volume inter-relationship.

Unit-II [4 hours]

Index properties of soil and its application, I. S. classification system.

Unit-III [4 hours]

Permeability: Introduction to permeability & seepage, their importance, Factors affecting permeability, permeability of stratified soil. Characteristics & uses of flow nets, quick sand condition.

Unit-IV [4 hours]

Compaction: Mechanics of compaction, factors affecting compaction, field compaction equipment, quality control.

Consolidation: Introduction to consolidation & importance in settlement calculation.

Unit-V [4 hours]

Stress Distribution: Stress distribution in soil mass, Boussinesq's theory, point load, Newmark's influence chart, and Equivalent point load method.

Unit–VI[5 hours]

Shear Strength –Concept of Mohr's stress circle, Mohr-Coloumb's theory, Drainage condition, Pore pressure and its measurement, shear strength by direct shear test, tri-axial test, unconfined compression test, vane shear test.

Text Book

1. Basics and Applied Soil Mechanics –Gopal Ranjan & ASRRao, New Age Int. Pub.
2. Geotechnical Engineering –C Ventakramaiah, New Age International Publications
3. Soil Mechanics and Foundation Engineering –B.C. Punmia, Laxmi Publications
4. Textbook of Soil Mechanics & Foundation Engineering -VNS Murthy, CBS Publishers.

Reference

1. Textbook of Geotechnical Engineering –Braja M. Das, Cengage Publications
 2. Fundamentals of Geotechnical Engineering –Braja M. Das, Cengage Publications
- Modern Geotechnical Engineering –Alam Singh, CBS Publishers

Course Name: Basics of Geotechnical Engineering Lab

Course Outcomes

On successful completion of the course, students will be able to;

1. Identify and classify the soil.
2. Determine index properties of soil.
3. Determine coefficient of permeability soil.
4. Determine OMC and MDD of soil.
5. Determine shear strength parameters of soil.

List of Practicals: Minimum 10 of the following

1. Determination of moisture content by Oven drying method.
2. Determination of Free Swell Index of soil.
3. Determination of specific gravity of soil.
4. Field density determinations by Sand replacement method and Core cutter method.
5. Grain size distribution by Dry-Sieve Analysis.
6. Determination of Atterberg limits.
7. Determination of coefficient of Permeability by falling head test.
8. Determination of OMC & MDD by Standard Proctor's compaction Test.
9. Determination of Unconfined compression strength of clayey soil.
10. Determination of $C-\phi$ parameters by Direct shear Test.
11. Triaxial compression test (Demonstration)
12. One field visit

Ramdeobaba College of Engineering and Management
Department of Civil Engineering
Syllabus for Semester B.Tech II

Course Code : 25ES01TP0202

Course Name: Solid Mechanics

L :3 Hrs., P :2 Hrs., Per Week

Credits:3

Course Outcomes:

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

CO1: Understand fundamental concepts of stress, strain, and stress-strain behavior of materials.

CO2: Analyse axial force, shear force, and bending moment in statically determinant beams and plot SFD & BMD.

CO3: Apply simple bending theory to calculate bending and shear stresses in beams.

CO4: Analyse circular shafts and helical springs for torsional loading.

CO5: Calculate beam deflection and buckling of column using suitable methods.

CO6: Evaluate principle stress, principle strain and shear stress in two dimensional plane.

Simple Stress and Strain:

Concept of stress and strain, stress-strain behaviour of ductile and brittle material in uniaxial state of stress. Elastic, plastic and strain hardened zones, stress-strain relations, elastic constants, relation between elastic constants. Uniaxial loading and deformation of statically indeterminate problems under: axial loading, bars of varying section, composite bars, temperature stresses, temperature changes.

Axial force, shear force and bending moment

Types of load, determination of axial force, shear force and bending moment at a section in statically determinant beams. Plotting of shear force diagram and bending moment diagram.

Bending and Shear Stress in beam

Assumptions and derivation of simple bending theory, relation between bending moment, bending stress and curvature for homogeneous and composite beams. Bending and shear stresses with stress distribution in beams.

Torsion of shafts

Applications of the equation of the hollow and solid circular shafts, torsional rigidity, Combined torsion and bending of circular shafts, analysis of close-coiled -helical springs.

Deflection of beams and buckling of columns

Calculate slope and deflection using Macaulay's method and double integration method for determinant beams. Buckling of columns using Euler's formula.

Principle stress and strain in two dimensions

Transformation of stresses, principle stress and strain, maximum shear stress, Mohr's circle, combined bending and torsion.

Text Books:

1. S.S. Bhavikatti, Strength of Materials, 3rd Edition, Vikas Publishing House, 2008
2. A. Pytel and F. L. Singer, Strength of Materials, 4th ed.: Harper & Row, New York.
3. Uday Shankar dixit, Nelson Muthu and S.M. Kamal Strength of Materials, All India Council for Technical Education (AICTE), New Delhi, India
4. Strength of Materials a Rudimentary Approach: M.A. Jayaram, Sapna Book House, Bangalore.
5. Strength of Materials: S.Ramamrutham, Dhanpat Rai and Sons, New Delhi

Reference Books:

1. Seely, F. B.; and Smith, J.O "Advanced Mechanics of Material", John Wiley and Sons. Inc.
2. Mechanics of materials: Beer &Johntson, McGraw - Hill Publishers.e of Engineering & Management, Nagpur Programme Scheme & Syllabi For B. E. (Civil Engineering)

Course Name: Solid Mechanics Lab

Course Outcomes: Students will be able to

CO1. Understand the importance of elastic properties of various metals.

CO2. Examine the behavior and failure pattern of various metals under loading conditions such as tension, compression, bending, torsion, shear etc.

CO3. Examine the deflected shape of statically determinate beam.

CO4. Compare the buckling shape of Column under various end condition.

Practical's: Minimum eight of the following:

1. Study of elastic properties of metals.
2. Tension test on metals.
3. Compression test on metals.
4. Shear test on metals
5. Hardness test on metals.
6. Torsion test on metals.
7. Impact test on metals.
8. Deflection of springs.
9. Bending test on beam.
10. Verification of SFD and BMD by graphical solution.
11. Measurement of deflections in statically determinate beam
12. To study behavior of different types of struts and compare the Euler's buckling load for different end conditions.

Reference Material:

1. S.S. Bhavikatti, Strength of Materials, 3rd Edition, Vikas Publishing House, 2008
2. Strength of Materials: S.Ramamrutham, Dhanpat Rai and Sons, New Delhi
3. Strength of Materials: S.S.Rattan McGraw Hill Education India Pvt Limited, 2008

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech II

Course Code : 25ES01TH0203

Course Name: Building Services

L : 03 Hrs., P : 0 Hrs., Per Week

Credits: 3

Course Outcome

1. The Students will be able to identify pipe fitting & system required for single & multistoried buildings.
2. The Students will be able to identify sanitary fittings & systems required for single & multistoried buildings and prepare water supply & sanitary drawings for single & multistoried buildings as per NBC 2016.
3. The Student will be able to analyze HVAC system of the building.
4. The Students will be able to evaluate the fire fighting system of a building.
5. The Students will be able to understand basics of electrification in a building.
6. Students will be able to understand the fundamental concept of the building Acoustic

Unit - I

Water supply: Introduction, types of sources Domestic water distribution system, reservoirs, supply system layouts, Layout of domestic water piping systems, joints, fittings and valves. Cold & hot water lines in buildings, Water supply to high rise buildings: problems encountered & systems adopted.

Planning of bathrooms, lavatory blocks and kitchen in domestic and multi-storied buildings. Preparation of plumbing drawings, symbols commonly used in these drawings. Introduction to De-centralized water Treatment units, water drainage and Rain Water Harvesting.

Unit - II

Building Sanitation: Principles of sanitation, collection and disposal of various kinds of refuse from buildings. House drainage system, Specifications and installation of sanitary fittings like wash basins, water closets, urinals, bidets, sinks, etc in buildings. Uses of gate valve, float valve, flap valve, ball valve, flush valve, etc, different types of taps, faucets, stop cocks, bib cocks, 'P', 'Q', 'S', floor/bottle traps used in buildings.

Unit - III

Fire control systems; Causes of fire in buildings – Safety regulations – NBC 2016 – Planning considerations in buildings like non-combustible materials, staircases and lift lobbies, fire escapes and A.C. systems. Heat and smoke detectors – Fire alarm system.

Unit - IV

Lifts, Escalators, Freight elevators, Passenger elevators, Hospital elevators.

Unit -V

Basics of electrification in a building– Single-phase and three-phase supply – Protective devices in electrical installations – Earthing for safety – Types of earthing – ISI specifications – Types of wires, wiring systems, and their selection.

Unit -VI

Requirement of good Acoustic, sound absorbing material, Factors to be followed for noise control in residential building.

Text Books

1. Plumbing Engineering. Theory, Design and Practice, S.M. Patil, 1999
2. SP 7 : 2016, National Building Code of India 2016 (NBC 2016), <https://bis.gov.in/index.php/standards/technical-department/national-building-code/>
3. ISHRAE Handbook
4. Building Acoustics by Tor Erik Vigran, CRC Press; 1st Edition 2008.
5. V.K. Jain, Handbook of Designing and Installation of Services in High Rise Building & Complexes, Khanna Publication, New Delhi.

Reference Books

1. F. Hall, Roger Greeno, Building Services Handbook: Incorporating Current Building and Construction Regulations.
2. Building Services Research and Development Association Staff Building Services Materials Handbook -Heating, Sanitation and Fire Rout ledge
3. E.C. Butcher and A.C. Parnell. Designing for Fire safety.
4. Peter R. Smith and Warden G. Julian, Building Services.

Assignment:

1. Study of building drawing representing domestic water piping systems.
2. Study of building drawing representing sanitary & drainage systems.
3. Study of building drawing representing fire fighting system
4. Study of building drawing as per HVAC requirements.

Prepare building drawing with water supply & sanitary requirement as per NBC 2016.

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Syllabus for Semester B.Tech II
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Course Code :25HS02TH0205

Course Name: Foundation Literature of Indian Civilization

L : 2 Hrs., P : 0 Hrs., Per Week Credits: 02

Course outcome:

At the end of the course the students will be able to achieve the following:

CO1: Understand the Indian knowledge system and its scientific approach

CO2: Get introduced to the Vedic corpus and recognize the multi-faceted nature of the knowledge contained in the Vedic corpus

CO3: Understand the salient features of the philosophical systems of the Vedic and non-Vedic schools

CO4: Develop a basic understanding of the ancient wisdom recorded in various Indian literary work

Syllabus

Unit 1: Overview of Indian Knowledge System:

6 hours

Importance of ancient knowledge, defining IKS, IKS classification framework, Historicity of IKS, Some unique aspects of IKS.

Unit 2: The Vedic corpus:

6 hours

Introduction of Vedas, four Vedas, divisions of four Vedas, six Vedangas, Distinct features of Vedic life.

Unit 3: Indian Philosophical systems:

6 hours

Development and unique features, Vedic schools of philosophy, Samkhya and Yoga School of philosophy, Nayay and Vaisesika school of philosophy, Purva-mimamsa and Vedanta schools of Philosophy, Non-vedic philosophies: Jainism, Buddhism, and other approaches

Unit 4: Indian wisdom through ages:

8 hours

Panchatantras, Purans: contents and issues of interests, Itihasa: uniqueness of the two epics (Ramayan and Mahabharata), Key issues and messages from Ramayana, Mahabharata – a source of worldly wisdom; Indian ancient Sanskrit literature: Kalidas, Vishakadutta, Bhavbhuti, Shudraka*

*any one text as decided by the course teacher

Reference material

1. B. Mahadevan, Vinayak Rajat Bhar, Nagendra Pavana R. N., “Introduction to Indian Knowledge System: Concepts and Applications” PHI, 2022
2. S.C. Chatterjee and D.M. Datta, An introduction to Indian Philosophy, University of Calcutta, 1984

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech II

Course Code: 25HS04PR0201

Course Name: Health-Fitness Wellbeing (HFW)

L : Hrs., P : 2 Hrs., Per Week

Credits: 1

Aim of the Course: The course aims to foster Health and wellness through Healthy and Active Lifestyle and creating awareness about the fundamentals of Physical Education, Sports, Yoga, Recreation and its effectiveness through practical experiences and hands on activities.

Objectives of the Course:

1. To impart the students with basic concepts of Sports, Yoga and Recreational activities for health and wellness.
2. To familiarize the students with health-related Exercise and evaluate their Health-related Fitness.
3. To make Overall growth & development with team spirit, social values and leadership qualities among students through various sports, games and Yogic activities.
4. To create Environment for better interaction and recreation among students as neutralizer for stress through various minor and recreational games.

Course Outcomes: On completion of the course, students will be able to:

1. Understand fundamental skills, basic principle and practices of Health, Fitness, Sports and Yoga.
2. Practically learn the principles of implementing general and specific conditioning of Fitness exercises.
3. Develop Health-related fitness and Body-mind co-ordination through various fitness activities, sports, recreational games and yoga.
4. Practice Healthy & active living with reducing Sedentary Life style.

Course Content:

Unit 1:

- Warm up and Cool Down and Stretching Exercises.
- General and Specific Exercises.
- Calculation of BMI & Resting Pulse Rate.
- General and Specific exercises for strength, Speed, Agility, Cardiovascular Endurance, Flexibility and Coordination.
- Practice of Fundamental Skills of Volleyball, Table Tennis and Chess, etc.
- Knowledge and practice of the Equipment used in Health Center, Gymnasium and its application.

Unit 2:

- Yog: Standing, Sitting, Prone & Supine positions.
- Suryanamaskar.
- Pranayama, Meditation and Relaxation Techniques.
- Dietary Habits, Daily Energy Requirements
- Recreational Games.
- Practice of Fundamental Skills of Basketball, Football, Carrom, etc.
- Health related Physical Fitness Test.

References:

1. Russell, R.P. (1994). Health and Fitness Through Physical Education. USA: Human Kinetics.
2. Uppal, A.K. (1992). Physical Fitness. New Delhi: Friends Publication.
3. AAPHERD "Health related Physical Fitness Test Manual."1980 Published by Association drive Reston Virginia
4. Kumar, Ajith. (1984) Yoga Pravesha. Bengaluru: Rashtrothanna Prakashana.
5. Dr. Devinder K. Kansal, A Textbook of Test Evaluation, Accreditation, Measurements and Standards (TEAMS 'Science)

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech III

Course Code :25ES01TP0301
L :3 Hrs., P : 2 Hrs., Per Week

Course Name: Fluid Mechanics
Credits: 4

Course Outcomes

The students would be able to,

1. To understand and analyse properties of fluid, fluid pressure, and forces on various surfaces.
2. Examine various flow patterns and fundamental principles of fluid mechanics and its applications to fluid flow.
3. Compare and evaluate effect of various parameters involved in fluids, fluids flows and its geometry.
4. Analyse and compute the flow in pipe, channel and tank by using various devices.
5. Understand and analyse kinematics and kinetics of fluid flow

Unit I: Fluid properties

(6 Hours)

Definition of fluid, Differences between solids, liquids and gases, basic properties of fluids, dynamic and kinematic viscosity, Newton's equation, Rheological Diagram, Ideal and real fluids. Compressibility and bulk modulus. Surface tension, capillarity, vapour pressure, cavitation and Effect of pressure and temperature on fluid properties.

Unit II: Pressure Measurement and Hydrostatics

(6 Hours)

Fluid pressure, Variation of fluid pressure with depth, pressure and head, atmospheric pressure vacuum, Gauge and absolute pressures, Pressure measurement by manometers.

Hydrostatics pressure on plane surface, Centre of pressure and total pressure for fluid masses subjected to horizontal, vertical and inclined plane surface.

Unit III Kinematics of flow**(5 Hours)**

Lagrangian and Eulerian approaches in fluid flow description. Steady, unsteady, uniform, Non-uniform flow. One, two and three dimensional flow, Rotational & Irrotational flow. Streamline, path line, streak line Velocity and its variation with space and time. Acceleration of fluid particles, Normal and tangential acceleration. Equation of continuity in Cartesian coordinates, stream functions, velocity potential. Relationship between stream function and velocity potential, flow net.

Unit IV: Kinetics of fluid flow, Buoyancy and Floatation**(5 Hours)**

Forces influencing motion, various equations of motion, Euler's Equation Bernoulli's equation and its application and Limitations, Kinetic energy correction factor. Momentum equation & its application. Buoyant force and center of buoyancy, Archimedes principle, Meta-centre. Stability of bodies.

Unit V: Flow through pipes and tanks:**(6 Hours)**

Definition, types, hydraulic coefficients, factors affecting them and their experimental determination, time for emptying tank by Orifices. Discharge through large and submerged Orifices, external and internal mouth pieces, running free and running full, pressure at vena contracta, Discharge through a convergent-divergent mouthpiece. Measurement of discharge through pipes using Venturimeter, Orifice meter. Measurement of velocity using Pitot tube.

Text Books:

1. Hydraulics and fluid mechanics by Dr. P. N. Modi and S. M. Seth, latest edition, Standard book house.
2. R. K. Bansal, a Textbook of Fluid Mechanics and Hydraulic Machines, Laxmi Publications P Ltd New Delhi.

3. Fluid Mechanics - Fundamentals and applications by Yunuscengel, John M Cimbala, TataMcGraw Hill Publishing Company Ltd New Delhi, latest edition /reprint.
4. Hydraulic Fluid mechanics & Fluid Machines By S. Ramamurthan
5. Streeter V.L. and Wyle E.B.; Fluid Mechanics, International Students Edition 1986.

Reference Books:

1. Theory and Application of Fluid Mechanics by K. Subramanaya, latest edition, Tata McGraw HillPublishing Company Ltd New Delhi.
2. Engineering Fluid Mechanic By R.J.Garde& A.C.Mirajgaoker
3. Introduction to Fluid Mechanics E.J Shaughnessy, I.M Katz and J.P Schaffer. SI edition,2005, Oxford University Press, New Delhi
4. Fluid Mechanics, F.M., White, 5th Edition, McGraw Hill, New York.
5. Fluid mechanics By Dr.D.S.Kumar

Course Code :

Course Name: Fluid Mechanics I Lab

Course Outcomes

The students would be able to,

1. Describe the process of experimentation. Handle and operate the equipment's according to its working principle.
2. Plan and conduct the experiments in accordance with the objectives
3. Determine the coefficients of equipment's. Also interpret and discuss the experimental observations.
4. Analyse and compare the experimental and theoretical observations.
5. Calibrate and analyse coefficient of discharge and losses

List of Practical's

Minimum 8 out of the following:

1. Determination of Hydraulic coefficients of Orifice.
2. Determination of coefficient of discharge of Mouthpiece
3. Determination of coefficient of discharge of Rectangular Notch
4. Determination of coefficient of discharge of Triangular Notch.
5. Determination of minor losses for G I pipe various sections
6. Determination of frictional loss for G I pipes.
7. Determination of coefficient of discharge for Venturi-meter.
8. Determination of coefficient of discharge for Orifice meter.
9. Determination of Meta-centric height of ship model.

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Syllabus for Semester B.Tech III

Course Code: 25ES01TP0302

Course Name: Concrete Technology

L : 4 Hrs., P : 2 Hrs., Per Week

Credits: 4

Course Outcome

1. The students will be able to understand the microstructure of the hydration product of cement.
2. The students will be able to analyse and interpret fresh and hardened properties of concrete.
3. The students will be able to demonstrate different types of concrete with its properties and uses.
4. The students will be able to explore to use methods for concrete mix design with quality control approach.

Unit I

Structure of Concrete : Introduction, Structural Levels, Structure of Concrete in Nanometer Scale: C – S – H Structure, Transition Zone in Concrete, Micro-structural Engineering

Unit II

Fresh Concrete : chemical and physical processes of hydration and interaction; Admixtures: Review of types and classification; chemical composition; origin and manufacture; actions and interactions; usage; effects on properties of concretes, methods of test; applications. Rheology of concentrated suspensions, pastes, mortars and concretes; workability, segregation and bleeding. Theory and principles governing the correct placing and compaction of concrete.

Unit III

Hardened Concrete: Strengths of Hardened Concrete, Stress – Strain Relationship and Constitutive Equations, Dimensional Stability—shrinkage and Creep, Durability Impact, Dynamic and fatigue behaviour of concrete, behaviour of concrete under fire.

Unit IV

Fiber-Reinforced Cementitious Composites, High-Strength Cementitious Composites, Polymers in Concrete, shrinkage-Compensating Concrete, Self-Compacting Concrete, Engineered Cementitious Composite, High-Volume Fly Ash Concrete, Structural Lightweight Concrete, high grade concrete

Unit V

Concrete Fracture Mechanics: Introduction, Linear Elastic Fracture Mechanics, The Crack Tip Plastic Zone, Crack Tip Opening Displacement, Fracture Process in Concrete.

Non Destructive Testing : Rebound hammer, UPV and core test (method of testing, calculation of output and the interpretation of results)

Unit VI

Concrete mix design, Basic considerations and choice a mix proportions, various methods of mix designs including IS Code method.

Quality control and quality assurance of concrete, selection of control procedures, Measures of dispersion, Acceptance criteria, Quality management in concrete construction, probability and sampling theory, tests of significance, curve fitting and regression, repeatability and reproducibility, control charts. Role and limitations of statistics in concrete technology.

References

1. Concrete: Microstructure, properties and materials, P.K. Mehta and P.J.M. Monteiro, McGraw Hill, 2006.
2. Orchard D.F., Concrete Technology -Vol I., Applied Science Publishers (Fourth Edition) 1979.
3. Neville A.M and J.J. Brook; Properties of Concrete, Addison Wesley 1999.
4. Advance Concrete Technology by Zongjin Li, Published by John Wiley & Sons, Inc., Hoboken, New Jersey.

Course Code :

Course Name: Concrete Technology Lab

Course Outcome

1. The students should be able to test various building material.
2. The students should be able to interpret the quality of material.
3. The students should be able to analyze various properties of various building material.

List of Practicals:

Minimum 10 of the following

Test on Bricks and Blocks

1. Water absorption
2. Compressive strength

Test on Cement:

1. Determination of fineness of cement
2. Determination of Normal consistency.
3. Determination of setting time.
4. Determination of soundness.
5. Determination of compressive strength.

Test on Aggregate:

1. Determination of particle shape. Elongation and Flakiness index of aggregates.
2. Determination of finess modulus of aggregate and drawing particle size distribution curve.
3. Determination of water absorption and moisture content.

Test on concrete:

1. Determination of workability by slump test
2. Determination of workability by compaction factor test
3. Determination of workability by flow test
4. Determination of workability by Vee-bee test.
5. Determination of strength by cube strength of concrete
6. Determination of strength by N D T: Rebound hammer test, ultrasonic pulse velocity test.
7. Determination of cover by covermeter.

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Syllabus for Semester B.Tech III

Course Code : 25ES01TP0303

Course Name: Structural Analysis

L :3 Hrs., P :2 Hrs., Per Week

Credits: 4

Course Outcomes

After completion of this course, students will be able to,

1. Apply three moment theorem to analyze fixed and continuous beams.
2. Analyze beams and portal frames with and without sway using moment distribution method.
3. Use influence line diagrams as a tool for analysis of beams and trusses.
4. Analyze two hinged and three hinged arches.
5. Analyze indeterminate beams and frames using Slope deflection method.

Analysis of fixed and continuous beams by the **theorem of three moments**, along with consideration of sinking of supports.

Analysis of continuous beams, portal frames with and without sway by **Moment Distribution Method**.

Influence line for rolling loads on beams with concentrated and uniformly distributed loads, for reactions, maximum B.M. and S.F. Influence lines for forces in members of simple trusses.

Analysis of **Two-Hinged and three hinged arches** (calculation of S.F, B.M and normal thrust).

Analysis of indeterminate continuous beams and frames using **Slope deflection method** (maximum indeterminacy upto two).

Reference

1. Timoshenko S.P. & Young D.H. "Theory of Structures; International edition", McGraw Hill, 1965.
2. C.S.Reddy "Basics of Structural Analysis" McGraw Hill 3rd edition 2010
3. Ghali, A.; & Neville A.M. "Structural Analysis A Unified Classical and Matrix Approach (4th Edition)", E & F N Spon; Van Nostrand Reinhold, 1997.
4. Wang, C.K. "Indeterminate Structures", Prentice Hall of India; 2000.
5. Schodek, D.L. "Structures (4th Edition)", McGraw Hill International editions; 1983.

6. Meghre, A.S.; & Deshmukh, S.K. "Matrix Methods of Structural Analysis (1st Edition)", Anand; Charotar Publs, 2003.
7. Weaver J.M.; & Gere, W. "Matrix Analysis of Framed Structures (3rd edition)", Van Nostrand Reinhold; New York, 1990.
8. Jain, O.P. & Arya, A.S. "Theory and Analysis of Structures; Vol. I & II", Nemchand Brothers; Roorkee.
9. Krishnamurthy D., "Theory of Structures", J.K. Jain Brothers, 1976.
10. Rajsekaran S., Shankarasubramanian G. "Computational of Structural Mechanics", Prentice Hall of India Pvt. Ltd., New Delhi, 2001.

Course Code :

Course Name: Structural Analysis Lab

Course Outcomes

After completion of this course, students will be able to,

1. Analyze statically determinate & indeterminate structures.
2. Draw influence line diagrams for the central reaction in two-span continuous beams and for horizontal thrust in two-hinged parabolic arches.
3. Utilize structural analysis software to verify Shear Force Diagram (SFD), Bending Moment Diagram (BMD) and reactions for statically determinate and statically indeterminate structures.
4. Gain practical knowledge of photoelasticity to determine the material fringe constant.

List of practicals (Any 8)

5. To determine the deflection of two span continuous beams.
6. To find horizontal reaction of two hinged portal frame.
7. To draw influence line diagram of central reaction in a two-span continuous beam.
8. To determine horizontal reaction of two hinged parabolic arch and draw the influence line diagram for horizontal thrust.
9. Application of structural analysis software for verifying SFD, BMD for determinant beams subjected to different types of loads.
10. Verification of Three Moment Theorem using structural analysis software.
11. Verification of Moment Distribution Method using structural analysis software.
12. Verification of Slope Deflection Method using structural analysis software.
13. Study of Photoelasticity.
To determine the material fringe constant using compression method in two

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Syllabus for Semester B.Tech III

Course Code: 25ES01TH0304 Course Name: Technical Report Writing
L :1 Hrs., P : Hrs., Per Week Credits: 1

Course Outcome:

On the completion of course, the students will able to:

1. Interpret the technical information in various technical documents
2. Develop proficiency in written communication
3. Effectively represent themselves professionally
4. Learn various techniques used on software to reduce laborious work

Minimum 10 of following Assignments

1. Introduction to technical writing, Definition, Technical Writing vs. Essays, Need and role of charts and diagrams in technical writing
2. English Grammar for effective writing and use of punctuations
3. Letters (Business Letter, Resume Cover Letter, Thank-You Letter after an Interview, Follow-up Letter after an Initial Contact, Letter of enquiry, etc.); composition and examples
4. E-mail and its effective utilization
5. Curriculum Vitae v/s Resume and preparation of the same
6. Importance and Effective utilization of charts, figures, equations, diagrams, etc.
7. Other technical writing documents like Memos, Brochures/Newsletters, Fliers, PowerPoint Presentations; importance and application
8. Technical Research paper writing (interpretation, significance, lay out, structure)
9. Thesis writing (interpretation, significance, lay out, structure)

10. Technical Reports (Laboratory Reports, Design Reports, Site Visit Reports, Progress Reports)

11. Types of communication; one to one-telephonic interview; one to many-speech; many to one- PI; many to many-GD

12. Using Templates in Microsoft Word

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Course Code: 25ES01TH0306 Course Name: Finance Management for Civil Engg. Project
L : 2 Hrs., P : Hrs., Per Week Credits: 2

Course Outcomes

On successful completion of the course students will be able to;

1. Understand basic concept of accounting.
2. Prepare journal & ledgers of various transactions.
3. Prepare & analyzed financial statements.
4. Evaluate depreciation of construction equipment.

INTRODUCTION TO ACCOUNTING AND FINANCE FOR CIVIL ENGINEERS

Basic Accounting and concepts in finance: Accounting & Concepts in Finance, Generally Accepted Accounting Principles. **Journal and ledger:** record various transactions in journal & pass entry in ledger.

Financial statement: Profit & Loss account, Balance Sheet

Depreciation: straight line, reducing balance, sinking fund, **Inventory Management** - Economic Order quantity ,

Branch and department accounts: Account in PWD, Measurement book, E- Measurement, Muster Roll, First & final bills

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech III

Course Code:25ES01PR0307

Course Name: Field visit

L : 2 Hrs., P : Hrs., Per Week

Credits: 2

Field visit to various construction projects to enhanced the field explorature

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech IV

Course Code: 25ES01TP0401

Course Name: Water Supply Engineering

L :3 Hrs., P : Hrs.2, T: Per Week

Credits: 4

Course Outcomes

The students would be able to,

1. Understand and evaluate the necessity of water management with the basic knowledge of sources, water supply scheme and treatment processes.
2. Understand and analyse requirements of various components of water supply scheme for efficient operation and maintenance of the scheme.
3. Analyze various water demands, design periods, population forecasting and conveyance.
4. Evaluate different characteristics of water and analyze water treatment methods.
5. Apply the knowledge of various principles, theories and equations in process analysis and in the design of various components of water supply scheme.

Unit I

Introduction: Importance and need of planned water supply scheme, various components of water supply scheme.

Water Demand: Types of demand, factors affecting per capita demand, variation in demand, losses and theft,

Population forecast: Design period and population forecasting methods.

Sources of Water: Various sources of surface water and ground water for water supply scheme

Unit II

Water quality: Physical, Chemical and bacteriological characteristics of water, environmental significance of various characteristics for different beneficial use, water quality standards (BIS and other latest standards and amendments), standard for packaged water, general idea of waterborne diseases and its safety measures.

Portable Water treatment: Portable water, Objectives of treatment, various unit processes, treatment flow sheet of conventional water treatment plant and site selection criteria for water treatment plant.

Unit III

Aeration: Purpose, types of aerators and simple design of cascade aerator.

Coagulation and Flocculation: Significance, types of coagulants, coagulant doses, types of mixing and Flocculation devices.

Unit IV

Sedimentation: Principles, types of setting basins, efficiency of settling basin.

Simple design of plain sedimentation and sedimentation with coagulation tank. Brief idea about clariflocculator.

Filtration: Importance of filtration, mechanism of filtration, types of filters - RSF, SSF, Pressure filters. Simple design of SSF and RSF.

Unit V

Disinfection: Necessity, Mechanisms, criteria for good disinfectant, various types of disinfectants, Disinfection by chlorination using different forms of chlorine.

Conveyance of water: Hydraulic design aspects: Darcy's, and Hazen-William formulas.

Rising

main, pumps, storage and distribution systems.

Text books

1. Water and Wastewater Technology: Mark Hammer, Jr. and Mark Hammer, Pearson New International Edition
2. Water Supply and Sewerage By Terrence McGhee, Tata McGraw Hill Publication.
3. Water supply Engineering Vol. I : B. C. Punmia (Laxmi Publication)
4. Water supply & Sanitary Engineering : G. S. Birdie (Dhanpat Rai Publication)
5. Environmental Engg. Vol. I : S. K. Garg (Khanna publication.)

Reference

1. Water Supply Engg. By P. N. Modi (Standard Book House)
2. CPHEEO Manual of water supply & treatment
3. WHO guidelines for drinking water standard
4. Handbook for design of water treatment plants by Dr. A.G. Bhole IWWA publication.
5. Indian drinking water quality standards IS 10500

Course Name: Water Supply lab

Course Outcomes

The students would be able to,

1. Understand and evaluate the significance of various characteristics of water along with the knowledge of drinking water standards
2. Analyze various characteristics of water.
3. Understand the necessity of water treatment.
4. Analyze and suggest the type of treatment required for a given water sample to make it suitable for drinking or end use.
5. Remember and understand various instruments and methods used in water analysis.

Practicals:

Minimum 8 of the following:

1. Determination of pH
2. Determination of Conductivity
3. Determination Chlorides
4. Determination of Solid's
5. Determination of Acidity
6. Determination of Alkalinity
7. Determination of Dissolved Oxygen
8. Determination of Hardness
9. Determination of Available Chlorine in bleaching powder
10. Study practical on determination MPN and plate count tests.

Text Books:

1. Chemistry for environmental engineering and science by Sawyer, McCarty and Parkin,

McGraw-Hill Education Publications.

2. A Textbook on Experiments and Calculations in Engineering Chemistry by S. S. Dara, S. Chand Publications.

3. Advanced Practical Physical Chemistry by J. B. Yadav, Krishna's Prakashan Media (P) Limited.

Reference Books:

1. Standard Methods for the Examination of Water and Wastewater, American Public Health Association, American Water works Association, Water Environment Federation.

2. Civil Engineering Department, RCOEM, Laboratory Manual.

3. Indian drinking water quality standards IS 10500

4. CPHEEO Manual on Water Supply and Treatment

5. WHO guidelines for drinking water standard

Note: Use of python in all or any relevant practical is desirable.

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech IV

Course Code: 25ES01TH0402

Course Name: Reinforced Concrete Structures

L :3 Hrs., P : Hrs., T: Per Week

Credits: 3

Course Outcomes

On completion of the course, the students

1. Will be able to understand the basic concepts of reinforced concrete analysis and design.
2. Will be able to understand the behavior and various modes of failure of reinforced concrete members.
3. Will be able to analyze and design various reinforced concrete members viz. beam, slab, column, and footings by limit state design method as per I.S. 456-2000.
4. Will be able to understand, and design simple prestressed concrete beams.

Syllabus

Limit state Design Concept, Partial safety factors, load factors, stress-strain relationship, stress block parameters, failure criteria, Balanced failure mode and primary compression failure mode, Use of I.S. 456:2000.

Limit state of collapse in flexure: Design of one-way single span and continuous slabs, cantilever slabs.

Analysis and Design of Singly reinforced Beams, "T" and "L" beams. Design of Dog-legged Staircases.

Limit state of collapse under compression axially loaded short column with axial load, uniaxial moment, Interaction diagram/ Charts. Isolated footing for axially loaded columns.

Limit state of collapse in shear & bond: design of beam for shear, shear span, post cracking resistance, shear mechanism approach, shear failure modes and collapse load, interaction of shear, flexure and axial force.

Text Books

1. Reinforced concrete design, S.N. Sinha, Tata McGraw-Hill publications
2. Prestressed concrete, N Krishna Raju, Tata McGraw-Hill publications
3. RCC Design and detailing by Neelam Sharma, S.K. Kataria & Sons.
4. Practical Design of Reinforced concrete structure HPK Ghosh Karuna Moy, PHI Lear Pvt. Ltd.

References

1. FundamentalsofRCDesign,M.L.Gambhir,PHILearningPvt.Ltd.
2. LimitStateDesignofReinforcedconcrete,P.C.Varghese,PHILearningPvt.Ltd.
3. RCC Design,Menon&Pillai,TataMcGraw-Hill publications
4. ReinforcedConcrete:LimitStateDesign,AshokK.Jain,NemChandPublishers.
5. DesignofRCCstructuralElementsVol.I,II,S.S.Bhavikatti,NedageInternationalPublish.
6. LimitStateTheoryandDesignofReinforcedConcrete,KarveS.R.andShahV.L,Structu
res Publications, Pune. 2007.

BureauofIndianStandards,I.S:456-2000:Plainandreinforcedconcrete,Codeof
Practice,BureauofIndianStandards.BureauofIndianStandards1967.S.P.(16):DesignAidsforRei
nforcedConcrete. (Interaction Charts Only),BureauofIndianStandards andIS:1343-2012.

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech IV

Course Code : 25ES01TP0403

Course Name: Basics of Surveying

L : 3 Hrs., P : 2 Hrs., Per Week

Credits: 4

Course Outcomes: On successful completion of the course students will be able to;

1. Understand the basics of surveying and the role of a surveyor
2. Aware of the role of surveying in the site investigation before carrying out any construction work.
3. Understand the methods of chain and compass surveying
4. Recognize the concepts of leveling and contouring
5. Have the knowledge of various surveying equipment and the instruments such as theodolite, compass, etc.

Syllabus

Introduction: Definition of surveying, primary divisions of surveying, object and classification of surveying, principles of surveying, approximate methods of chain and tape surveying, unfolding and folding of a chain, instruments for chaining and taping, measurement by tape and chain, errors in tape measurements and their corrections, testing and adjusting of a chain, chaining on flat and sloping ground, obstacle in chaining, direct and indirect methods of ranging, methods of traversing, principle basic definitions, bearings and meridians, prismatic compass, surveyors compass, azimuthal and quadrantal bearing systems, true north and magnetic north, magnetic declination, local attraction and its correction.

Levelling and contouring: Definition of terms, principles of levelling, types of levels, levelling staffs, booking and reduction in field book, balancing of sights, errors, curvature and refraction, distance of visible horizon, reciprocal levelling, and its merits, contour, contour interval, horizontal equivalent, contour gradient, factors affecting contour interval, characteristics of contours, direct and indirect methods of contouring, uses of contour maps.

Area: Measurement of Area, Computation of area by Geometrical Figure, Area of offsets, Area from co-ordinates, Area by planimeter, Digital Planimeter

Volume: Definitions, Methods of Measurement of Volume. Measurement from cross-sections, Types of cross-sections and areas, prismoidal correction, curvature corrections

Theodolite: Vernier and microscopic theodolite, construction, temporary and permanent adjustments, measurements of horizontal and vertical angles, methods of repetitions and reiteration, sources of errors, checks in traversing, omitted measurements.

Text Book

1. Duggal S.K., *Surveying Volume-I*, Tata McGraw Hill Publisher, New Delhi, 2017.
2. Arora. K.R., *Surveying Volume-I*, Standard Publishers Distributors, 2019.
3. Punmia, B. C, Jain A. K, Jain A. K., *Surveying Volume-I*, Laxmi Publications, 2016.

Reference Book

1. Kanetkar TP, *Surveying and Levelling*, Pune Vidyarthi Griha Prakashan, Pune, 2006

Course Name: Basics of Surveying Lab

Course Outcomes: On successful completion of the course students will be able;

1. Understand the field conditions to plan and collect field data.
2. Prepare field notes from surveyed data.
3. Interpret survey data and compute area and volume.
4. Find the elevations from field data
5. Set out alignments of engineering constructions in the field.

Any Six

1. Measurement of fore and back bearing by compass
2. Measurement and booking of levels by auto level
3. Profile & cross section levelling
4. Traversing by plane table survey
5. Measurement of Horizontal angle by mechanical vernier theodolite
6. Measurement of Vertical angles by mechanical vernier theodolite
7. Traversing by total station
8. To plot a contour map
9. Area computation using digital planimeter

Two day survey camp on any one using advanced survey instruments

1. Contouring
2. Road Survey
3. Layouting
4. Location of Boundary and area calculation

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech IV

Course Code: 25ES01TH0405

Course Name: Construction Engineering &

Management

L : 3 Hrs., P : Hrs., Per Week

Credits: 3

Course Outcomes:

1. The students will be able to understand aspect of construction management.
2. The students will be able to evaluate the effect of implementation of resources.
3. The students will be able to analyze methods of cost control and material management.

General

Construction Economics; Resource levelling, Project Control and Material Management.

Unit - I : Construction Management

Planning for Construction Projects, Principles of Planning, Objectives, construction projects types and features, phases of a project, agencies involved and their methods of execution; role of client and contractor.

Process of development of plans and schedules, work break-down structure, activity lists.

Unit - II : Project Planning

Construction Planning, Project planning, milestone schedules, WBS, Concept of productivities, estimating durations, sequence of activities, activity utility data; Gantt Charts, Network techniques, CPM, PERT and Line of Balancing Techniques, Resource Planning, Scheduling, Productivity chart, Project tracking

Unit - III : Resource Planning

Resources leveling and smoothing. Crashing of networks, direct cost, Indirect Cost, Normal cost, crash cost, cost-time optimization, Use of application software for Project Management, Allocation of Resources.

Unit - IV : Construction Project Control

Construction Project Control Methodologies and Productivity Improvement: EVM, BIM, LBM. Earned Value Management- meaning and definition, Earned value, cost performance index, schedule performance index, cost variances, schedule variance, Final Cost, Final Project Duration. Funds: cash flow, sources of funds; Histograms and S-Curves. Common causes of time and cost overruns and corrective measures.

Unit - V : Material Management

Material Management: Functions, objectives, purchasing, procedures, Material Stock, Storing, Recording, Inventory control, Inventory control techniques, Break even analysis, ABC analysis, and EOQ models

Reference Books

1. Sengupta B., Guha M, (1998), "Construction Management and Planning" ,McGraw Hill Companies.
2. Construction Project Scheduling and Control, 3rd Edition, by Saleh Mubarak. ISBN : 978-1-118-86400-1
3. Peurifoy, R.L. Construction Planning, Methods and Equipment, McGraw Hill, 2011
4. Code for Practice for Project Management for Construction and Development, 5th Edition Wiley Blackwell by CIOB (The Chartered Institute of Building).
5. National Building Code of India 2016 (NBC 2016)
6. K.K. Chitkara, Construction Project Management, 2ndEdition, McGraw Hill Publication
7. Harold Kerzner Project Management CBS Publisers & Distributors 2ndEdition.
8. Frank Harris & Ronald Mc Caffer Modern Construction Management Blackwell Science 4th Edition.
9. Roy Pilcher Principles of Construction Management McGraw Hill London.
10. Kumar Neeraj Jha, Construction Project Management, Pearson Publication.
11. Project Management Body of Knowledge, 5thEdition, PMI Global Standard
12. Harvey Maylor, Project Management, 3rdEdition, Pearson7.K.K. Chitkara, Construction Project Management, 2ndEdition, McGraw Hill Publication
13. P G. Gahoit & B.M. Dhir, Construction Management, New age international (p) Ltd.
14. Srinath L, CPM & PERT, East-West Press Pvt. Ltd New Delhi.
15. N.D. Vora, Quantitative Techniques in Management, Tata McGraw Hill, New Delhi, 3rd Edition.
16. Daniel Halpin, Construction Management, 3rdEdition, John Wiley & Sons, Inc.

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech IV

Course Code: 25ES01PR0406

Course Name: Computational Tools for Civil

Engineering

L : 3 Hrs., P : Hrs., Per Week

Credits: 3

Design/Analysis based on softwares like

STAAD-Pro

Abaqus

Geo5

Other related software.

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech V

Course Code: 25ES01TP0501

Course Name: Transportation Engineering

L : 3 Hrs., P : 2 Hrs., Per Week

Credits: 4

Course Outcome

After the completion of the course in Transportation Engineering, the student should be able to:

1. Define and describe different objectives and requirements of Highway Development and Planning, Alignments.
2. Explain, Discriminate and Design various Geometric Features of Highways.
3. Understand, analyse, apply and evaluate the tests on Highway materials, construction methods and design the components of Pavements,
4. Understand, analyse, apply and evaluate the parameters of Traffic Engineering.

Unit I

Highway Development & Planning

Principles of Highway planning, Road development in India, Classification of roads, network patterns, Planning, Surveys. Highway Alignment: Requirements, Engineering Surveys.

Unit II

Highway Geometric Design

Cross Section elements, carriageways, camber, stopping & overtaking sight Distances, Horizontal alignment- Curves, design of super elevation, widening, transition curves, vertical curves.

Unit III

Pavement Design

Types of pavements & characteristic, Design parameters, Axle & Wheel load, tyre pressure, ESWL for dual Wheels, repetitions, Group Index & IRC method of flexible pavement design. Analysis of load & temperature stresses of rigid pavement, joints.

Unit IV:

Highway Construction materials, methods & Maintenance

Highway Materials: Properties of sub grade and pavement component materials, Tests on subgrade soils, aggregates and bituminous materials. Application of Geosynthetics, Earthen/Gravel road, Water Bound Macadam, Wet Mix macadam, Bituminous pavement, Cement Concrete pavement. Pavement failures, maintenance and strengthening measures.

Unit V

Traffic Engineering

Traffic characteristics (Road User, Driver and Vehicular characteristics), Traffic Studies (Volume studies, speed studies, parking studies and accident studies), Traffic Safety (Causes and types of accidents, Use of intelligent transportation system), Traffic controls (Road markings, Traffic signs, traffic signals)

TextBooks:

1. Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised, 10th Edition, Nem Chand & Bros, 2017
2. Kadiyalai, L.R., 'Traffic Engineering and Transport Planning', Khanna Publishers.
3. Partha Chakraborty and Animesh Das 'Principles of Transportation Engineering', PHI Learning,
4. Srinivasa Kumar, R, Textbook of Highway Engineering, Universities Press, 2011.

Reference Books

1. Paul H. Wright and Karen K. Dixon, Highway Engineering, 7th Edition, Wiley Student Edition, 2009.
2. Fred L. Mannering, Scott S. Washburn, Walter P. Kilareski, 'Principles of Highway Engineering and Traffic Analysis', 4th Edition, John Wiley

Course Code:

Course Name: Transportation Engineering lab

Course Outcomes

On successful completion of the course students will be able to;

1. Determine the various properties of aggregates
2. Determine the various properties of bitumen
3. Determine the various properties of soil subgrade

Test on Soil

1. CBR Test
2. AASHTO Classification
3. Test on Stabilized soil

Test on Aggregate

1. Specific Gravity & Water Absorption
2. Crushing Value test on Aggregate
3. Abrasion Value test on Aggregate
4. Impact Value test on Aggregate

Test on Bitumen

1. Penetration Test
2. Softening Point Test
3. Ductility Test
4. Specific gravity of bitumen

Study experiments

1. Bituminous Mix Design
2. Road Construction Machinery
3. Stripping Test on Bituminous Mix

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech V

Course Code: 25ES01TP0502

Course Name: Sanitary Engineering

L : 3 Hrs., P : 2 Hrs., Per Week

Credits: 4

Course Outcomes

The students would be able to,

1. Understand and evaluate the necessity of wastewater and sanitation management along with the basic knowledge of collection methodology, treatment processes and disposal methods.
2. Understand and analyse requirements of various components of wastewater treatment scheme for efficient operation and maintenance of the scheme.
3. Analyze various sewer appurtenances, sewer designs, sludge and rural sanitation systems
4. Evaluate different characteristics of wastewater and analyze wastewater treatment methods.
5. Apply the knowledge of various principles, theories and equations in process analysis and in the design of various components of sewerage system

Unit I:

General Aspects of waste water sanitation and treatment: Necessity of sanitation and treatment, classification of waste water, system of sanitation, patterns of sewage collection systems.

Estimation of storm water and sanitary waste water.

Conveyance of sewage: Types, hydraulic design of sewer.

Unit II:

Laying of sewer: Procedure for laying of sewer to grade, testing of sewer line.

Sewer Appurtenances: Manhole, street inlets, storm water overflows, inverted syphons, flushing, ventilation, drop manhole, lamp hole, clean out and catch basin.

House plumbing systems: Ideal requirements of HPS, types of HPS, anti-syphonage.

Unit III:

Characteristics of sewage: Physical, chemical and biological characteristics of wastewater and its significance, BOD rate constant, BOD equation and its application to simple analysis.

Rural sanitation: Pit privy, aqua privy, bio-gas recovery. Septic tank including soak pit, (including design problem), sullage collection and disposal.

Wastewater treatment: Wastewater treatment flow sheet and its site selection,

Unit IV:

Preliminary treatment: Screens, Grit chambers

Primary treatment: Primary Settling Tank (including simple design).

Unit V:

Secondary treatment: Types of secondary treatment, principle of biological treatment, aerobic

and anaerobic treatment processes, activated sludge process and trickling filter.

Treatment of sludge: sludge digestion, sludge drying beds.

Disposal of wastewater: Disposal standards, disposal by dilution, disposal by land treatment.

Text Books :

1. B.C.Punmia," Waste Water Engineering" - Laxmi Publication

2. G.S.Birdie, "Water Supply & Sanitary Engineering"- Dhanpat Rai Publishing Company (P)

Ltd.

3. Metcalf & Eddy, “Wastewater Engineering: Treatment and Resource Recovery”

Publisher:

McGraw Hill.

4. S.J. Arceivala, “Wastewater Treatment and Disposal”, Marcel Dekker,1981.

5. Fair G M, Geyer J C and Okun, “Water and Wastewater Engineering”, Vol II, JohnWiley Publications, 1969

Reference Books :

1. S. K. Garg, Environmental Engineering Vol-II (Khanna Publication)

2. Davis & Cornwell, Introduction to Environmental Engineering, McGraw Hill, International, 1998.

3. CPHEEO manual on sewerage and sewage treatment

Course Name: Sanitary Engineering lab

Course Outcomes:

The student would be able to:

1. Understand and evaluate the significance of various characteristics of wastewater along with the knowledge of disposal standards
2. Analyze various characteristics of wastewater.
3. Understand the necessity of wastewater treatment.
4. Analyze and interpret experimental data obtained from wastewater samples and suggest the type of treatment required for its safe disposal.
5. Remember and understand various principles and instruments used in wastewater analysis.

PRACTICALS:

Minimum Eight Experiments

1. To determine oil & grease content of a given wastewater sample using separating funnel
2. To determine optimum coagulant dosage using Jar test apparatus
3. To determine of TDS of given sample using TDS meter
4. To determine moisture content of given sample as per IS 1350:1984 (BIS 1984).
5. To determine ash content and volatile matter and fixed carbon content of given sample as per IS 1350:1984 (BIS 1984).
6. To determine sludge volume index (SVI) in the given wastewater sample.
7. To determine calcium and magnesium ions present in the given sample.
8. To determine Mixed liquor suspended solids and mixed liquor volatile suspended solids of a given wastewater sample.
9. To determine the Biochemical oxygen demand (BOD) of a given wastewater sample.
10. To study the determination of Chemical Oxygen Demand (COD) of a given wastewater sample
11. To determine percentage of available chlorine in given sample containing bleaching powder.
12. To determine sulphates using spectrophotometer.
13. To determine turbidity of a solution using Nepheloturbidimeter.

Text Books :

1. B.C.Punmia, " Waste Water Engineering" - Laxmi Publication
2. G.S.Birdie, " Water Supply & Sanitary Engineering"- Dhanpat Rai Publishing Company (P) Ltd.
3. Metcalf & Eddy, “Wastewater Engineering: Treatment and Resource Recovery” Publisher: McGraw Hill.
4. S.J. Arceivala, “Wastewater Treatment and Disposal”, Marcel Dekker, 1981.
5. Fair G M, Geyer J C and Okun, “Water and Wastewater Engineering”, Vol II, John Wiley

Publications, 1969

Reference Books:

1. Standard Methods for the Examination of Water and Wastewater, American Public Health Association, American Water works Association, Water Environment Federation.
2. Civil Engineering Department, RCOEM, Laboratory Manual.
3. CPHEEO manual on sewerage and sewage treatment.
4. IS 3025: 1987 Methods of sampling and test (physical and chemical) for water and

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech V

Course Code: 25ES01TH0503
L : 3 Hrs., P : Hrs., Per Week

Course Name: Estimation & Costing
Credits: 3

Course Outcomes

The students should be able to,

1. Read the drawings, understand the details, identify the appropriate items and calculate the quantity of items involved in civil Engineering work including earthwork of road / canal and reinforcement of RCC members by applying the basic principles of computation.
2. Prepare approximate and detailed estimate of load bearing & framed structure and various civil engineering works. Evaluate the financial aspect of project.
3. Draft the specifications of various items involved in civil engineering works considering the object, type and principles of specification. Analyze the unit rate of item referring the specification of item and local or regional current market rates of materials and labors.
4. Prepare contract documents, float tender and select proper agency for execution of work according to types of contract. Supervise the work, prepare bills and maintain the accounts of works. Collect logical information and evaluate the present fair value of property for various purpose of valuation & Fixation of standard rent.

UNIT I

- ☐ Definition and Purpose of estimate, Mode and Unit of measurement of various items as per IS1200 , Work charge establishment, Contingencies, PWD as construction agency, Technical sanction, Administrative approval, Price escalation, Current schedule of rates .
- ☐ Types of estimate, Objective, use and methods of approximate estimate, Estimate of earthwork of road & canal.
- ☐ Detailed estimate of RCC members with detailed calculation of reinforcement and bar bending Schedule.

UNIT II

- ☐ Methods of detailed estimate Detailed estimate of building for RCC framed structure.

UNIT III

- ☐ Contract, Contract documents, essentials of contract, major conditions of contract & clauses, Types of contract with advantage & disadvantage and its suitability, Earnest money and Security deposit.
- Tender notice, Tender documents, Types of tender, Acceptance and rejection of tender, unbalanced tender, Pre-qualification & Post qualification of contractor, Drafting of short tender notice, Liquidated damage, arbitration.

UNIT IV

- Specification definition, Objectives, Principles of writing specification, Sources of information, Types of specifications, developing and drafting of details specifications of important items of building and roadworks.
- Rate Analysis: Definition, Purpose, factors affecting, Task works per day, Rate analysis of important items of work. Comparison of analyzed rates with CSRates.

UNIT V

- Valuation: Purpose, Factor affecting, Cost, price & value, Definition of various values used, Freehold & lease hold property, Methods of valuation of property, valuation of residential building
- Outgoing, gross income, net income, sinking fund, rent fixation, obsolescence, depreciation and its methods .capitalized value , yearurchase.

NOTE : Questions based on unit I and unit II are compulsory and set for 15 marks each.

Remaining three questions set on units III, IV and V with internal choice for 10 marks each.

Duration of question paper is 4 hours.

Text Books

- M. Chakraborti ,Estimating, costing, specification and valuations in civil engineering, edition 2010 and latest,UBS publication culcutta.

References

- B. N. Dutta , Estimating and costing ,Publisher S. Dutta & company lucknow, Feb 1999 edition. UBS publisher distributors Ltd, 5, Ansari road ,Newelhi.
- S. P. Chandola& V.N.Vazirani, Estimating and costing , Edition 2010 and latest , khanna Publishers, 2-B, Nath market, Naisarak,elhi.
- S.C. Rangwala Estimating Costing and valuation , edition 2011, Charotar publishing house, opposite Amul dairy, Court roadAnand.
- D. D. Kohli ,.Estimating costing and accounts (civil), 10th edition, S Chand andompany.
- Roshan Namavati ,Valuation of Real Properties

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech V

Course Code: 25ES01TH0504

Course Name: Advanced Concrete Structures

L : 3 Hrs., P : Hrs., Per Week

Credits: 3

On completion of the course, the students:

1. Will demonstrate the ability to understand the behavior and modes of failure of reinforced concrete members such as statically indeterminate continuous beams, short and slender columns, biaxially bent columns, footings (single and combined), staircases and retaining walls etc.
2. Will demonstrate the ability to analyze and design reinforced concrete members such as statically indeterminate continuous beams, short and slender columns, biaxially bent columns, footings (single and combined), staircases and retaining walls etc.
3. Will demonstrate the ability to relate the knowledge and design skills taught in class to real world problems & implement the technique in designing.

Unit I : Limit state of collapse in flexure: Analysis and design of doubly reinforced rectangular, T and L section Limit state collapse in Torsion: Concept of interaction of torsion, shear and flexure, analysis and design of rectangular sections for torsion, shear and flexure. Limit state of serviceability: Deflection calculations for beams and one way slabs.

Unit II : Moment redistribution, analysis and design of fixed beams, propped cantilever, two span symmetric continuous beam.

Unit III : Analysis and design of columns subjected to biaxial moments, design of long columns Analysis and design of portal frames (single bay single storey), hinged or fixed at base, design of hinge and design of foundation.

Unit IV : Design of isolated footings for uniaxial and biaxial bending for square, rectangular and circular section Design of combined footing □ Rectangular footing □ Strap beam footing

□ Trapezoidal footing □ Raft footing

Unit V : Design of RCC two way slab with various end conditions using with IS code

coefficient. Design of RCC cantilever and counter fort retaining wall.

Reference Books :

1. Illustrated Design of RC Buildings by V. L. Shah and S. R. Karve, Standard Publisher 2.

Reinforced concrete design by S. Sinha , Tata McGraw Hill Publications 3. Fundamentals of

RC Design, M. L. Gambhir, PHI Learning Pvt. Ltd. 4. Limit State Design of Reinforced

concrete, P. C. Varghese, PHI Learning Pvt. Ltd. 5. RCC Design, Menon & Pillai, Tata McGraw-

Hill publications 6. Limit state Design of reinforced conc. (As per IS 456:2000), Dr. BC

Punmia, A.K. Jain, Laxmi publications. 7. Reinforced Concrete: Limit State Design, Ashok K.

Jain, Nem Chand Publishers. 8. Practical Design of Reinforced Concrete Structures, Ghosh

Karuna Moy, PHI Learning Pvt. Ltd. 9. Limit State Theory and Design

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech V

Course Code: 25ES01TH0505-1 Course Name: Advanced Concrete Technology
L : 4 Hrs., P : Hrs., Per Week Credits: 4

Course Outcome

1. The students will be able to understand the microstructure of the hydration product of cement.
2. The students will be able to analyse and interpret fresh and hardened properties of concrete.
3. The students will be able to demonstrate different types of concrete with its properties and uses.
4. The students will be able to explore to use methods for concrete mix design with quality control approach.

Unit I

Structure of Concrete : Introduction, Structural Levels, Structure of Concrete in Nanometer Scale: C – S – H Structure, Transition Zone in Concrete, Micro-structural Engineering

Unit II

Fresh Concrete : chemical and physical processes of hydration and interaction; Admixtures: Review of types and classification; chemical composition; origin and manufacture; actions and interactions; usage; effects on properties of concretes, methods of test; applications. Rheology of concentrated suspensions, pastes, mortars and concretes; workability, segregation and bleeding. Theory and principles governing the correct placing and compaction of concrete.

Unit III

Hardened Concrete: Strengths of Hardened Concrete, Stress – Strain Relationship and Constitutive Equations, Dimensional Stability—Shrinkage and Creep, Durability Impact, Dynamic and fatigue behaviour of concrete, behaviour of concrete under fire.

Unit IV

Fiber-Reinforced Cementitious Composites, High-Strength Cementitious Composites, Polymers in Concrete, Shrinkage-Compensating Concrete, Self-Compacting Concrete, Engineered Cementitious Composite, High-Volume Fly Ash Concrete, Structural Lightweight Concrete, high grade concrete

Unit V

Concrete Fracture Mechanics: Introduction, Linear Elastic Fracture Mechanics, The Crack Tip Plastic Zone, Crack Tip Opening Displacement, Fracture Process in Concrete.

T

Non Destructive Testing : Rebound hammer, UPV and core test (method of testing, calculation of output and the interpretation of results)

Unit VI

Concrete mix design, Basic considerations and choice a mix proportions, various methods of mix designs including IS Code method.

Quality control and quality assurance of concrete, selection of control procedures, Measures of dispersion, Acceptance criteria, Quality management in concrete construction, probability and sampling theory, tests of significance, curve fitting and regression, repeatability and reproducibility, control charts. Role and limitations of statistics in concrete technology.

References

1. Concrete: Microstructure, properties and materials, P.K. Mehta and P.J.M. Monteiro, McGraw Hill, 2006.
2. Orchard D.F., Concrete Technology -Vol I., Applied Science Publishers (Fourth Edition) 1979.
3. Neville A.M and J.J. Brook; Properties of Concrete, Addison Wesley 1999.
4. Advance Concrete Technology by Zongjin Li, Published by John Wiley & Sons, Inc., Hoboken, New Jersey.

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech V

Course Code: 25ES01TH0505-2

Course Name: Environmental Impact Assessment

L : 4 Hrs., P : Hrs., Per Week

Credits: 4

Course outcomes

At the end of this course students will demonstrate the ability to carry out;

1. Environmental impact and risk analysis.
2. Life cycle assessment

Unit - I

Introduction : Evolution of EIA; EIA at project; Regional and policy levels; EIA process in India and other countries; EIA methodologies; Screening and scoping criteria; Rapid and Comprehensive EIA

Unit - II

EIA methodologies : Baseline data collection; Prediction and assessment of impacts on physical, biological and socio-economic environment .Environmental health Impact assessment

Unit - III

Methods of Impact Analysis : Environmental clearance procedure in India ,Cost benefit analysis& its dimensions, Environmental audit, Role of GIS in EIA-base line study , risk assessment & management,

Unit - IV

Environmental Risk Analysis, Fundamentals of hazards, exposure & risk assessment, Basic Steps in risk management- hazard identification, exposure assessment & risk characterization, Quantified risk assessment for industrial accidents, Design of risk management program , Risk assessment application to environment management problems.

Unit - V

Life cycle assessment, stages in LCA of a product, energy and resource balance, Environmental management systems

Text Books:

1. A.Chadwick, Introduction to Environmental Impact Assessment, Taylor & Francis, 2007.
2. Larry, W. Canter, Environmental Impact Assessment, McGraw Hill Inc. Singapore, 1996.
3. Rau, GJ. And Wooten, C.D., Environmental Impact Analysis Handbook, McGraw Hill 1980
4. CPCB, MoEFCC guidelines for EIA

Reference Books

1. R. Therirvel, E. Wilson, S. Hompson, D. Heaney, D. Pritchard, Strategic Environmental Assessment Earthscan, London, 1992.
2. A. Gilpin, Environmental Impact Assessment-Cutting edge for the 21st century, CUP, London, 1994.
3. Paul, A Erickson, A Practical Guide to Environmental Impact Assessment, Academic Press, 1994.
4. Suresh, K.D., Environmental Engineering and Management, SK Kataria Publishers, New Delhi, 2002.
5. Gupta, K.R., Environmental Legislation of India, Atlantic Publishers, 2006.

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech V

Course Code: 25ES01TH0505-3 Course Name: Advanced Structural Analysis
L : 4 Hrs., P : Hrs., Per Week Credits: 4

Course Outcome

On completion of the course students will be able to;

1. know the deflected shape of structures for understanding response due to various loads.
2. analyze the beam and frames for vertical and horizontal loads and draw SFD and BMD.
3. calculate forces in members of truss due to load by stiffness method.
4. analyze the non-prismatic beam for understanding its behavior

Syllabus

Approximate Method structural analysis for multistoried frames with lateral loads (portal and cantilever method), Approximate methods for vertical loads i.e. Substitute method etc. (Max three bay three storeys)

Analysis of non-prismatic fixed beams by **Column analogy Method**, Application to beams, Calculations of stiffness factors and carryover factors for non-prismatic member.

Introduction to **Flexibility Method** of structural analysis, influence coefficients, Choice of base determinate structure and redundant forces, compatibility equations and solution of simple beam problems with sinking effect, up to 3 degree of indeterminacy.

Basic concept, Degree of Freedom. Formulation of elemental/local stiffness matrix and global stiffness matrix for **Plane Truss**. Transformation Matrix, Assembly of Global/ Structural stiffness matrix up to (8x8). Member load matrix including lack of fit, temperature, Assembly of Global/ Structure load matrix, Solution to problems with maximum degree of freedom three.

Formulation of element/local **Stiffness Matrix** and global stiffness matrix for beam members (without axial deformations) for **Continuous Beams**, Assembly of global/ structural stiffness matrix, Member load matrix due to various type of loading, Assembly of global/ structure load matrix up to Three Elements. Solution to problems with maximum degree of freedom Three.

Formulation of element/ local Stiffness Matrix and global stiffness matrix for **Plane frame** members (without axial deformations), Transformation matrix Assembly of global/ structural stiffness matrix, Member load matrix due to various type of loading, temperature, Assembly of global/ structural load matrix. Solution to Plane frame problems with maximum degree of freedom three. Introduction to FEM

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech V

Course Code: 25ES01TH0505-4

Course Name: Geotechnical Explorations

L : 4 Hrs., P : Hrs., Per Week

Credits: 4

Course Outcomes

1. Students will able to identify and determine the properties of soil.
2. Students will understand the principles of exploration, Methods of exploration,
3. Students will analyses the advance methods of exploration.
4. Students will able to undertake various field techniques and its interpretations.
5. Students will able to prepare the geotechnical exploration report.

Unit I

IMPORTANCE AND OBJECTS OF GEOTECHNICAL EXPLORATION:

Principle methods of subsurface exploration as per IS 1892, Methods of open exploration its suitability. Types of borings, selection of suitable boring method; stabilization of boreholes; number, location and depth of boring for different structures, Types of soil samples & their suitability, precautions in sampling, parameter for sampler design, Planning of subsurface exploration program for major civil engineering projects

Unit II

INDIRECT METHODS OF EXPLORATION:

Seismic refraction method, electrical resistivity method, qualitative and quantitative interpretation of test results, limitations.

Unit III

FIELD INVESTIGATION (Sampling Method):

Standard Penetration test as per IS2131, Static Cone and dynamic cone penetration tests as per IS 4669.3, interpretation of test results and correlations for obtaining design soil parameters of cohesive and cohesion less soil. Determination of bearing capacity by above criteria.

Unit IV

FIELD INVESTIGATION (In-situ Method):

Field vane shear test, Plate load test as per IS 1888, Pressure meter test – Principle, equipment, use & interpretation of results.

Unit V

ROCK TESTING

Test conducted on rocks, Core, RQD, underwater sampling,

Soil survey and Mapping: methods of soil survey introduction of remote sensing.

Unit VI

REPORT & INSTRUMENTATION

Sub-surface Investigation Report: Salient features and boring logs; boring and sampling records handling

Advance Equipment's used in boring and samplings.

Text Books:

1. Basic and Applied soil mechanics: Gopal Ranjan & A.S. Rao, New Edge International Ltd., (2004)
2. Soil Mechanics and Foundation Engineering: K.R. Arora, Standard Publisher and Distributor, 1989 and later.
3. Foundation Analysis & Design: Bowles, J.E., McGraw Hill (1996)
4. . J. E. Bowles, "Foundation Analysis and Design", McGraw Hill Companies, 1997.
5. M. D., Desai, "Ground Property Characterization from In-Situ Testing", Published by IGS-Surat Chapter, 2005.
6. M. J., Hvorslev, "Sub-Surface Exploration and Sampling of Soils for Civil Engineering Purposes", US Waterways Experiment Station, Vicksburg, 1949.

Reference books:

1. Soil Mechanics in Theory and Practice: Alam Singh, Asia Publisher and Distributor, 1975
2. Advanced Foundation Engineering: Murthy VNS, CBS publishing, (2007)
3. Foundation Engineering Handbook: Fang, H.Y., CBS publishing, (2004)
4. IS 1892, IS 2131, IS 4669.3, IS 1888 Codes,

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech V

Course Code: 25ES01TH0505-5
L : 4 Hrs., P : Hrs., Per Week

Course Name: Railway Engineering
Credits: 4

Course Outcome

1. Students should be able to explain and describe various terms in railway engineering
2. Students should be able to Explain, Discriminate and design various geometric features of railway track.
3. Students should be able to Define and describe the construction and maintenance steps of railway track.

UNIT - I

Railway track gauge, alignment of railway lines, engineering surveys construction of new lines, tracks and track stresses

UNIT - II

Rails, sleepers; ballast; subgrade and formation, rack fittings and fastenings, creep of rails, geometric design of track, curves and super-elevation

UNIT - III

Points and crossings, track junctions and simple track layouts; rail joints and welding of rails; track maintenance, track drainage

UNIT - IV

Modern methods of track maintenance, rehabilitation and renewal of track; tractive resistance and power, railway stations and yards; Railway tunnelling; signalling and interlocking; maintenance of railways and high speed trains.

Text Books

1. Railway Engineering: Saxena and Arora, Dhanpat Rai & Sons
2. Railway Engineering : Rangawala

Reference Books

1. Railway Tracks Engineering: J.S.Mundrey, Tata McGraw-Hill Publishing

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech V

Course Code: 25ES01TH0505-6

Course Name: Engineering Geology

L : 4 Hrs., P : Hrs., Per Week

Credits: 4

Course Objectives:

1. To Understand the Earth System
2. Teach fundamental geomorphic and dynamic processes on the Earth
3. To know about the material present i.e. minerals and rocks
4. understand Structural deformations and impacts
5. Earthquakes and causes, effects, zones
6. Know subsurface exploration methods
7. Know groundwater availability and domains; recharge
8. Teach consideration for site selection for projects.

Scope:

Geodynamics: Internal structure of the earth, Continental drift and Plate Tectonics.

Geomorphology:

Geomorphological processes and classification, weathering and erosion, landforms.

Mineralogy: Definition and classification of Minerals, Megascopic physical properties of Minerals,

Overview of silicate family minerals (Quartz, Feldspar, Olivine, Pyroxene, Amphibole, Mica).

Petrology: Rock cycle; Genesis, Textures, Forms/structures, classification and strength aspects of Igneous,

sedimentary and Metamorphic rocks. Geomechanical properties of rocks, Rock as construction aggregate and road metal.

Structural Geology: Rock Deformation; Attitude of rocks, Mechanism of formation, nomenclature

classification and field identification of Folds, Joints, Faults. Problems on Strike, Dip, thickness and depth of strata.

Stratigraphy: Scope & application of Stratigraphic principles, overview of Indian Stratigraphy.

Introduction to Rock Mechanics; Concept of stress and strain in rocks, rock mass classification and rating,

RQD, etc. Surface and subsurface geological investigations; Drilling, core logging, Geological, geophysical and remote sensing investigations; Scope of rock excavation, blasting techniques, Geological

criteria for design & construction of Dams, Bridges, Tunnels, buildings.

Mass movements, Stability of Slopes & Landslides: Causes and prevention.

Engineering Seismology: Causes and effects of earthquakes; Seismic waves, magnitude, intensity, seismic

zoning & seismic Zones of India; Tsunamis.

Geohydrology: Rocks as aquifers, occurrence and availability of Groundwater; Groundwater investigations, groundwater development and management in India; Techniques of groundwater recharge.

Course Outcomes:

1. Generate global vision of Earth processes
2. Identify the subsurface material
3. Knows reason of phenomena like Earthquakes and zoning
4. Know about groundwater availability zones and groundwater management
5. Know megascopic and mechanical properties of rocks
6. Know field procedures of subsurface exploration
7. Generate subsurface profiles and map structures
8. Know considerations for site selection for engineering projects

REFERENCE:

1. KVGK Gokhale, Principles of Engineering Geology, BS Publications.
2. F.G.Bell, Fundamentals of Engineering Geology, BS Publications, 2005.
3. Parbin Singh, Engineering Geology, S K Kataria and Sons, Sixth Edition.
4. Homes Arthur and Homles Doris, Principles of Physical Geology, ELBS Publications, 1987.
5. F.G. H. Blyth and M.H. de Freitas, A geology for Engineers, Elsevier, Seventh Edition.

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VI

Course Code: 25ES01TP0601

Course Name: Design of Steel Structures

L : 3 Hrs., P : 2 Hrs., T: 1 Per Week

Credits: 4

Course Outcomes

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

1. Learn the analysis and design methods of structural steel
2. Understand the fundamentals of structural steel fasteners and connections
3. Analyze steel structures and their members, under the action of different loads
4. Design of simple structural steel connections and elements of steel structures like tension members, compression members, beams and columns

Unit I

Steel as a structural material, various grades of structural steel, properties, various rolled steel sections and their properties, Introduction to IS 800:2007, 808, 816, 875 etc, Design philosophies, Plate(Local) buckling, Classification of cross-sections (flexure).

Structural Steel Fasteners: Introduction, Behavior of bolted and welded connections (types, designations, properties, permissible stresses), failure of bolted and welded joints. Strength of bolt and strength of weld, Efficiency of joints, Design of simple, bolted and welded connections.

Unit II

Design of axially loaded members (a) Tension members: Introduction, Net area, Shear-lag.

(b) Compression members: Introduction, Euler's buckling theory, Classification of cross-sections (buckling), Imperfection factor.

Analysis of roof truss of an industrial building : Introduction to different components of industrial shed, types of trusses, assessment member forces under various loads (dead load, live load and wind load).

Unit III

Design of simple beams: Introduction, Flexural behaviour of beams which does not undergo lateral buckling, Flexural behaviour of beams which undergo lateral buckling, Shear behaviour, Web buckling and Crippling, Design strength in bending, Design strength in shear, Limit state serviceability – Deflection, Introduction to plate girder.

Unit IV

Design of columns: Introduction, Design of axially loaded rolled sections, built up columns, laced and battened columns, Column base: slab base and gusseted base under axial loads.

Text Books

1. Design of steel structures by N. Subramanian (Using IS: 800-2007) Publisher: Oxford University Press, India
2. Limit State Design of Steel Structures by S. K. Duggal Publisher: Tata Mc Graw Hill
3. Limit State Design of Steel Structures : Based on IS: 800-2007 by Dr. Ramchandra, Virendra Gehlot Scientific Publishers
4. Design of steel structures by K. S. Sairam Publisher: Pearson Education

References

1. McCormac, J. C., Nelson, J.K. Jr., Structural Steel Design. 3rd edition. Prentice Hall, N.J., 2003.
2. Galambos, T.V., Lin, F.J., Johnston, B.G., Basic Steel Design with LRFD, Prentice Hall, 1996
3. Steel Design Manual by ELBS Publications
4. Salmon, C.G. and Johnson, J.E., Steel Structures: Design and Behavior, 3rd Edition, Harper & Row, Publishers, New York, 1990.

Course Name: Design of Steel Structures lab

Course Outcomes

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

1. Analyze and design bolted, welded connections, tension members, compression members, beams and columns, and understand their detailing
2. Develop analytical and design skills while working in a team

Term Work

Design of simple connections

☐ Welded

☐ Bolted

Design of steel members for

☐ Tension

☐ Compression

☐ Flexure

Design of steel frame using appropriate software preparing detailed drawing using Auto CAD for all steel

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VI

Course Code: 25ES01TH0602
L : 3 Hrs., P : Hrs., Per Week

Course Name: Foundation Engineering
Credits: 3

Course Outcomes

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

1. Plan the Geotechnical exploration program for major civil engineering structure.
2. Analyze the stability of slopes and solve the field problems.
3. Predict the earth pressure on the resisting structures.
4. Understand various geotechnical designs and select type of foundations.
5. Study the various techniques of ground improvement and apply them on field.

Unit I

Geotechnical Exploration

Principle methods of subsurface exploration, IS 1892, geophysical methods, open pits and shafts, types of boring, number, location and depth of boring for different structures, types of soil samples and samplers. Collection & shipments of samples, plotting of bore log and sampling record. Standard penetration test, corrections for field N- values & correlations for obtained design soil parameters, pressuremeter test.

Unit II

Lateral Earth Pressure

Earth pressure at rest, active and passive pressure, general & local states of plastic equilibrium in soil. Rankine's and Coulomb's theories of earth pressure, Effects of surcharge, submergence.. Graphical construction by Culmann for simple cases of wall- soil system for active pressure condition. Concept of reinforced earth retaining wall.

Unit III

Stability Of Slopes

Causes and types of slope failure, stability analysis of infinite slopes and finite slopes, center of critical slip circle, slices method and friction circle. Slopes with pore pressure consideration. Taylor's stability numbers & stability charts, method of improving stability of slopes, types, selection and design of graded filter, concept of soil nailing.

Unit IV

Shallow Foundation

Different types of shallow foundation and modes of failure. Bearing capacity of soil By Terzaghi's theory, Design criteria and codal provisions. Effect of water table on bearing capacity,

correction factor for shape and depth of footing. Bearing capacity estimation on sand and clays from N-value, factor affecting bearing capacity. Settlement of shallow foundation: elastic and consolidation settlement, differential settlement, control of excessive settlement. Proportioning the footing for equal settlement. Plate load test: Procedure, interpretation for bearing capacity and settlement prediction, limitations, IS code method.

Unit V

Pile Foundations

Classification of piles, constructional features of cast-in-situ & pre-cast concrete piles. Pile driving methods. Load transfer mechanism of axially loaded piles. Pile capacity by static formula & dynamic formulae. Pile load test and interpretation of data, group action in piles, spacing of piles, negative skin friction and its effect on pile capacity, general feature of under reamed piles. Settlement of pile group, Introduction to IS2911.

Unit VI

Ground Improvement

Introduction to different methods of ground improvement.

Text Book

1. Basic and Applied soil Mechanics by Gopal Ranjan & A.S. Rao, New Edge Int. Ltd. (2004)
2. Foundation analysis and design by Bowles J. E., McGraw Hill International publishing (1995)
3. Soil Mechanics in Theory and Practice by Alam Singh, Asia Publisher and Dist. (1975 & later).
4. Geotechnical Engineering : A practical problem solving approach by Sivakugan N., Das B. M., Cengage Learning, 2011

Reference

1. Advanced Foundation Engineering: V. N. S. Murthy, CBS Publications (2007)
2. Principles of Foundation Engineering: B. M. Das, Cengage Publications (2011)
3. Foundation Engineering Manual : By N. V. Nayak
4. NPTEL Course
5. IS codes

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VI

Course Code: 25ES01TP0603

Course Name: Flow through pipes & channels

L : 2 Hrs., P : 2 Hrs., Per Week

Credits: 3

Course Outcomes

The students would be able to :

1. Understand and describe various principles of flow through pipes, open channel and centrifugal pumps.
2. Apply basic principles of flow in pipes and open channel to solve fluid flow problems in steady state condition.
3. Analyse and design various components of fluid flow system and comparison of possible solutions.
4. Compare and interpret the data / information/concepts/principle and used for solving incompressible fluid flow problems in steady state condition.

Unit I : Flow through Pipes

Hydraulically smooth and rough pipe; frictional resistance to flow; Darcy-Weisbach & Hazen-William equation, moody's diagram. Hydraulic gradient line and Total energy gradient line.

Unit II :

Pipes in series and parallel, branched pipe Water hammer pressure, three reservoir problem, flow through siphon; Concept of drag lift and its simple application.

Unit III : Flow through Open Channel

General : Introduction to open channel flow; Types of channel , Geometrical properties, Types of flow in open channel, Chezy's equation; Manning's equation; determination of discharge; normal depth; most economical channel section.

Unit IV

Uniform Flow : Basics.- continuity, energy and momentum equations, Characteristics of uniform flow, computations of uniform flow.

Non uniform flow (Critical Flow) : Basics and computations; Applications of specific energy concept, specific energy curve, gradual transition of channels, humps, width restrictions.

UNIT V

Gradually Varied Flow (GVF): Introduction to GVF; Equation of gradually varied flow; analysis of GVF: Classification and characteristics of surface profiles; Computations of water surface profile using direct step method.

Rapidly Varied Flow (RVF):, theory and classification of hydraulic jump, Elements and characteristics of hydraulic jump in a rectangular channel. Length, height and application of hydraulic jump. Energy dissipation.

UNIT VI

Dimensional analysis: Definition and use, fundamentals and derived dimensions, methods, application of methods to develop relationship in variables. Dimensionless numbers and its significance

Theory of model : Similitude, geometric, kinematic and dynamic similarities, Reynolds and Froude number law its significance.

Text Books

1. Hydraulics and fluid mechanics including Hydraulic machines by Dr. P. N. Modi and S. M. Seth, Latest edition, Standard book house (2002).
2. Theory and application of fluid mechanics by K Subramanya ,Tata McGraw Hill Publishing Company Ltd New Delhi.
3. A textbook of Fluid Mechanics & Hydraulic Machines by R. K. Bansal.

Reference

1. Fluid Mechanics & Hydraulic Machines by S. C. Gupta, Darling Kindersley (I) pvt. Ltd. Pearson licensee, Nodia, UP.
2. Fluid Mechanics – Fundamentals and applications by Yunus cengel, Jhon M Cimbala, Tata McGraw Hill Publishing Company Ltd New Delhi, latest edition/ reprint.
3. Open Channel Hydraulics by V. T. Chow.

Course Name: Flow through pipes & channels lab

Course Outcomes

The students would be able to,

1. Describe the process of experimentation. Handle and operate the equipments according to its working principle.
2. Plan and conduct the experiments in accordance with the objectives.
3. Determine important parameters, coefficients of equipments and interpret the experimental observations.
4. Analyze and compare the experimental and theoretical / analytical observations.

List of Practical's

Minimum 8 of the following

1. Determination of Manning's constant for open channel.
2. Determination of Chezy's constant for open channel.
3. Developing specific energy diagram for a rectangular channel.
4. Study of GVF profiles.
5. Determination of spillway constant.
6. Analysis of branch network using software like water GEMS, EPANET for pipe flow
7. Analysis of rectangular / trapezoidal section.
8. Three reservoir problem
9. Determination of height of hump for critical flow. (transition of channel)
10. Determination of friction factor in flow through GI pipe
11. Any other experimental employing self learning and other tools.

Note: Use of python in all or any relevant practical is desirable.

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VI

Course Code: 25ES01TP0604-1 Course Name: Advanced Construction Techniques
L : 3 Hrs., P : 2 Hrs., Per Week Credits: 4

Course Objectives

1. To share overview of latest concrete construction methods.
2. To make the students understandable of various methods of handling and placing of concrete.
3. To make the students familiar with the construction techniques in marine environment.
4. To make students aware about the quality and safety measures in construction works.

Course Curriculum

Concrete Construction Methods, Formwork Design and Scaffolding; Slip Forms and other moving forms; Pumping of Concrete; Grouting and Mass Concreting Operations (roller compacted concrete); Ready-Mix Concrete; Various Methods of Handling and Placing Concrete, Accelerated curing, Hot and cold weather concreting, Under water concreting, Prestressing. Steel and Composite Construction Methods, Fabrication and erection of structures including heavy structures, Prefab construction, Industrialized construction and Modular coordination. Special Construction Methods, Construction in Marine Environments, High Rise Construction, Bridge Construction including Segmental Construction, Incremental Construction and Push Launching Techniques; Geosynthetics; Safety, Quality Measures and Reliability

Course outcomes

1. To get overview of latest concrete construction methods.
2. An understanding of various methods of handling and placing of concrete.
3. Understand the construction techniques in marine environment.
4. To make aware the quality and safety measures in construction works.

Text and Reference Books:

1. Neville A M and Brooks J J, "Concrete Technology" Pearson Education Asia, Singapore, 1994.
2. Neville A M, "Properties of Concrete" Pearson Education, New Delhi, 2004.
3. Peurifoy R L, "Construction Planning, Equipment and Methods" McGraw Hill Ltd., New York, 2002.

Course Name: Advanced Construction Techniques Lab

Assignments (minimum 8) based on above said syllabus & case studies on **Advanced Construction Techniques**

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VI

Course Code: 25ES01TP0604-2

Course Name: Climates Change & Mitigation

L : 3 Hrs., P : 2 Hrs., Per Week

Credits: 4

About the course

Course content

The course addresses the main drivers of climate change and the challenge posed by climate mitigation: approaches to avoid a uncontrolled and large climate change through global warming. The course addresses following issues:

- (1) The greenhouse effect, global warming and the response of the climate system to anthropogenic emissions or land use changes;
- (2) possible consequences of climate change, adaptation and associated costs;
- (3) biogeochemical cycles of carbon and other important greenhouse gases and biophysical properties of land-climate interactions;
- (4) analysis of the dynamics of emissions using scenario models (SSPs, RCPs) and quantification of climate change impacts and mitigation benefits (radiative forcing, temperature, CO₂-equivalents);
- (5) technological options to reduce emissions (renewable energy, changes in lifestyle, negative emission technologies and solar radiation management) and land management strategies for climate change mitigation, their characteristics, costs, co-benefits and barriers;
- (6) climate mitigation status and experience in selected sectors, such as industry, transport, energy and households;
- (7) climate policy instruments and framework conditions (Paris Agreements).

Learning outcome

Knowledge: The student should be able to

- i) explain causes of global warming, as well as emission trends and driving forces that are responsible for fossil fuel emissions and deforestation
- ii) identify technological options to reduce emissions, their barriers and costs and co-benefits.
- iii) explain climate policy tools, their theoretical merits and practical experiences iv) explain the understanding of climate mitigation in difference disciplines and the discipline's contribution to climate mitigation. v) recognize co-benefits, tradeoffs, potentials, and limitations of a wide range of climate change mitigation options, from the energy to the land sector (including negative emission technologies and geoengineering). Competences: The student should be able to i)

Identify, find and interpret relevant knowledge in the scientific literature on climate mitigation. ii) Explain the terminology and principles for assessing climate mitigation measures. iii) Identify actors and assess potential challenges and barriers associated with the implementation of climate mitigation measures and policies as well as the consequences of these. iv) Quantify climate change impacts and mitigation benefits through appropriate metrics. v) Report and discuss climate-relevant aspects in a scientifically rigorous way. General competency: The student should be able to i) Understand anthropogenic climate change and its causes. ii) Understand the challenge posed by climate change with respect to ethics and international politics. iii) Understand the assessment of climate mitigation measures. iv) Interpret analyses and model results in the field of climate mitigation.

Course Name: Climates change & mitigation lab

Assignments (minimum 8) based on above said syllabus & case studies on **Climates change & mitigation**

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VI

Course Code: 25ES01TP0604-3 Course Name: Retrofitting & Rehabilitation of Civil Infrastructure

L : 3 Hrs., P : 2 Hrs., Per Week Credits: 4

Course Outcomes

Student shall be able to

1. visualize and elaborate the root causes of damage and deterioration of structures
2. identify, suggest and explain damage assessment method based on condition of structure
3. aware of different available repairing materials and their specific application
4. aware of different available repairing techniques and case studied

Unit 1

Strength and Durability of structures 10

- a. Inspection, identification and diagnosis of common defects and failure with possible cause in buildings and infrastructural utilities
- b. Holistic Models of deterioration in RCC
- c. Corrosion in RCC: Type of corrosion, causes of corrosion of embedded reinforcement in concrete, effect of reinforcement, corrosion on concrete. Oxidation process between two metals in contact and its preventive maintenance.
- d. Permeability in concrete

Unit 2

Damage Assessment methods 10

- a. Concept of structural auditing
- b. Condition Survey
- c. Non Destructive testing of Structures (UPV, Rebound hammer, Half cell potentiometer, RCPT, Cover meter, Core testing, etc.)
- d. Performance evaluation

Unit 3

Repairing materials 10

- a. Grouts, FRP wrapping materials, Micro concrete, Adhesives and sealants, Corrosion inhibitors, Special types of concrete etc.

Unit 4

Techniques for Repair and Protection Methods 10

- a. Shoring, Underpinning, Jacketing, FRP application, Grouting, Gunite, Case studies

References

1. Denison Campbell, Allen and Harold Roper, "Concrete Structures, Materials, Maintenance and Repair", Longman Scientific and Technical UK, 1991.
2. Shetty M.S., "Concrete Technology - Theory and Practice", S. Chand and Company, 2008
3. Handbook on repair and rehabilitation of RCC building, CPWD, GOI, New Delhi
4. Ravishankar.K., Krishnamoorthy.T.S, " Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures", Allied Publishers, 2004.
5. Dov Kominetzky.M.S., "Design and Construction Failures, TMH

Course Name: retrofitting & rehabilitation of civil infrastructure lab

Assignments (minimum 8) based on above said syllabus & case studies on **retrofitting & rehabilitation of civil infrastructure**

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VI

Course Code: 25ES01TP0604-4 Course Name: Ground Improvement
L : 3 Hrs., P : 2 Hrs., Per Week Credits: 4

Course Outcomes

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

1. Identify problematic soils and their associated issues.
2. Understand the various ground improvement techniques.
3. Propose suitable remedial techniques and their design.

Introduction to ground improvement techniques : Concepts and essential requirements of ground improvement, classification of ground improvement techniques, economic considerations and suitability.

Compaction and Consolidation : Equipments and control of field compaction, surface compaction and deep compaction, vibrofloatation. Preloading and static loads and by vacuum, accelerated consolidation by sand drains, free strain and equal strain cases, design of sand drain layout.

Stabilization : Methods of stabilization, mechanical stabilization, organic and inorganic stabilizing agents and their characteristics - lime, cement, lime, flyash, bitumen and chemicals.

Grouting : Materials and methods of grouting, grout volume and grouting pressure, grout requirements and tests, grouting of rock foundation of dams.

Reinforced earth and Geotextiles : Basic theory of reinforced earth, materials, method, application and design of reinforced earth, characteristics of reinforced earth masses; geotextiles, geogrids and geosynthetics, their basic features, functions and applications.

Stone columns : Application, layout feature, procedures of installation, vibrofloat and rammed stone column, unit cell concept, load transfer mechanism, settlement in stone column, methods of improving the effectiveness of stone column, Design for stone column layout for intended requirements.

Text Book

1. Ground Improvement Techniques : P. P. Raj, Prentic Hall of India (2005)
2. Engineering Principles of Ground Modification : M.R. Housmann, McGraw Hill (1990)
3. Principles of Foundation Engineering: Braja M. Das, Cengage Learning Publications (2011)

References

1. Constructional and Geotechnical Methods in Foundation Engineering : R.M. Koerner, McGraw Hill (1985)

2. Design and Construction of Stone Column: FHWA Report No. Rd 83/026, (1983)
3. Advanced Foundation Engineering: V. N. S. Murthy, CBS Publications (2007)
4. NPTEL Course on Ground Improvement
5. Foundation Engineering Manual : Nayak N. V., Dhanpat Rai Publications (2009)

Course Code: **Course Name: Ground Improvement Lab**

Outcomes:

1. Student will have an ability to suggest suitable ground improvement techniques.
2. Student will have an ability to design and layout of propose techniques.

The term work shall consist of analysis and design for any THREE of the following design assignments to be carried out by each student individually (with different data).

1. Design of sand layout in soft compressible clay deposit for required (accelerated) rate of consolidation.
2. Design of a reinforced earth retaining wall.
3. Design of stone column layout (using conventional incremented fill material or cemented granular fill material) for intended degree of improvement in safe load carrying capacity of soft soil ground.
4. Analysis and design of skirted stone columns.

The work shall be submitted in the form of a journal and shall be assessed by concerned teacher/s through viva-voice examination

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VI

Course Code: 25ES01TP0604-5
L : 3 Hrs., P :2 Hrs., Per Week

Course Name: Traffic Engineering and Management
Credits: 4

Course Outcomes

1. Students should be able to Define and describe various traffic studies and traffic characteristics
2. Students should be able to describe terms related to highway capacity and have knowledge of statistical tools in traffic engineering
3. Students should be able to explain various theories related to traffic flow

UNIT - I

Traffic Studies and Forecast

Traffic Studies, Traffic Characteristics, General travel forecasting principles, different methods of traffic forecast - Mechanical and analytical methods, Demand relationships, methods for future projection; Design Hourly Volume For Varying Demand, Concept of Design vehicle units and determination of PCU under mixed traffic conditions, Price-volume relationships, demand functions. Determination of design hourly volume; critical hour concept

UNIT - II

Highway Capacity

Factors affecting capacity, level of service; Capacity studies - Capacity of different highway facilities including unsignalised and signalised intersections. Problems in Mixed Traffic flow; Case studies;

UNIT - III

Accident Analysis

Analysis of individual accidents and statistical data; Methods of representing accident rate; Factors in traffic accidents; influence of roadway and traffic conditions on traffic safety; accident coefficients; Driver strains due to roadway and traffic conditions

UNIT - IV

Traffic Flow

Theory : Fundamental flow relationship and their applications, Traffic flow theories and applications; Shock waves; Queuing theory and applications; Probabilistic Aspects Of Traffic Flow: Vehicle arrivals, distribution models, gaps and headway distribution models; gap acceptance merging parameters, delay models, applications; Simulation: Fundamental principle, application of simulation techniques in traffic engineering - formulation of simulation models, Case studies. Formulation of system models.

Text Books

1. Highway Engineering: (1991) Khanna S.K. and Justo C.E.G., Nem Chand & Bros.
2. Traffic engineering and transportation planning: (1987) L.R. Kadiyali, Khanna Publications

Reference Books

1. Transport planning and Traffic Engineering, edition Latest, C A O'Flaherty, Butterworth Heinemann Publications.
2. Introduction to Transportation Engineering, edition Latest, James H Bank, Tata McGraw Hill Publications.
3. Transportation Engineering an Introduction, edition C. Jotin Khisty, PHI Publication.

Course Code:**Course Name: Traffic Engineering and Management Lab**

Course Outcomes

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

1. Carry various traffic studies like speed studies, volume studies and parking studies etc.
2. Design traffic signals and intersections.
3. Carry out road safety audit.

Practicals

1. Speed studies
2. OD studies
3. Design of traffic signals
4. Design of intersection
5. Design of Rotaries
6. Road safety studies
7. Traffic volume studies
8. Parking studies

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VI

Course Code: 25ES01TP0604-6
L : 3 Hrs., P : 2 Hrs., Per Week

Course Name: Computer Aided Design and Drafting
Credits: 4

Course Outcomes

1. An ability to understand and apply basic fundamentals of CAD in civil engineering
2. An ability to develop computer model of various components used in civil engineering
3. An ability to develop computer program for analysis and design of various components of civil engineering structures.

Content

Fundamentals of CAD : Computer graphics & its terminology. CAD definition, concept & need. CAD process. Functional areas of CAD. Coordinate systems. Geometric transformation- concept and types. 2 dimensional (2D) geometric transformation- translation, scaling, rotation and mirror with numeric examples.

Analysis of building components through computer programs/excel

Designing of building components through computer programs/excel

Generating computer drawing from design output

Introduction to software's for modelling and design various civil engineering structures.

Text Books

1. . Ibrahim Zied, CAD / CAM: Theory and Practice, McGraw-Hill
2. Hearn E J and Baker M P, Computer Graphics, Pearson.

Course Code:

Course Name: Computer Aided Design and Drafting Lab

Course Outcomes

An ability to use various computer software's for modelling of various components used in civil engineering.

An ability to use various computer software's for analysis and design various components used in civil engineering.

An ability to develop computer program for analysis and design of various components used in civil engineering.

CE-CAD is a one-credit course that will introduce students to the basics of Computer Aided Design utilizing software to produce engineering designs. The course will also provide an overview of the different disciplines in Civil Engineering including structural, geotechnical, water resources, environmental, transportation, etc.

Content

Modelling using AutoCAD or Context Capture

Analysis and design of various structural components using STAAD/SAP Development of computer program for analysis and design of structural components.

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VI

Course Code: 25ES01TP0605-1

Course Name: Solid Waste Management

L : 3 Hrs., P : Hrs., Per Week

Credits: 3

Course Outcomes

The students would be able to;

1. Explain and describe various sources, characteristics, processing methods and disposal methods of solid waste.
2. Identify and explain necessity of solid waste management, its components and various rules and legislation.

Unit-I

Introduction to solid waste management: necessity, functional elements of solid waste management, Organization structure, Impact of solid waste on environment, MSW rules 2016, Construction and demolition (C&D) waste management rule 2016, Swachh Bharat mission, PPP model.

Unit-II

Characteristics of solid wastes : Classification, sources, composition, quantity, Factors affecting the quantity and per capita contribution of solid waste. Physical and chemical characteristics, sampling and analysis of solid waste.

Unit-III

Segregation, Collection and transportation of solid waste : Segregation methods, methods of collection, equipment's used for collection and transportation of solid waste. Transfer stations and its economic use. Estimation of truck capacity, vehicles routing

Unit-IV

Solid waste processing : Methods of processing like Salvaging, pyrolysis, RDF, biogas recovery, choice of methods and merits and demerits of various processing methods.

Unit-V

Solid waste management : Composting, Principles, methods of composting, factors affecting composting. Design of composting pit, vermi composting.

Sanitary land filling : Site requirement, methods, leachate management. Solid waste mining, design of landfills, bio-gas, bio-mining, fire hazards.

Incineration : Principles, types, merits and demerits.

Text Books

1. Bhide A.D. and Sundaresan B.B. Solid wastemanagement in developing countries by (INSDOC,New Delhi)
2. Sasikumar K. and Gopi Krishna S. Solid waste management, PHI learning pvt ltd, Delhi
3. Bhatia H. S. Environmental Pollution and Control, Galgotia publication, Delhi

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VI

Course Code: 25ES01TP0605-2
L : 3 Hrs., P : Hrs., Per Week

Course Name: Prestressed concrete structure
Credits: 3

Course Outcomes

1. The graduates will be able to apply the fundamental concepts of prestressing, prestressing systems employed in practice. Losses of Prestress.
 2. The graduates will be able to apply limit state design criteria to assess the limit state of collapse and serviceability, ensuring structural safety and functionality under various loading conditions.
 3. The graduates will be able to analyse and design structural sections for flexure, bending, shear and bond, integrating principles of prestressed concrete.
 4. The graduates will be able to design statically indeterminate prestressed structures.
 5. The graduates will be able to design prestressed concrete pipes and slabs.
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Introduction to Prestressed Concrete:

Introduction to basic concepts and general principles of pre- stressed concrete, materials used in prestressed concrete and methods and techniques of prestressing, prestressing systems.

Analysis of Prestress and Losses of Prestress:

Analysis of prestressed concrete sections for flexure considering loading stages, computational of sectional properties, critical sections under working loads for pretensioned and post tensioned members, load balancing method of analysis of prestressed concrete beams, losses in prestress

Design for Flexure and Shear:

Design for flexure and shear– Flexural analysis of beams for limit state of serviceability, design for simply supported beams for limit state of collapse – shear and diagonal tension in un-cracked beams, diagonal cracking in shear, shear design for limit state of collapse.

Design of End Anchorages:

End zone stresses in prestresses concrete members, pretension transfer bond, transmission length, end block of post tensioned members.

Statically Indeterminate Structures:

Analysis and design - continuous beams - Concept of linear transformation - concordant cable profile and cap cables.

Prestressed Concrete Slabs and Pipes:

Design of simply supported post tensioned slabs, Prestressed Concrete Pipes.

References:

1. Krishna Raju.N, "Prestressed Concrete", 4th Edition, Tata McGraw Hill Publishing

Co. New Delhi 2006.

2. Sinha. N. C., & Roy. S. K., "Fundamentals of Prestressed Concrete”,
S.Chand& Co.,
1985.

3. Rajagopalan .N, "Prestressed Concrete", International, Limited, 2005. 2th Edition,
Alpha Science

4. Lin .T.Y, "Design of Prestressed Concrete Structures", John Wiley and Sons - Inc
1981.

5. Leonhardt .F. "Prestressed Concrete Design and Construction", - Second Edition
Wilhelm Ernst & Sohn, Berlin, 1964.

6. Guyon .V, "Limit State Design of Prestressed Concrete", - Vol - 1 & 2,
Applied
Science Publishers, London **1995**.

7. Dayaratnam.P, "Prestressed Concrete", Tata McGraw Hill Publishing Co. New
Delhi
2000.

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VI

Course Code: 25ES01TP0605-3
L : 3 Hrs., P : Hrs., Per Week

Course Name: Advanced Geotechnical Engineering
Credits: 3

Course Outcomes

On successful completion of the course students would be able to;

1. Understand the various properties of the soils and their determination.
2. Do the settlement analysis in different conditions and design the foundations.
3. Analyse the modern approach for investigations of soil properties.

Syllabus

- General Concepts: Soil Structure, Consistency of Cohesive Soils, plasticity, Clay Activity, Atterberg Limits, USCS and AASHTO Soil Classification.
- Stresses in Soils: Geostatic and External Stresses in Soils, Pore Water Pressure Concept, Boussinesq and Westergaard Relationships for External Stress. Calculations, Effect of Ground Water Table.
- Shear Strength of Soils: Stress Path, Mohr Circle, Mohr-Coulomb Failure Criteria, Shear Strength in the Laboratory (Direct Shear Test, Triaxial Compression Test, CU, UU and CD tests), Skempton's Pore Water Pressure Parameters, Shear Strength in the Field (Vane Shear, CPT, SPT, PMT, CBR)
- Settlement Analysis of Soils: Consolidation Theory, Immediate Settlement in Granular Soils, Primary consolidation, Secondary Compression, Time Rate of Settlement, Methods for Accelerating Consolidation Settlements, Pre-compression.
- Design of Foundations: Introduction, general principles, strip and pad foundations, building on shrinkable soil, building on fill, raft foundation – variable soil and make up ground, pile foundation – choice, types; construction problems.
- Introduction to Unsaturated Soil Mechanics: Types of problems, typical profiles of unsaturated, tropical and residual soil, expansive and collapsing type of soils. Origin and formation, identification and classification of expansive and collapsing soils, Contractile skin.
- Collapse and Heave: Collapse potential and swell potential, importance and their determination by different laboratory methods, Heave prediction based on Oedometer tests, suction tests and empirical procedures, heave and collapse settlement.

- Technical Forensic Investigation: Collection of data, problem characterization, development of failure hypotheses, a realistic backanalysis, field observations and performance monitoring, modelling of failure hypothesis and quality control of formal and technical aspects of the work. Numerical Problems.

Text Book

1. Das, B. M. (2008). Advanced Soil Mechanics. Taylor and Francis Group, London, Second edition.
2. Murthy, V.N.S. (2002). Geotechnical Engineering: Principles and Practices of Soil Mechanics and Foundation Engineering. CRC Publications
3. Coduto, D. P. (1999). Geotechnical Engineering: Principles and Practices, Prentice Hall
4. Gopal Ranjan, Rao A.S.R. (2007). Basic and Applied Soil Mechanics Foundation Engineering, New Age Publications
5. Som N. N. & Das S.C. (2002): Theory & practice of foundation Design:, Prentice Hall Edn, Asia

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VI

Course Code: 25ES01TP0605-4

Course Name: Pavement Design

L : 3 Hrs., P : Hrs., Per Week

Credits: 3

Course Outcomes

1. The student can understand, analyze, apply and evaluate various parameters required in the design of flexible and rigid pavement of highway and airfield pavements.
2. They can analyze, apply and evaluate the analysis of flexible and rigid of highway and airfield pavements.
3. They can analyze, apply and evaluate the design of flexible and rigid of highway and airfield pavements.
4. They will be able to conduct field tests and can analyze, apply and evaluate the design strengthening of pavements.

Unit I

General: Types and component parts of pavements, Factors affecting design and performance of pavements.

Design parameters: Design wheel load, Standard axle load and wheel assemblies for road vehicles. Under carriage system of aircraft. Tyre and contact pressure, contact area, imprints, computation of ESWL for flexible and rigid pavements. ESWL of multiple wheels, repeated loads and EWL factors. Pavement behaviour under transient traffic loads. airport traffic areas, Serviceability concept.

Unit II

Analysis of flexible pavement : Stress, strain, deflection analysis one layer system by Boussinesq's. Burmister's two layer theory, three layer and multi-layer theories; wheel load stresses, Layer equivalent concepts, Stress and deflections for rigid pavements due to load and temperature, influence charts

Analysis of Rigid pavement : Wheel load stresses, warping stresses, frictional stresses, combined stresses.

Unit III

Highway Flexible pavement design : Empirical, semi-empirical and theoretical approaches, Triaxial (Kansas state method), Design using the latest IRC code, AASHTO method of design.

Unit IV

Highway Rigid pavement design: Design of CC pavement for roads and runways as per IRC latest code, design of joint details for longitudinal joints, contraction joints and expansion joints, PCA and AASHTO methods

Unit V

Airfield flexible pavement design : Mcleod (Canadian method), FAA, US Corps of engineering, CBR.

Airfield rigid pavement design : Definitions of ACN, PCN, LCN, Calculation of LCN value, Ultimate load analysis and yield lines patterns method, FAA, PCA & LCN methods.

Unit VI

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Pavement testing and evaluation : Pavement Failures in both Flexible Pavement & Rigid Pavement - types and causes, condition surveys and surface evaluation for unevenness, rut depth, profilometers, bump integrators, falling weight deflectometer.

Failures of pavements : Causes and remedies, maintenance and rehabilitation of pavements.

Strengthening of pavements : Benkleman beam deflection study.

Text Books

1. Pavement Design by Srinivasa Kumar, R, Orient Black Swan, 2013.
2. Pavement Evaluation and Maintenance Management System by Srinivasa Kumar, R, Universities Press (India) Private Limited
3. Pavement Analysis and Design by Yang H. Huang 2nd Edition, Pearson Education, Inc., Pearson Prentice Hall Company.
4. Airport Engineering by G Venkatappa Rao, Tata McGraw -Hill Publishing Company Ltd.
5. IRC-37: (Latest Code) Guide lines for Design of Flexible Pavement
6. IRC-58: (Latest code) Guide lines for Design of Plain Jointed Rigid Pavement for highways

References

1. Principles of Pavement Design by H.J.Yoder and Witczak, John wiley and sons.
2. Pavement Engineering: Principles and Practice, Third Edition Book by Rajib Basu

Mallick and Tahar El-Korchi Publisher: CRC press, Taylor and Francis

3. Airport Engineering by Khanna and Arora, Nemchand & Brothers.
4. Highway Engineering by Khanna O.P, Justo C.G., Nem Chand Publishers
5. MOST Specifications for Road and Bridge Works, 1994 (Third Revision)
6. NPTEL Course on Pavement Design

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VI

Course Code: 25ES01PR0607

Course Name: Quality Control in Construction

Processes

L : Hrs., P : 2 Hrs., Per Week

Credits: 1

Course Objectives:

1. To introduce the students about quality and safety related challenges in construction industry
2. To make students aware about the globally recognized guidelines/theories for quality and safety in construction
3. To make students self efficient to audit quality and safety related challenges in construction

Total quality management concepts; ISO9000; QA/QC systems and organizations, Quality Audits; Problem solving techniques; Statistical Quality Control; Quality Function Deployment; Material Quality Assurance; Specifications and Tolerances.

Safety issues; Injury accidents and their causes; Safety program components; Role of workers, Supervisors, Managers and Owners; Safety Procedures for various construction operations; Safety audits; Safety laws. Safety Organization and Management: Safety policies, safety organization, safety committees, safety representatives, outside agencies – Govt. intervention, international agreements.

REFERENCE:

1. Levitt, R.E. and Samelson, N.M., Construction Safety Management, Mc. Graw Hill Book Company, Inc., N.Y. 1991.
2. Juran Frank, J.M. and Gryna, F.M., Quality Planning and Analysis Tata McGraw Hill 1982.
3. Raymond Elliot Levitt & Nancy Morse Samelson Construction Safety Management Amazon Second edition.
4. Grant E.L. and Leavensworth Statistical quality Control McGraw Hill 1984.
5. Hutchins G, ISO 9000, Visa Books, New Delhi, 1993.
6. Ron Baden Hellard, Total Quality in Construction Projects, Thomas Telford, London

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VI

Course Code: 25ES01PR0608

Course Name: Simulation in Civil Engineering

L : Hrs., P : 2 Hrs., Per Week

Credits: 1

Course Objective:

Student shall be able

- a. To prepare Capital Budgeting of a Construction project in excel sheet.
- b. To use time value of money formulae such as IRR, CRF, PV, FV in the excel sheet.
- c. To prepare a Construction programme for Town ship, Road Project, Bridge project etc with using Prima Vera Softwares./staad pro software

Spreadsheet applications for calculation of Present worth, future worth, IRR, CRF etc.

Project management software such as Prima vera software, Microsoft project- Preparation of project and feed data into the software for various projects. Study of Statistical Software such SPSS

Ramdeobaba University, Nagpur

Department of Civil Engineering

Syllabus for Semester B.Tech VII

Course Code: 25ES01TP0701-1

Course Name : Advanced Construction Material

L : 3 Hrs., P : 2 Hrs., Per Week

Credits: 4

Course Outcomes

1. The students will be able to classify and select advance construction materials on the basis of their properties.
2. The students will be able to identify and suggest ceramic and polymeric materials for improvement in functional performance of building components.
3. The students will be able to demonstrate the use of industrial by-products and waste in new building materials.
4. The students will be able to explore use of new construction chemicals and repairing methods.

Unit I

Construction Materials : Classifications, selection criteria for construction materials. Materials engineering concept: Consideration of physical, Mechanical, thermal, and other Properties. Nature of materials. Laboratory measuring devices : Introduction of Dial gauge, LVDT, strain gauge, proving ring, load cell

Unit II

Ceramic Materials : Mechanical, thermal and electrical properties. Processing of ceramic, classification, refractories, glass, uses and application. Polymeric Materials : Plastic as engineering material, Thermoplastics, Thermosetting plastic, Elastomers. Properties, additives and compounding of polymers, methods of processing of polymers, uses and application, Scope of polymers in civil engineering

Unit III

Ferro-cement, Fibre reinforced concrete, high performance concrete, special types of concretes. Stucco plaster, new construction materials e.g. cladding, false ceiling and panelling, etc.

Unit IV

Composites : requirements, classification, microscopic composites, macroscopic composites, their applications and properties.

Thermal performance of materials and insulating materials Acoustics and sound proofing methods and materials

Unit V

Engineering wood products Use of waste products and industrial by-products: Fly ash, micro-silica, GGBFS and other mineral products Geo-textiles and geo-synthetics, geogrids

Unit VI

Construction Chemicals : Property modifiers, materials for repair and retrofitting, water proofing material and process of construction,

References

1. Engineering materials: Polymers, Ceramics and composites, Bhargava A K, PHI Publications, Second edition, 2012
2. Materials for Civil and Construction engineers, Michael S Mamlouk, John P Zeniewski, Pearson

Publications,

3. Engineering Materials, Rangawala S.C., Chortor Publications
4. Building Materials, S.K. Duggal, New Age International Publications, Fourth edition, 2012
5. Building Materials Technology Structural Performance & Environmental Impact, L. Reed Brantley, Ruth T. Brantley, McGraw Hill Inc Publications
6. Chudley, R., Greeno (2006), 'Building Construction Handbook' (6th ed.), R. Butterworth-Heinemann
7. Concrete: Microstructure, properties and materials, P.K. Mehta and P.J.M. Monteiro, McGraw Hill, 2006.

Course Name: Advanced Construction Material lab

Assignments (minimum 8) based on above said syllabus & case studies on **Advanced Construction Material**

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VII

Course Code: 25ES01TP0701-2 Course Name : Industrial Waste Water Treatment
L : 3 Hrs., P : 2 Hrs., Per Week Credits: 4

Course Outcomes

The students would be able to;

1. Describe and explain the necessity and importance of industrial wastewater treatment along with the basic principles and fundamentals of waste minimization for reuse recycling and recovery, treatment processes and disposal methods in industrial wastewater.
2. Apply the knowledge of various principles, theories and equations in process analysis and in the design of various treatment methodologies for various industrial waste waters.

Syllabus

Unit -I

Necessity and importance of industrial waste water treatment, Generation of Industrial wastewater, characteristics of industrial waste water and its variation, sampling and analysis of wastewater, statistical analysis of data, standards for wastewater disposal, Environmental impacts due to discharge of wastewater on streams, land and sewerage system.

Unit-II

Basic concept of Reuse, Recycling and Resource recovery; Volume and strength reduction; Construction, working, design parameters and design of Equalization, and Neutralization and floatation.

Unit-III

Treatment flow sheet of wastewater from various industries viz. Pulp and paper, tanning, Sugar, Dairy, Cement, Fertilizers, Metal Finishing, textile, Etc. Joint treatment of industrial waste.

Unit-IV

Types of biological processes used in treatment of wastewater. Construction, working and design parameters of Stabilization pond, aerated lagoon, oxidation ditch, biological de-nitrification processes, membrane biological reactors. Anaerobic treatment of industrial wastewater.

Unit- V

Industrial waste survey; Stream sanitation, stream sampling, Stream survey; Principles and techniques for
Industrial pollution prevention and control.

Text Books

1. Nemerow N. L. Theories and Practices of Industrial Waste Treatment, Addison Wesley Publishing Co. NY. 2nd Edition.
2. W.W. Eckenfelder, Industrial Water Pollution Control Mc-Graw Hill Book Co. 2nd Edition.
3. Freeman H.M., Industrial Pollution Prevention Handbook Mc-Graw Hill 1st Edition.
4. E.B. Bess Elivievre, Treatment of Industrial Waste, Mc-Graw Hill Book Co. 1st Edition.
5. Metcalf and Eddy, Wastewater Engineering, Treatment, Disposal And Reuse, 3rd Edition Mc-Graw Hill 1991.
6. A. D. Patwardhan, Industrial waste water treatment, PHI Learning Pvt. Ltd, EEE, 2nd Edition. June 2017

Reference Books

1. Central Pollution Control Board, India, Comprehensive Industry Document Series.
2. Gupta KR, Environmental Legislation of India, Atlantic publishers, 2006.
3. CPHEEO Manual on Sewerage & sewage treatment.

Course Name: Industrial waste water treatment lab

Assignments (minimum 8) based on above said syllabus & case studies on **Industrial waste water treatment**

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VII

Course Code: 25ES01TP0701-3
L : 3 Hrs., P : 2 Hrs., Per Week

Course Name : Reinforced Earth
Credits: 4

Course outcomes:

After studying this course, students will be able to:

1. identify, formulate reinforced earth techniques that are suitable for different soils and in different structures;
2. understand the laboratory testing concepts of Geosynthetics
3. design RE retaining structures and Soil Nailing concepts
4. Determine the load carrying capacity of Foundations resting on RE soil bed.
5. assess the use of Geosynthetics in drainage requirements and landfill designs

1 Basics of Reinforced Earth Construction

Basics of Reinforced Earth Construction:

Definition, Historical Background, Components, Mechanism and Concept, Advantages and Disadvantage of reinforced earth Construction, Sandwich technique for clayey soil.

Geosynthetics and Their Functions:

Historical developments, Recent developments, manufacturing processwoven&non-woven, Raw materials – Classification based on materials type – Metallic and Non-metallic, Natural and Man-made, Geosynthetics

Properties and Tests on Materials Properties –

Physical, Chemical, Mechanical, Hydraulic, Endurance and Degradation requirements, Testing & Evaluation of properties

2 Design of Reinforced Earth Retaining Walls

Design of Reinforced Earth Retaining Walls:

Concept of Reinforced earth retaining wall, Internal and external stability, Selection of materials, Typical design problems

Soil Nailing Techniques:

Concept, Advantages & limitations of soil nailing techniques, comparison of soil nailing with reinforced soil, methods of soil nailing, Construction sequence, Components of system, Design aspects and precautions to be taken

3 Design of Reinforced Earth Foundations

Design of Reinforced Earth Foundations:

Modes of failure of foundation, Determination of force induced in reinforcement ties – Location of failure surface, tension failure and pull out resistance, length of tie and its curtailment, Bearing capacity improvement in soft soils, General guidelines.

4 Geosynthetics for Roads and Slopes

Geosynthetics for Roads and Slopes:

Roads - Applications to Temporary and Permanent roads, Role of Geosynthetic in enhancing properties of road, control of mud pumping, Enhancing properties of subgrade, Design requirements Slopes – Causes for slope failure, Improvement of slope stability with Geosynthetic, Drainage requirements, Construction technique. Simple Numerical Stability Checking Problems on Reinforced Slopes

5 GEOSYNTHETICS - FILTER, DRAIN AND LANDFILLS

GEOSYNTHETICS - FILTER, DRAIN AND LANDFILLS:

Filter & Drain – Conventional granular filter design criteria, Geosynthetic filter design requirements, Drain and filter properties, Design criteria – soil retention, Geosynthetic permeability, anticlogging, survivability and durability (No Numerical Problems) Landfills – Typical design of Landfills – Landfill liner & cover, EPA Guidelines, Barrier walls for existing landfills and abandoned dumps (No Numerical Problems)

Text Books:

1. Koerner. R.M, “Design with Geosynthetics”, Prince Hall Publications
2. Koerner. R.M. & Wesh, J.P, “Construction and Geotechnical Engineering using synthetic fabrics”, Wiley Inter Science, New York,.
3. Sivakumar Babu G. L., “An introduction to Soil Reinforcement and Geosynthetics”, Universities Press, Hyderabad

4. Swami Saran, “Reinforced Soil and its Engineering Applications”, I. K. International Pvt. Ltd, New Delhi

5. Venkattappa Rao, G., & Suryanarayana Raju., G. V.S, “Engineering with Geosynthetics”, Tata McGraw Hill publishing Company Limited., New Delhi.

Reference Books:

1. Jones, “Earth reinforcement and Soil structure”, CJEP Butterworths, London

2. Ingold, T.S. & Millar, K.S, “Geotextile Hand Book”, Thomas, Telford, London.

3. Hidetoshi Octial, Shigenori Hayshi& Jen Otani, “Earth Reinforcement Practices”,Vol. I, A.A. Balkema, Rotterdam

4. Bell F.G, “Ground Engineer’s reference Book”, Butterworths, London

5. Ingold, T.S, “Reinforced Earth”, Thomas, Telford, London.

6. Sarsby R W- Editor, “Geosynthetics in Civil Engineering”, Woodhead Publishing Ltd & CRC Press, 2007

Course Name: Reinforced Earth lab

Assignments (minimum 8) based on above said syllabus & case studies on **Reinforced Earth**

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VII

Course Code: 25ES01TP0701-4

Course Name : Urban Transportation Planning

L : 3 Hrs., P : 2 Hrs., Per Week

Credits: 4

Course Outcomes

The students will be able to;

1. Explain the characteristic of urban transportation, structure of urban transportation and classification of urban roads.
2. Describe the objectives of transportation planning, data collection for planning and environmental impact analysis.
3. Explain the process of travel demand forecasting & need for interaction in different modes of transportation.
4. Describe the use of intelligent Transport System and need to accommodate non-motorized transports.

Unit I

Urbanization and Transportation: Importance of urban area, Structure of urban area, urban design, use of road space, classification of urban roads.

Unit II

Urban Transportation Characteristics : Factors influencing transportation needs, transportation demand, type of trips, mode of travel, urban transportation scene in India. Road congestion, impact of transport on environment.

Unit III

Urban Transportation Planning Process : Urban transportation planning objectives, urban transportation system, urban transportation planning process, data collection, surveys for data collection, environmental impact analysis.

Unit IV

Travel Demand Forecasting : Trip generation and attraction analysis, trip distribution models, model split analysis, route assignment analysis.

Unit V

Public Transportation : Bus transport characteristics, bus route planning, performance indicator, types of rail transit, rail transit system development in Indian cities, Integrated Transport System, Modes of Integrated transport systems.

Unit VI

Innovations in Urban Transportation : Need for innovative approaches, track guided bus, BRT, GIS, ITS, functional areas of ITS. Non-motorized Urban Transportation : Importance of pedestrian facilities, sidewalks, PUP & POB, bicycle facility planning, types of bicycle facilities, bicycle network planning, bicycle parking, cycle-rickshaws.

TextBooks

1. Traffic Engineering and Transport Planning: L.R. Kadiyali, Khanna Publishers.
2. Urban Transportation: D. J. Victor & S. Ponnuswamy, Tata McGraw-Hill

References

1. Transport Planning and Traffic Engineering: C.A. O'Flaherty, BUTTERWORTH-HEINEMANN
2. Urban Development and Sustainable Transport P. Anbalagan, Bookwell Publications
3. Urban Transportation Planning 2nd Edition by Michael Meyer, Eric Miller, McGraw - Hill

Course Name Urban Transportation Planning lab

Assignments (minimum 8) based on above said syllabus & case studies on **Urban Transportation Planning**

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VII

Course Code: 25ES01TP0701-5 Course Name : BIM

L : 3 Hrs., P :2 Hrs., Per Week Credits: 4

Objectives:

- To learn the concept of Building Information Modeling
- To understand the workflow followed in industry during creation of BIM 3D model which includes building the discipline-based model and create the federated models.
- To explain the process of creating the BIM model
- To comprehend the various emerging trends of BIM & concept of digital twin

Building Information Modeling - BIM is an intelligent 3D model-based process that gives architectural, engineering and construction professionals the insight and tools to efficiently plan, design, construct and manage buildings and infrastructure. The course addresses the rapidly evolving needs of the built environment sector with respect to the emergence of BIM as a working practice. BIM manager plays a crucial role in advising clients, internal and external stakeholders on the benefits of BIM, and in implementing and managing the major BIM processes. This requires the demonstration of a complete knowledge of the BIM process & the ability to create the project environment in which BIM can realise its full potential. In this course, learners will be guided through each of the major project stages, from the strategic definition of the project right through to handover, operations, and end of use. At each stage, the trainer will demonstrate how to balance technical requirements with project management skills, so the students are confident in implementing BIM methodology. The course covers the key skills and competencies required for implementing BIM-Building Information Modelling to AECO-Architecture, Engineering, Construction & Operation projects

Course Name BIM lab

Assignments (minimum 8) based on above said syllabus & case studies on **BIM**

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VII

Course Code: 25ES01TH0702-1 Course Name : Contracts Management
L : 4 Hrs., P : Hrs., Per Week Credits: 4

Course Outcome

1. The students will be able to understand and assess the tendering process.
2. The students will be able to implement conditions of contract.
3. The students will be able to elaborate dispute resolution methodology in contract.

GENERAL

Overview of Tender; Types of contract; Conditions of contract

Unit - I

Preparation of Tender Documents and its submission, Evaluation of Tender and Award of contract – Letter of Award, Letter of Intent, Issues in tendering process: Pre - Registration, Pre – Qualification, Nominated Tendering, Rejection of Tenders, Repeat Orders, Revocation of Tenders and Unbalanced Bidding.

Unit - II

Bids & Proposals; Bid Evaluation; General Principles of Contracts Management: Indian Contract Act, Valid & Voidable Contracts; Prime and sub-contracts; Joint Ventures & Consortium, Build-Own- Operate & variations; Public- Private Partnerships; International Commercial Terms, Breach of contract.

Unit - III

Essentials for a legally valid contract, Documents for an Engineering Contract; Types of contracts relative merits, general and special conditions, termination of contracts, extra work and Changes, R.A. Bill & Final Bill, Payment of advance, insurance, claims, price variation, etc.

Unit - IV

General, Methods for dispute resolution–Negotiations, Mediation, Conciliation, Dispute Resolution Boards (DRB), Arbitration : – appointment, challenge, jurisdiction, powers, grounds of challenge, procedure and court assistance; Award including Form and content, Grounds for setting aside an award, Enforcement, Appeal and Revision.

Unit - V

Variations & Changes in Contracts; Differing site conditions; Cost escalation; Delays, Suspensions & Terminations; Time extensions & Force Majeure; Delay Analysis; Damage Assessment, and Claims for Damages. Liquidated damages & Penalties; Insurance & Taxation; Introduction to FIDIC.

Text Books

1. Meena Rao (2006), Fundamental concepts in Law of Contract, 3rd Edn. Professional Offset.
2. L.S. Ranaga Rao Contract Management and Dispute Resolutions Engineering staff College of India
January 2008.
3. General Conditions of Contract, Central Public Works Department, New Delhi, 2010
4. S. Ranaga Rao, Contract Management & Dispute Resolutions, Engineering staff College of India,
January 2008
5. V. K. Raina, Construction & Contract Management Practices, SPD, New Delhi
6. Patil B. S., (2009) "Civil Engineering Contracts and Estimates", University Press.
7. John G. Betty (1993/ Latest Edition) "Engineering Contracts", McGraw Hills.

Reference Books

1. Dutt (1994), Indian Contract Act, Eastern Law House
2. FIDIC Contract Conditions
3. Prakash V. A., (1997) "Contracts Management in Civil Engineering Projects", NICMAR
4. Vaid K.N., (1998) "Global perspective on International Construction Contracting Technology and Project Management", NICMAR, Mumbai
5. Albett Robert W., (1961/ Latest Edition) "Engineering Contracts and Specifications", John Willey and Sons, New York.
6. Vasavada B. J., (1997), "Engineering Contracts and Arbitration", (Self Publication by Jyoti B. Vasavada).

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VII

Course Code: 25ES01TH0702-2 Course Name : Air Pollution & Control
L : 4 Hrs., P : Hrs., Per Week Credits: 4

Course Outcomes

The students would be able to:

1. Understand and describe various types of air pollutants and its sources, air pollution parameters, Effects of air pollutants.
2. Determination techniques of air pollutants along with the importance of meteorological parameters in air pollution. methods of sampling and analysis of air pollutants
3. Knowledge about Control of various air pollutants methodology and modelling.
4. Knowledge of noise pollution its management and control.

Unit I

Introduction to air pollution, Air pollutants, Sources, classification, Effects on Health, vegetation, materials and atmosphere, Reactions of pollutants in the atmosphere and their effects- Smoke, smog and ozone layer disturbance, Greenhouse effect.

Unit II

Meteorological parameters affecting air pollution, Micrometeorological processes lapse rate and atmospheric stability, plume behavior, wind rose, pollution rose, Stack height computation, Regional air quality models, Source inventories and significance, Gaussian and other dispersion model.

Unit III

Air sampling and pollution measurement methods, principles and instruments, Ambient air quality and emission standards, Air pollution indices, Air Act, legislation and regulations, control principles, Removal of gaseous pollutants by adsorption, absorption, reaction and other methods.

Unit IV

Particulate emission control, settling chambers, cyclone separation, Wet collectors, fabric filters, electrostatic precipitators, scrubbers and other removal methods like absorption, adsorption, precipitation etc. Biological air pollution control technologies, Indoor air quality.

Unit V

Noise pollution : Sources, Basics of acoustics and specification of sound; sound power, sound intensity and sound pressure levels, calculation of weighted noise level index; plane, point and line sources, multiple sources; outdoor and indoor noise propagation, effects of noise on health, annoyance rating schemes;

Unit VI

Introduction to vehicular pollution, special noise environments; noise standards and limit values; noise instrumentation and monitoring procedure, Noise indices, Noise management and control methods.

Text Books

1. Rao M.N. and Rao H.V. N, Air Pollution, Tata Mc-Graw Hill Publishing Co. New Delhi, Third Edition, 1992.
2. Rao C.S., Environmental Pollution Control Engg, New Age International Pvt. Ltd. Publishers, 2006.
3. Y. Anjaneyulu, A textbook of air pollution & control technology, Allied publishers
4. Environmental Noise Pollution – PE Cunniff, McGraw Hill, New York, 1987

References

1. Air Pollution, NEERI Manual.
2. Nevers N.D, Air Pollution control Engineering, Editions Civil Engineering series, 1995.
3. Stern A. C, Air pollution, Tata McGraw Hill International, Vol I to IX

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VII

Course Code: 25ES01TH0702-3

Course Name : Bridge Engineering

L : 4 Hrs., P : Hrs., Per Week

Credits: 4

- I Introduction to bridges, classification, computation of discharge, linear waterway, economic span, afflux, scour depth Design loads for bridges, introduction to I.R.C. loading standards, Load Distribution Theory, Bridge slabs, Effective width, Introduction to methods as per I.R.C.
- II Straight and skew slab bridges
- Design of T beam bridges (up to three girders only) Proportioning of components, analysis of slab using IRC Class AA tracked vehicle, structural design of slab, analysis of cross girder for dead load & IRC
- III Class AA tracked vehicle, structural design of cross girder, analysis of main girder using Courbon's method, calculation of dead load BM and SF, calculation of live load B M & S F using IRC Class AA Tracked vehicle. Structural design of main girder.
- IV Other Bridges: Design of Box culvert (Single vent only), Design of Pipe culverts
- VI Substructures - Design of Piers and abutments, Introduction to Bridge bearings, Hinges and Expansion joints.

Essential Readings

1. N Krishna Raju, "Design of Bridges, Oxford and IBH publishing company
2. T R Jagadeesh and M A Jayaram, "Design of bridge structures", Prentice Hall of India

Supplementary Readings

1. Jain and Jaikrishna, "Plain and Reinforced Concrete", Vol.2., Nem Chand Brothers
2. Standard specifications and code of practice for road bridges, IRC section I, II, III and IV.
3. "Concrete Bridges", The Concrete Association of India

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VII

Course Code: 25ES01TH0702-4 Course Name : Special Geotechnical Constructions
L : 4 Hrs., P : Hrs., Per Week Credits: 4

Course Outcomes

1. The graduate will be aware of the latest trends, modern standards and state-of-the-art techniques for solving geotechnical engineering problems.
2. The graduate will be able to develop design a geosynthetic system to meet desired needs such as economic, environmental and sustainability related.
3. The graduate will be able to identify, formulates and solve soil stability related problems.

Syllabus

The special geotechnical constructions and process to be studied are:

Dewatering, Braced Excavation, Diaphragm walls, Ground (soil and rock) anchors, Soil nailing, Screw piles, Secant pile walls, Gabion walls, Deep soil mixing walls, Geofoam and Geocells.

The state of the art, studying with respect to the following aspects is expected:

1. Types, uses and applications
2. Construction techniques / methods
3. Equipments, machineries required
4. General design considerations
5. Analysis and quantitative design solution
6. Important case studies (in India and Abroad)

Text Book

1. Construction of Diaphragm wall : I. Hajal, J. Morton and Z. Regals, series in Engineering Publications.
2. Foundation Engineering Handbook: Chapter no. 26, H.Y. Fang, CBS Publishers (2004).
3. Theory & practice of foundation Design: Som N.N. & Das S.C., Prentice Hall Edn, Asia (2002).

Reference Books

1. FHWA Reports and Publications.
2. Relevant IS codes and papers from various refereed journals and proceedings.

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VII

Course Code: 25ES01TH0702-5
L : 4 Hrs., P : Hrs., Per Week

Course Name : Airport Planning and Design
Credits: 4

course Outcome

1. Students should be able to understand and memorize various terms related to airport Engineering
 2. Students should be aware of various facilities in terminal building
 3. Students should be able to describe and explain various geometric parameters of Runway and Taxiway
 4. Students should understand various air traffic management and visual aids
- Syllabus

UNIT - I

Aircraft characteristics; Aircraft performance characteristics: Airport planning Airport Site Selection; Wind rose, cross wind component, Runway Orientation and configuration.

UNIT - II

Terminal Building, Facilities for passengers, Aircraft Parking.

UNIT - III

Geometric Design of the Airfield: Determination of Runway Capacity and Delay - Taxiway and Gate Capacity

UNIT - IV

Air Traffic Management: Navigational aids: ground based systems, satellite based systems – Air traffic control and surveillance facilities. Visual Aids: Airport marking and Lighting for runway, Taxiway and other areas. Air traffic control: Need, network, control aids, instrumental landing systems, advances in air traffic controls.

Text Book

1. Airport Engineering: Khanna and Arora, Nem Chandra & Brothers, Roorkee
2. Airport Engineering: G. Venkatappa Rao, Tata McGraw-Hill Publishing

Reference Book

1. Planning and Design of Airports: Robert Herorjeff, McGraw-Hill Publishing

Ramdeobaba University, Nagpur

Department of Civil Engineering

Syllabus for Semester B.Tech VII

Course Code: 25ES01TH0702-6

Course Name : Numerical Methods for Civil Engineers

L : 4 Hrs., P : Hrs., Per Week

Credits: 4

Course Outcomes

1. An ability to apply numerical methods to obtain approximate solutions to mathematical problems involved in civil engineering domain.
2. Ability to analyse and evaluate accuracy of various numerical methods and their applicability in civil engineering.

Syllabus

Solution of algebraic equations : Bisection Method, Regula Falsi Method, Newton-Raphson method

Interpolation & Extrapolation techniques : Newton's Foreword Difference Technique, Newton's Backward Difference Technique

Numerical integration techniques : Simpson's method, Trapezoidal method, Gauss Quadrature method

Solution of linear algebraic equations : Direct methods and iterative methods Eigen values problems: Direct,

Jacobi, Givens Method, Householders method.

Text Books

1. S.S.Sastry, Introductory methods of numerical analysis, PHI, 4 Edition, 2005.
2. Numerical methods, Principles, Analyses and Algorithms: Srimanth Pal, Oxford University Press, New Delhi.
3. Numerical Methods: Salvadori M., PHI learning Pvt, ltd., New Delhi, (1987)

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VII

Course Code: 25ES01TH0703-1 Course Name : Environmental System Modeling
L : 3 Hrs., P : Hrs., Per Week Credits: 3

COURSE CONTENT

1 Introduction:

Scope of Environmental Modeling, Mass balances, Basic concepts of transport phenomena, Chemical reaction kinetics, equilibrium, chemical modeling.

2 Environmental Modeling: Eutrophication of lakes, stoichiometry, phosphorus as a limiting nutrient, mass balance on total phosphorus in lakes ,dynamic ecosystem, Models for Eutrophication Assessments

3 Conventional pollutants in rivers: Introduction, mass balance equation, plugs flow systems, Streeter- Phelps equation, modifications to Streeter Phelps equation, Dissolved oxygen in rivers & estuaries.

4 Ground water contamination: Introduction, Darcy's law, flow equations, Contaminant solute transport equation, Bio transformations.

5 Air Quality Modeling: Types of modeling techniques, Modeling for nonreactive pollutants, single source, multi source and area source models, fixed box models, diffusion models, dispersion models, receptor and source oriented models

6 Applications: Software based applications- Air quality and water quality modeling

Reference Books:

1. Environmental modelling: Fate & transport of pollutants in Water, Air and Soil by Jerald L Schnoor.
2. Environmental Modelling by John Wainwright & Mark Mulligan
3. Modelling the Eutrophication Process by M W Lorenzen

Course Outcome:

After learning the course the students should be able to:

1. Understand the fate and transport of pollutant which is discharge into environmental sinks like river, lake and atmosphere.
2. Predict the ground water contamination.

List of Experiments: Term work will comprise of assignment and exercises based on mass balances, Basic

concepts of transport phenomena, chemical modeling, Eutrophication of lakes, Conventional pollutants in

rivers, ground water contamination, climate and climate system modeling

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VII

Course Code: 25ES01TH0703-2
L : 3 Hrs., P : Hrs., Per Week

Course Name : Advanced Steel Structure
Credits: 3

Syllabus: Theory

Design of connections.

Design of steel chimneys,

Design of storage vessels.

Design of industrial sheds, crane / gantry Girders.

Design of bridges – highway and railways, Foot Bridge.

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VII

Course Code: 25ES01TH0703-3 Course Name : Earth and Rock Fill Dam
L : 3 Hrs., P : Hrs., Per Week Credits: 3

Course Outcomes:

On completion students will be able to: CO1- Recognize potential failure modes or deformation types for soil slopes and embankments CO2- Determine the stability of a slope using slope stability software CO3- Distinguish the common causes/triggering mechanisms for landslides/slope instabilities CO4- Design proper slope and stable earthen structure as per requirement

Course Contents

Effective stress analysis; Stability of earth and rock fill dams; Steady state seepage and rapid draw down cases. Design of earth dams; Pore pressure during construction stage; Methods of seepage control in earth dams. Seismic analysis of embankment. Analysis of reinforced slope.

Text / Reference Books:

1. L. W Abramson, T. S Lee, S Sharma and G M Boyce, Slope Stability and Stabilization Methods, Willey Interscience publications
2. B M Das, Principles of Geotechnical Engineering, Thomson Brooks/Cole
3. T W. Lambe and R V Whitman, Soil Mechanics, John Wiley & sons
4. V N S Murthy, Principles of Soil Mechanics and Foundation Engineering, UBS Publishers Private Ltd

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VII

Course Code: 25ES01TH0703-4 Course Name: Remote Sensing & GIS
L : 3 Hrs., P : Hrs., Per Week Credits: 3

Course Objectives:

- ☐ Apply principles of Remote sensing and GIS to collect, map and retrieve spatial information.
- ☐ Plan, assess and evaluate natural and manmade systems using geospatial models and methods
- ☐ Use geospatial tools and techniques for hazard mitigation and resource planning.
- ☐ Pursue research and develop capabilities to handle multi-disciplinary field projects
- ☐ Work in teams and demonstrate leadership skills with professional ethics.

Course Outcomes: At the end of the program, the student will be able to:

- ☐ Identify specific data and methodologies for effective mapping and evaluation of natural resources
- ☐ Develop geospatial models and tools to address the social and engineering problems
- ☐ Apply geospatial technologies for hazard mitigation and management
- ☐ Design multi-criteria geospatial systems for decision making process

UNIT I

Aerial Photography and Photogrammetry: Basic principles, photographic systems, visual interpretation and mapping, ground truth verification, radiometer and its application.

Basic Concepts of Remote Sensing: Idealized remote sensing system, physics of remote sensing, electromagnetic spectrum, black body concept, atmospheric windows, geometry of scanners, CCD arrays and platforms, history of space imaging characteristics of space platform like LANDSAT, SPOT, IRS etc. characteristics of sensors like MSS, TM, LISS – I and II, outputs from various sensors.

UNIT II

Classification of Digital Data and Information: Supervised, unsupervised, extraction procedure for different applications and terrain evaluation, thematic interpretation, transfer of interpreted thematic information to base map, ground verification.

UNIT III

Application of Remote Sensing Geology and Geohazards: geological structures, landforms, topography, rocks. Identification of minerals and ore deposits. Identification of zones prone to landslide, earthquake, tsunami, avalanche, soil creep, beach erosion, land subsidence etc.

Hydrological hazards: flood forecasting, flood inundation mapping, risk zoning, reservoir sedimentation, fluvial geomorphology and environmental appraisal, snow melt initiation, drought, water quality and soil moisture,

Urban and regional planning: mapping for monitoring urban growth and changes, urban land use/land cover mapping, land degradation, deforestation, desertification

UNIT IV

Fundamentals of Geographic Information Systems Database concept, data types, data structures and models, coordinate systems and geo-referencing, concept of map projections, interpolation techniques, geo-spatial analysis and modeling.

Applications of Geographic Information Systems Applications of GIS in flood study, water resources assessment and management, ground water potential modeling, basin erosion, sedimentation, land-use/ land-cover study, spatial water quality analysis, vulnerability assessment, hazard zoning and risk assessment, forecasting etc.

Text Books

1. Paul R Wolf, Elements of Photogrammetry, McGraw Hill.
2. Lillesand and Kiefer, Remote sensing and Image Interpretation, John Wiley and Sons.
3. Ravi R Gupta, Remote Sensing Geology, Springer
4. Floyd F Sabins, Remote Sensing Principles and Interpretation, WH Freeman and Co.
5. John R Jenson, Introductory Digital Image Processing, Prentice Hall.

Reference Books:

1. Burrough P A, Principles of Geographical Information System for Land Resource Assessment, Oxford University Press.
2. Bonham-Carter G F, Geographic information systems for geoscientists modelling with GIS (1995) Pergamon.
3. Alard Meijerink
4. Hall M K, Schaller C J, Walker C S, and Kendal L P, Exploring Water Resources: GIS Investigations for the Earth Sciences (2002), Brooks Cole

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VII

Course Code: 25ES01TH0703-5 Course Name: Highway Construction and Management

L : 3 Hrs., P : Hrs., Per Week

Credits: 3

Course Outcome

1. Students should be able to describe and explain design principle of Flexible pavement
2. Students should be able to describe and explain design principle of Concrete pavement
3. Student should be able to explain various material required for construction of roads along with their properties
4. Students should be able to describe various evaluation techniques for pavements along with the maintenance measures.

UNIT - I Flexible Pavement Construction Earthwork, compaction and construction of embankments, specifications of materials, construction methods and field control checks for various types of flexible pavement materials in sub-base, base, binder and surface course layers and their choice

UNIT - II Cement Concrete Pavement Layers Specifications and method of cement concrete pavement construction; Construction of interlocking block pavements, Quality control tests; Construction of various types of joints; Soil Stabilized Pavement Layers: Principles of gradation/proportioning of soil aggregate mixes and compaction; Design factors, mix design, construction control and quality control checks for mechanical, soil- cement, soil- bitumen and soil-lime stabilization methods. Use of additives, Numerical problems on mix design and applications

UNIT - III Pavement Evaluation Pavement Distress - Functional and structural condition of pavements, Pavement distress survey, Functional condition evaluation of pavements- Roughness, Skid Resistance. Structural evaluation of pavements non-destructive testing, Benkelman beam and Falling Weight Deflectometer, Pavement strengthening based on deflection as per IRC

UNIT - IV Maintenance and rehabilitation techniques Pavement Management Systems - Pavement Management Systems- Components, structure, data requirements, Project level and Network level needs, Pavement performance prediction – concepts, modelling techniques– AASTHO, CRRI and HDM models, Budget forecasting for maintenance and rehabilitation, Ranking and optimization methodologies, life cycle costing.

Text Books

1. Highway Engineering : Khanna & Justo
2. A text book of highway engineering: R Srinivas Kumar

Reference Book 1. Pavement Analysis and Design: Yang H Huang

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VII

Course Code: 25ES01TH0704

Course Name: Hydrology and Water Resources

Engineering

L : 3 Hrs., P : Hrs., Per Week

Credits: 3

Course Outcomes

The students would be able to,

1. Understand the importance of hydrological data and parameters. Describe various hydrological parameters and develop the parametric correlation between the hydrological parameters.
2. Analyze measured hydrological parameters by applying various theories and equations.
3. Analyze hydrological data and apply for determination of design discharge/flood of water resource project using various mathematical techniques and equations.
4. Understand water resource management Importance of , groundwater recharging and reservoir planning and analysis.

Unit - I

- Introduction : Definition and its applications in civil engineering. Hydrological cycle, Meteorological factors affecting hydrological cycle, hydrological equation and its application.
- Precipitation : Definition, various forms. Determination of optimum numbers of rain gauges and estimation of missing rainfall data. Various methods of estimation of mean rainfall over the catchment. Hyetograph.

Unit - II

- Initial losses from precipitation : Interception and depression storage.
- Evaporation : Definition, mechanism, factors affecting evaporation. Measurement of evaporation by IS class 'A' pan, Evaporimeter. Estimation of evaporation by using empirical formulas and water budget equation.
- Evapotranspiration : Definition, mechanisms and factors affecting evapotranspiration. Estimation of evapotranspiration.

Unit - III

- Infiltration : Definition, mechanism and factors affecting infiltration. Infiltration capacity curve and its application. -index and its application.
- Runoff : Definition, components of runoff, factors affecting runoff and estimation methods.

Unit –IV

Hydrograph Analysis : Definition, types and components of flood hydrograph. Base flow separation from flood hydrograph, Derivation of unit hydrograph from flood hydrograph.

Analysis of unit hydrograph by superposition method and S-curve method. Triangular hydrograph and its analysis.

Unit - V

Statistical Methods for estimation of Peak flood and Design flood : Probability and recurrence interval of a flood magnitude. Frequency of point rainfall. Gumbel's probability distribution method. Rational method. Design floods and its types. Indian Standard guideline for design floods for dams (IS: 11223-1985). Risk, reliability, safety factor and safety margin of design flood. Impact of climate change on extreme flow events.

Unit - VI

Reservoir Planning : Types of reservoir, Selection of site for Reservoirs, Fixing of reservoir levels; Different storage zones in reservoir; Determination of storage capacity by mass curve method, Reservoir sedimentation; Multipurpose water resource projects. Economic planning of reservoir. Water Resources in India need of sustainability of water necessity of ground water recharge and its method and watershed management

Text Books

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References

- S. K. Garg, Hydrology and Water Resource Engineering, Khanna publication, Edition 2015 & Latest
 - B.C. Punmia, Water power engineering, Laxmi Publication.
 - Water Resources Engineering by Ray K. Linsley (McGraw-Hill series in water resources and environmental Engineering).
- Applied Hydrology by Ven Te Chow, David R. Maidment, Larry W. Mays (McGraw-Hill Book Company)

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VII

Course Code: 25ES01PR0705

Course Name : Minor project

L : 0 Hrs., P : 8 Hrs., Per Week

Credits: 4

Project work on any civil Engineering topics

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VII

Course Code: 25ES01TH0706

Course Name : participative learning

L : 0 Hrs., P : Hrs., Per Week

Credits: 1

Student will get 1 credit on

- 1 on completion of MOOC NPTEL course**
or
- 2 publishing scopus / SCI paper**
or
- 3 participate in national/ international conference / competition**

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VII

Course Code: 25ES01TH0707

Course Name : Property Documentation for Civil

Engineers

L : 1 Hrs., P : Hrs., Per Week

Credits: 1

Definitions of infrastructures; Typical infrastructure planning steps; Planning and appraisal of major infrastructure projects; Screening of project ideas; Life cycle analysis; Multi criteria analysis for comparison of infrastructure alternatives; Procurement strategies; scheduling and management of planning activities.

Economic analysis – concept and applications, principles of methodologies for economic analysis of public works, social welfare function, Demand curves and price elasticities; Shadow pricing; Accounting for risk and uncertainty.

Financial evaluation; Financial estimates and projections; Project risk analysis; Political and social perspectives of infrastructure planning; Case studies

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VIII

Course Code: 25ES01TH0802

Course Name : Contract Account and Work

Managment

L : 3 Hrs., P : Hrs., Per Week

Credits: 3

Course Outcome

The students will be able to;

- 1 .Demonstrate entrepreneurship skills to start a business venture in Civil Engineering
2. Exhibit knowledge for formation of business organization and its registration with various government agencies
- 3 .Demonstrate understanding in respect of business laws and different types of taxation which are applicable to civil engineering profession
4. Design and make financial analysis of civil engineering projects

UNIT - I : Introduction to Accountancy : Double entry system, ledger and journal, cash book, Trial balance

UNIT - II : Depreciation : straight line, reducing balance, sinking fund, Contract Accounts:, Work certify and payments, work in progress uncertified, profit on incomplete contract, balance sheet.

UNIT - III : Branch and department accounts, Inventory Management - Economic Order quantity, Investment appraisal - payback period method, NPV method and IRR method

UNIT - IV : Types of cost, Standard cost and budgeting, different types of budgets, advantages and problem Variance analysis - labour, material, overheads

UNIT - V : Taxation applicable to construction industry, Introduction to Construction Contract Management and Administration(Different Types of Construction Contracts, Construction Condition of contracts, Contractual documents, Record keeping and Essentials Quality Control).

UNIT - VI : Project financing : Capital costs, working capital, operating costs, Product revenues, Joint venture formation agreement, and Raw materials supply contract, Plants operation / management contract, Loan agreement and project loan structure, Money availability.

Text Books

1. Accounting Principles; R N Anthony
2. Cost and Management accountancy: S P Jain
3. Financial Management: M Y Khan
4. Business Laws: P R Chadha
5. Taxman's student guide to company law: A K Mujumdar
6. Taxman's student guide to Financial Management: Ravi Kishor

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VIII

Course Code: 25ES01TH0803

Course Name Irrigation Engineering

L : 3 Hrs., P : Hrs., Per Week

Credits: 3

Course Outcomes

The students would be able to:.

Identify, describe and explain the necessity and scope of irrigation engineering.

Understand the various types of irrigation schemes, its components and their functions.

Apply knowledge of basic science and engineering principles for analysis and design of various components of irrigation scheme.

Justify and describe the necessity of various repairs and maintenance work and its methodology for various components of irrigation scheme.

Unit I

Introduction : Necessity ,Importance, Benefits and ill effects of Irrigation; Classification of Irrigation schemes; General principles of flow, lift, perennial, inundation Irrigation systems; Comparative study of sprinkler and drip Irrigation systems.

Water Requirement of Crops : Suitability of soils for Irrigation, Standards of Irrigation water; PET-R method of crop water requirements; Depth & frequency of Irrigation; Command area classification, Relation between duty and delta; Factors affecting duty; Principal crops in India; Crop rotation; Methods of assessment of Irrigation water.

Unit II

Dams : Classification of dams on basis of use, hydraulic design and materials; Factors governing, selection of type of dam. Gravity Dam : Definition; forces acting on gravity dam; stability requirements; Theoretical & practical profile of gravity dam; Low & High dam; Galleries.

Unit III

Earthen Dams : Types and component parts of earthen dams, seepage and drainage arrangements; Failure of earthen dams; Plotting of phreatic line for homogeneous earthen dams with horizontal filters; Stability checks.

Unit IV

Spillways : Types of spillway, design principles of ogee spillway; Spillway gates – vertical lift, radial, rolling and drum; Energy dissipation methods on downstream of spillways.

Diversion Head Works : Parts of diversion headworks; Causes of failure of weirs on permeable foundation; Bligh's Creep theory; Dr. Khosla's theory for design of weirs on permeable foundations.

Unit V

Canals: Types of canal; Alignments of canal; Cross section of Irrigation canals; Balancing depth; Losses in canals. Canals In Alluvial Soils : Kennedy's silt theory – Design procedure, silt supporting capacity, drawbacks; Lacey's silt theory - Definition of initial, final and permanent regime channels, Lacey's Regime equation, channel design procedure, drawbacks; Garret's diagram and Lacey's diagram for channel design. Lined Canals : Design procedure, types of lining, relative merits and demerits of canal lining, Economics of canal lining

Unit VI

Canal Regulation Works : Theoretical aspects of location, objects, classification, components and schematic section of Head Regulator, Cross regulators, canal escapes, Canal falls and canal outlets. Cross Drainage Works : Theoretical aspects of location, objects, classification, components and schematic section of aqueducts, siphon aqueducts, super passage, canal siphon, inlets and level crossings. Water Logging and Land Drainage : Causes, effects, preventive measures of water logging, Types of drains, Layout of tile drains system, flow of ground water to drains. Soil Erosion : Causes, effects and control

Text Books

Santosh Kumar Garg , Irrigation Engineering and Hydraulic Structures, Khanna Publishers.
B. C. Punmia , Irrigation Engineering and water Power Engineering, Laxmi Publications.

References

K. R. Arora, Engineering and Hydraulic Structures, Standard Publishers.
R. K. Sharma , Irrigation Engineering and Hydraulic Structures, S. Chand Publications.
G. L. Asawa , Irrigation and Water Resources Engineering , New Age International Publishers.
P. N. Modi , Irrigation Engineering, Standard Publishers

Ramdeobaba University, Nagpur
Department of Civil Engineering
Syllabus for Semester B.Tech VIII

Course Code: 25ES01PR0801 Course Name : Industry Internship
L : 3 Hrs., P : Hrs.24, Per Week Credits: 12

Course Outcomes

The students would be able to;

1. Acquired the knowledge about construction process and technical information about the execution and maintenance of civil engineering works.
2. Understand the processes and work ethics so as to develop the essential skills.

Students are required to complete minimum six week internship in industry/research organization / IIT / IISc / IIIT / NIT / In-house research internship at RCOEM during the winter/summer vacations prior to the Commencement of Semester-VII.

On completion, the student has to submit the internship report/s and internship completion certificate/s issued by the organization(s) where it was completed, to the department.

The department will evaluate the same by way of Seminar/Viva-voce etc in the department in Semester-VII as an Audit Course. Student shall be required to secure Satisfactory 'SF' grade in it.

**UNIVERSITY HAS THE RIGHT TO MODIFY
SCHEME & SYLLABUS AS AND WHEN REQUIRED**
