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

2024-2025 I Year

2025-2026 II Year

B.Tech. (CIVIL & INFRASTRUCTURE ENGINEERING)

Shri RamdeobabaUniversity, Nagpur.
Department of Civil Engineering
Teaching and Evaluation Scheme B.Tech (Civil&InfrastructureEngineering) NEP-2020 based
To be implemented from Session: 2024-25

Semester – I

Course Code	Category	Name of Course	Lecture (Hours)	Practical (Hours)	Credits	CA	ESE/Internal Evaluation	Total	ESE Duration
24HS05TH0101	BSC-T	Physics for Civil Engineering	3	0	3	50	50	100	3
24HS05PR0101	BSC-P	Physics for Civil Engineering Lab	0	2	1	25	25	50	-
24HS03TH0101	BSC-T	Calculus, Probability and Statistics	3	0	3	50	50	100	3
24ES01TH0101	ESC-T	Engineering Mechanics	3	0	3	50	50	100	3
24ES01TH0102	ESC-T	Application of python in Civil Engineering	2	0	2	50	50	100	2
24ES01PR0103	ESC-P	Computer Programming for Civil Engineers	0	2	1	25	25	50	-
24ES01TH0104	ESC-T	Building Materials & Components	1	0	1	25	25	50	-
24ES01PR0105	VSEC-P	Engineering Drawing and Drafting (AutoCAD)	0	4	2	25	25	50	-
24HS02TH0101	AEC-T	English for Professional Communication	2	0	2	50	50	100	2
24HS02PR0101	AEC- P	English for Professional Communication Lab	0	2	1	25	25	50	-
24HS02PR0105	CC-P	Liberal/Performing Art	0	2	1	0	0	0	-
24HS02TH0104	VEC	Foundational Course in Universal Human Values	1	0	1	25	25	50	-
			15	**12**	**21**	**400**	**400**	**800**	

*List of Liberal/Performing Art courses are enclosed

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

Sr. no.	Course Code	Course Title	Lecture	Practical	Credits	Continuous Evaluation	End Sem Exam/ Internal Evaluation	Total	ESE Duration
1.	24HS02PR0105-01	Fundamentals of Indian Classical Dance: Bharatnatayam	0	2	1	25	25	50	N/A
2.	24HS02PR0105-02	Fundamentals of Indian Classical Dance: Kathak	0	2	1	25	25	50	N/A
3.	24HS02PR0105-03	Introduction to Digital Photography	0	2	1	25	25	50	N/A
4.	24HS02PR0105-04	Introduction to Basic Japanese Language	0	2	1	25	25	50	N/A
5.	24HS02PR0105-05	Art of Theatre	0	2	1	25	25	50	N/A
6.	24HS02PR0105-06	Introduction to French Language	0	2	1	25	25	50	N/A
7.	24HS02PR0105-08	Art of Painting	0	2	1	25	25	50	N/A
8.	24HS02PR0105-09	Art of Drawing	0	2	1	25	25	50	N/A
9.	24HS02PR0105-10	Nature Camp	0	2	1	25	25	50	N/A
10.	24HS02PR0105-11	Developing Self-awareness	0	2	1	25	25	50	N/A
11.	24HS02PR0105-12	Art of Poetry	0	2	1	25	25	50	N/A
12.	24HS02PR0105-13	Creative and Content Writing	0	2	1	25	25	50	N/A
13.	24HS02PR0105-14	Science of life through Bhagwad Gita	0	2	1	25	25	50	N/A
14.	24HS04PR0102-1	Adventure Sports	0	2	1	25	25	50	N/A
15.	24HS04PR0102-2	Introduction to Defense Forces & Obstacle Training	0	2	1	25	25	50	N/A
16.	24HS04PR0102-3	Self Defense & Indian Martial Arts	0	2	1	25	25	50	N/A
17.	24HS04PR0102-4	Basic Nutritional Course	0	2	1	25	25	50	N/A
18.	24HS01PR0103	Introduction to Remedies by Ayurveda	0	2	1	25	25	50	N/A
19.	24HS01PR0104	Biodegradation of Kitchen Waste	0	2	1	25	25	50	N/A
20.	24HS05PR0105	Herbal Home Remedies: A Course for Self-Care	0	2	1	25	25	50	N/A
21.	24EE07PR0105	Day-to-Day Electrical Systems	0	2	1	25	25	50	N/A

Shri RamdeobabaUniversity , Nagpur.
Department of Civil Engineering
Teaching and Evaluation Scheme B.Tech (Civil & Infrastructure Engineering) NEP-2020 based
To be implemented from Session: 2024-25

Semester-II

Course Code	Category	Name of Course	Lecture	Practical	Credits	CA	ESE	Total	ESE Duration
24HS01TH0201	BSC-T	Engineering Chemistry for Civil Engineers	3	0	3	50	50	100	3
24HS01PR0201	BSC-P	Engineering Chemistry for Civil Engineers Lab	0	2	1	25	25	50	-
24HS03TH0216	BSC-T	Linear Algebra and Multivariate Calculus	3	0	3	50	50	100	3
24ES01TH0201	ESC-T	Basics of Geotechnical Engineering	3	0	3	50	50	100	3
24ES01PR0201	ESC-P	Basics of Geotechnical Engineering Lab	0	2	1	25	25	50	-
24ES01TH0202	PCC-T	Solid Mechanics	3	0	3	50	50	100	3
24ES01PR0202	PCC-P	Solid Mechanics Lab	0	2	1	25	25	50	-
24ES01TH0203	VSEC-T	Building Services	3	0	3	50	50	100	3
24HS02TH0205	IKS-T	Foundational literature for Indian civilization	2	0	2	50	50	100	2
24HS04PR0202	CC-P	Sport-Yoga-Recreation	0	2	1	25	25	50	-
			17	**08**	**21**	**400**	**400**	**800**	

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

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

Semester-III

Course Code	Category	Name of Course	Lecture	Practical	Credits	CA	ESE	TOTAL	ESE Duration
24ES01TH0301	PCC-T	Fluid Mechanics	3	0	3	50	50	100	3
24ES01PR0301	PCC-P	Fluid Mechanics Lab	0	2	1	25	25	50	-
24ES01TH0302	PCC-T	Concrete Technology	3	0	3	50	50	100	3
24ES01PR0302	PCC-P	Concrete Technology Lab	0	2	1	25	25	50	-
24ES01TH0303	PCC-T	Structural Analysis	3	0	3	50	50	100	3
24ES01PR0303	PCC-P	Structural Analysis Lab	0	2	1	25	25	50	-
24ES01TH0304	VEC-T	Technical Report Writing	1	0	1	50	0	50	-
24ES01TH0305	MDM-T	List attached	3	0	3	50	50	100	2
	OE-T	**Open Elective - I**	2	0	2	50	50	100	2
24ES01TH0306	MGMT-T	Finance Management for Civil Engg. projects	2	0	2	50	50	100	2
24ES01PR0307	FP-P	Mini Project& Field visit	0	4	2	50	0	50	-
			17	**10**	**22**	**475**	**375**	**850**	

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

Semester-IV

Course Code	Category	Name of Course	Lecture	Practical	Credits	CA	ESE	TOTAL	ESE Duration
24ES01TH0401	PCC-T	Water Supply Engineering	3	0	3	50	50	100	3
24ES01PR0401	PCC-P	Water Supply Engineering Lab	0	2	1	25	25	50	-
24ES01TH0402	PCC-T	Reinforced Concrete Structures	3	0	3	50	50	100	3
24ES01TH0403	PCC-T	Basics of Surveying	2	0	2	50	50	100	2
24ES01PR0403	PCC-P	Basics of Surveying Lab	0	2	1	25	25	50	-
24ES01TH0404	MDM-T	List attached	3	0	3	50	50	100	3
	OE-T	**Open Elective - II**	3	0	3	50	50	100	3
24ES01TH0405	AEC-T	Concrete mix design	1	0	1	50	0	50	0
24ES01TH0406	MGMT-T	Construction Engineering & Management	3	0	3	50	50	100	3
24ES01PR0407	VSEC	Computational Tools for Civil Engineering	0	2	1	50	0	50	0
			18	**6**	**21**	**450**	**350**	**800**	

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

Shri RamdeobabaUniversity , Nagpur.
Department of Civil Engineering
Teaching and Evaluation Scheme B.Tech (Civil & Infrastructure Engineering) NEP-2020 based
To be implemented from Session: 2026-27

Semester-V

Course Code	Category	Name of Course	Lecture	Practical	Credits	CA	ESE	TOTAL	ESE Duration
24ES01TH0501	PCC-T	Transportation Engineering	3	0	3	50	50	100	3
24ES01PR0501	PCC-P	Transportation Engineering Lab	0	2	1	25	25	50	-
24ES01TH0502	PCC-T	Sanitary Engineering	3	0	3	50	50	100	3
24ES01PR0502	PCC-P	Sanitary Engineering Lab	0	2	1	25	25	50	-
24ES01TH0503	PCC-T	Estimating & Costing	3	0	3	50	50	100	3
24ES01TH0504	PCC-T	Advanced Concrete Structures	3	0	3	50	50	100	3
24ES01TH0505	PEC-T	Program Elective-T	4	0	4	50	50	100	3
24ES01TH0506	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**	**400**	**400**	**800**	

Shri RamdeobabaUniversity , Nagpur.
Department of Civil Engineering
Teaching and Evaluation Scheme B.Tech (Civil & Infrastructure Engineering) NEP-2020 based
To be implemented from Session: 2026-27

Semester-VI

Course Code	Category	Name of Course	Lecture	Practical	Credits	CA	ESE	TOTAL	ESE Duration
24ES01TH0601	PCC-T	Design of Steel Structures	3	0	3	50	50	100	3
24ES01TH0602	PCC-T	Foundation Engineering	2	0	2	50	50	100	2
24ES01TH0603	PCC-T	Flow through pipes & channels	3	0	3	50	50	100	3
24ES01PR0603	PCC-P	Flow through pipes & channels Lab	0	2	1	25	25	50	-
24ES01TH0604	PEC-T	Program Elective - II	3	0	3	50	50	100	3
24ES01PR0604	PEC-P	Program Elective – II Lab	0	2	1	25	25	50	-
24ES01TH0605	PEC-T	Program Elective - III	3	0	3	50	50	100	3
24ES01PR0606	PCC-P	Technical Drawing Analysis &Evaluation	0	2	1	50	-	50	-
24ES01TH0607	MDM-T	List Attached	3	0	3	50	50	100	3
24ES01PR0608	VSEC-P	Quality control in construction processes	0	2	1	50	0	50	0
24ES01PR0609	CCA-P	Simulation in Civil Engineering	0	2	1	50	-	50	0
			17	**10**	**22**	**500**	**350**	**850**	

Exit Option

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

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

Semester-VII/VIII

Course Code	Category	Name of Course	Lecture	Practical	Credits	CA	ESE	TOTAL	ESE Duration
24ES01TH0701	PEC-T	Program Elective - IV	3	0	3	50	50	100	3
24ES01PR0701	PEC-P	Program Elective – IV Lab	0	2	1	25	25	50	-
24ES01TH0702	PEC-T	Program Elective - V	4	0	4	50	50	100	3
24ES01TH0703	PEC-T	Program Elective - VI	3	0	3	50	50	100	3
24ES01TH0704	PCC-T	Hydrology and Water Resources Engineering	3	0	3	50	50	100	3
24ES01PR0705	Project-P	Minor Project	0	8	4	50	50	100	0
24ES01TH0706	CCA	Participative Learning	1	0	1	50	-	50	0
24ES01TH0707	CCA	Property Documentation for Civil Engineers	1	0	1	50	-	50	0
			15	**10**	**20**	**375**	**275**	**650**	**12**

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

Semester-VIII/VII

Course Code	Category	Name of Course	Lecture		Practical	Credits	Theory Course				Practical Course	
							CA	ESE	TOTAL	ESE Duration	CA	ESE
Option 1 - Project												
24ES01PR0801	VEC/ Project-P	Major Project	0		12	6	0	0	0	0	100	100
24ES01TH0802	PCC-T	Contracts Account and Work Management	3		0	3	50	50	100	3	0	0
24ES01TH0803	PCC-T	Irrigation Engineering	3		0	3	50	50	100	3	0	0
			6		**12**	**12**	**100**	**100**	**200**	6	100	100
Option 2 – Industry Internship												
24ES01PR0804	II-P	Industry Internship	**0**		**24**	**12**	0	0	0	0	100	100
Option 3 - Research Internship												
24ES01PR0805	RI-P	Research Internship	0		18	9	0	0	0	0	100	100
24ES01TH0806	PCC	Research Methodology	3		0	3	50	50	100	3	0	0
			3		**18**	**12**	50	50	100	3	100	100
Option 4 - TBI Internship												
24ES01PR0807	TBI	TBI Internship	**0**		**24**	**12**	0	0	0	0	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**

Program Elective courses basket

Semester		Construction Management	Environmental Engineering	Structural Engineering	Geotechnical Engineering	Transportation Engineering	General	Water Resources
V	**(PE-I)(T)**	Advanced Concrete Technology	Air Pollution & Control	Advanced Structural Analysis	Geotechnical Explorations	Railway Engineering	Engineering Geology	Urban Drainage and Sewage System
VI	**(PE-II) (T&P)**	Advanced Construction Techniques	Industrial Waste Water Treatment	Retrofitting & Rehabilitation of Civil Infrastructure	Ground Improvement	Traffic Engineering and Management	Computer Aided Design and Drafting (CADD)	Water Transmission & Distribution System
	(PE-III) (T)	Urban Infrastructure	Solid Waste Management	Prestressed Concrete Structures	Advanced Geotechnical Engineering	Pavement Design	Infrastructure Planning and Management	Introduction to Piping and Plumbing Engineering
VII	**(PE-IV) (T&P)**	Advance construction Materials	Water and waste water Treatment	Earthquake Resistant Design of RCC Structures	Reinforced Earth	Urban Transportation Planning	BIM	Integrated Water Resources Management
	(PE-V) (T)	Contracts Management	Environmental Management	Bridge Engineering	Special Geotechnical Constructions	Airport Planning and Design	Numerical Method for Civil Engineers	Open Channel Hydraulics
	(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	Watershed Conservation and Management

Sr. No	Semester	Open Electives
1	III	1) The Construction Industry: The Way Forward 8 2) Comfort in Buildings 3) Formwork Systems
2	IV	1) Introduction to Programming with MATLAB 2) Linear Regression and Modeling
3	V	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

Participative Learning 1 Credit (12-14 Hours minimum)

Short Course, Workshop, Hands-on-training, Training Program, MOOCCourses of 1 Credit (contents are beyond regular curriculum), Participation incompitetions, Laboratory based Experimental Learning, Modelling of prototype,Filing/Grant of Design Patent/Copyright, any other work relevant to programcertified 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.

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. SreejaPekkat	IITG	IITG
Civil Engineering	Bridge Engineering	By Prof. PiyaliSengupta	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. BhargabMaitra	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. PennanChinnasamy	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 NandanSengupta	IITK	IITK

Shri RamdeobabaUniversity , Nagpur.

Department of Civil Engineering
B.Tech (Civil & Infrastructure 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
24ES01TH3100	**Construction Technology**	**3**	**0**	**3**	**50**	**50**	**100**	**3**
24ES01TH4100	**Fire fighting system**	**3**	**0**	**3**	**50**	**50**	**100**	**3**
24ES01TH5100	**Geotechnical Design**	**3**	**0**	**3**	**50**	**50**	**100**	**3**
24ES01PR5100	**Geotechnical Design Lab**	**0**	**2**	**1**	**25**	**25**	**50**	**-**
24ES01TH6100	**Foundation Design**	**3**	**0**	**3**	**50**	**50**	**100**	**3**
24ES01PR6100	**Foundation Design Lab**	**0**	**2**	**1**	**25**	**25**	**50**	**-**
24ES01PR7100	**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**
24ES01TH3200	**Sustainable Engineering**	**3**	**0**	**3**	**50**	**50**	**100**	**3**
24ES01TH4200	**Disaster Management**	**3**	**0**	**3**	**50**	**50**	**100**	**3**
24ES01TH5200	**Engineering Ethics and Professional Practice**	**3**	**0**	**3**	**50**	**50**	**100**	**3**
24ES01PR5200	**Engineering Ethics and Professional Practice Lab**	**0**	**2**	**1**	**25**	**25**	**50**	
24ES01TH6200	**Basics of Civil Engineering**	**3**	**0**	**3**	**50**	**50**	**100**	**3**
24ES01PR6200	**Basics of Civil Engineering Lab**	**0**	**2**	**1**	**25**	**25**	**50**	
24ES01PR7200	**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 :Ceritificate course in Civil and Infrastructure Engineering

2) After 2nd year exit : Advanced Certifictae course in Civil and Infrastructure Engineering

3) After 3rd year exit : Diploma in Civil and Infrastructure Engineering

4) After 4th year exit :B.Tech in Civil & Infrastructure Engineering

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

Course Code : 24HS05TH0101
Course Name: Physics for Civil Engineering
L :3 Hrs., T: hr P : 0 Hrs., Per Week 3 Credits: 3

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

Department of Civil Engineering

Syllabus for Semester B.Tech I

Course Code : 24HS05PR0101

Course Name: Physics for Civil Engineering Lab

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

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.

B. Experiments related to Civil Engineering

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.

C. Open ended experiment on Virtual Lab

Suggested References:

1. Physics Lab Manual written by the Teaching Faculty of Physics Department, RCOEM.

Department of Civil Engineering
Syllabus for Semester B.Tech I

Course Code : 24HS03TH0101
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'stype, 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 ofparameters, 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, Eulers 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. Spiegal ,Schaum series*
8. A text book of Applied Mathematics Volume I & II, by P. N. Wartikar and J. N. Wartikar, Pune VidhyarthiGrihaPrakashan, Pune-411030 (India).
9. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.

Department of Civil Engineering
Syllabus for Semester B.Tech I

Course Code : 24ES01TH0101
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.*

Syllabus for Semester B.Tech I

Course Code : 24ES01TH0102
Course Name: Application of python in Civil Engineering
L :2 Hrs., P : Hrs., Per Week Credits: 2

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, polygones, 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’Relly, 2nd Edition.

Syllabus for Semester B.Tech I

Course Code: 24ES01PR0103
Course Name: Computer Programming for Civil Engineers
L :0 Hrs., P :2 Hrs., Per Week Credits: 1

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, polygones, 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’Relly, 2nd Edition.

Department of Civil Engineering

Course Code : 24ES01TH0104
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
Department of Civil Engineering
Syllabus for Semester B.Tech I

Course Code : 24ES01PR0105
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, andproduce2Ddrawings.
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: Matchproperties,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
Department of Civil Engineering
Syllabus for Semester B.Tech I

Course Code : 24HS02TH0101
Course Name: English for Professional Communication
L : 2 Hrs., P :0 Hrs., Per Week Credits: 2

Course Objectives

The main objective of this course is to enhance the employ ability 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 technique so freadingcomprehension used in professional communication.
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.Createprecise and accurate written communication products.

Unit-1: Vocabulary Building

Importance of using appropriate vocabularyTechniques of vocabulary development commonly used power verbs, power adjectives and powered verbs. Synonyms, antonyms, phrases & idioms, one-word substitution sand standard abbreviations

Unit-2: Listening and Reading Comprehension

Listening Comprehension: active listening, reasons for poor listening, traits of a good listener, and barriers to effective listening Reading Comprehension: types and strategies.

Unit-3: Functional Grammar and Usage

IdentifyingCommonErrorsinuseof:articles,prepositions,modifiers,modalauxiliaries,redundancies,andclichésTense Subject-verb agreement, noun-pronoun agreement Voic

Unit-4: Writing Skills

Sentence StructuresSentenceTypesParagraph Writing: Principles, Techniques, and Styles

Unit-5: Writing Practices

Art of Condensation: Précis, Summary, and Note Making
Correspondence writing techniques and etiquettes–academic writingEssay Writing

Books

1. *Communication Skills*.SanjayKumarand PushpLata.OxfordUniversityPress.2011.
2. *PracticalEnglishUsage.*MichaelSwan.OUP.1995.
3. *RemedialEnglishGrammar.*F.T.Wood.Macmillan.2007
4. *OnWritingWell.*WilliamZinsser.HarperResourceBook.2001
5. *StudyWriting.*LizHamp-Lyons andBenHeasly.CambridgeUniversityPress.2006.
6. *ExercisesinSpokenEnglish.*Parts.I-III.CIEFL,Hyderabad.OxfordUniversityPress

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

Course Code : 24HS02PR0101
Course Name: English for Professional Communication Lab
L : 0 Hrs., P :2 Hrs., Per Week Credits: 1

CourseObjective

ToenhancecompetencyofcommunicationinEnglishamonglearners

CourseOutcomes

OncompletionofEnglishLabcourse,studentswillbeabletoachievethefollowing:

CO1: Applyeffectivelisteningandspeakingskillsinprofessionalandeverydayconversations.
CO2: DemonstratethetechniquesofeffectivePresentationSkills
CO3:EvaluateandapplytheeffectivestrategiesforGroupDiscussions
CO4: AnalyseandapplytheeffectivestrategiesforPersonalInterviews
CO5: Implementessentiallanguageskills-listening,speaking,reading,andwriting

Syllabus

Listofpracticals

Computer Assisted + Activity Based Language Learning

Practical1: EverydaySituations:ConversationsandDialogues–SpeakingSkills

Practical2: Pronunciation, Intonation,Stress, andRhythm

Practical3: EverydaySituations:ConversationsandDialogues–ListeningSkills

ActivityBasedLanguageLearning

Practical4: PresentationSkills:Orientation&MockSession

Practical5: PresentationSkills:Practice

Practical6: GroupDiscussions:Orientation&MockSession

Practical7: GroupDiscussions:Practice

Practical8: PersonalInterviews:Orientation&MockSession

Practical 9: PersonalInterviews:Practice

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

Course Code: 24HS02PR0105-01
1Course Name: Fundamentals of Indian classical dance:Bharatnatayam

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

Courseobjective

Thecourseaimstointroducethestudentsto Bharatnatyam,animportantelementofIndian traditional knowledge system. The course will not only provide the learningand skill to perform this art but would also enhance manymental and physical aspectsof the students such as strength, flexibility, discipline, self-confidence, creativity,focus,coordination,etc.

CourseOutcomes

Oncompletionofthecourse,studentswillbeabletoachievethe following:

CO1:Understandtheimportanceof danceandBharatnataymasanIndiandanceform
CO2:Developskillstoperformthedanceformatitsbasiclevel.
CO3:Evaluatetheirstrengthsandinteresttotakebridgecoursetogive*Pratham*(1st levelformalexam ofBharatnatayam).

Syllabus

Practical-1:OrientationinBharatnatayam

Practical-

2:TattuAdavutill8,NaattaAdavu4Steps,PakkaAdavu1step,MettaAdavu1Step,KudittaMettaAda vu4Steps,

Practical-3:Practicesessions

Practical-

4:TattaKudittaAdavu(Metta),TattaKudittaAdavu(Metta)2Steps,TirmanamAdavu3Steps,Kattu Adav-3Steps,KattuAdav-3Steps

Practical-5:Practicesessions

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

7:practicesessions

Practical–8:finalpracticesessionsandperformances.

Recommendedreading

1. *IntroductiontoBharata'sNatyasastra*,AdyaRangacharya,2011
2. *The NatyasastraandtheBodyinPerformance:EssaysontheAncientText*,editedbySreenath Nair,2015

3. *Bharatanatyam How to ... : A Step-by-step Approach to Learn the Classical Form*,EshwarJayalakshmi,2011

Ramdeobaba University, Nagpur

Department of Civil Engineering

Syllabus for Semester B.Tech I

Course Code: 24HS02PR0105-02

Course Name: Fundamentals of Indian Classical Dance:Kathak

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

Courseobjective

ThecourseaimstointroducethestudentstoKathak,animportantelementofIndiantraditionalknowledgesystem.Thecoursewillnotonlyprovidethelearningandskillto perform this art but would also enhance many mental and physical aspects of thestudents such as strength, flexibility,discipline,self-confidence,creativity,focus,coordination,etc.

CourseOutcomes

Oncompletionofthecourse,studentswillbeabletoachievethe following:

CO1: Understand the importance of dance and Kathak as an Indian dance formCO2:Developskillstoperformthedanceformatitsbasiclevel.
CO3:Evaluatetheirstrengthsandinteresttotakebridgecoursetogive*Prarambhik* (1stlevelformalexamofKathak).

Syllabus

Practical-1:OrientationinKathak.Correctpostureofkathak,BasicMovementsandexerciseStepping,Chakkaro f5count(Bhramari),
Practical-2:practicesessionsofpractical1

Practical -3: Hastaks, Hastaks and Steppings, Reciting asamyukta Mudra shloka,Hastakandsteppings
Practical-4:practicesessionsofpractical3

Practical-5:TodasandAsamyuktahastamudrashlok,VandanaofShlok, 2TodasandVandana,GhanteKiTihai,
Practical -6:practicesessionsofpractical5

Practical-7:21ChakkardarTodaandGinntiKiTihai,2Todasand1ChakkardarToda,practicesessions
Practical-8:Finalperformances.

Recommendedreading

1.KathakVolume1A"Theoretical&PracticalGuide"(KathakDanceBook),MaramiMedhi&DebasishTalukdar,2022,AnshikaPublication(13September2022)

Ramdeobaba University, Nagpur

Department of Civil Engineering

Syllabus for Semester B.Tech I

Course Code : 24HS02PR0105-03

Course Name: Introductionto Digital Photography

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

Courseobjective

The course aims to develop basic skills of students in digital photography to lay afoundationforthemasahobbyand/oraprofession.

Courseoutcome:

Attheendofthecoursethestudentswillbeabletoachievethe following:

CO1:Developanunderstandingofthetechnicalaspectsandaestheticsof Photography.
CO2: Apply the rules of digital photography for creating photographs.CO3:
Develop skills to enhance photographs through post processing.CO4: Create
a portfolio oftheirphotographsinselected genre.

Syllabus

Practical 1: Orientation in digital photography: Genres, camera handling and settingsPractical2:RulesofComposition

Practical3:RulesofComposition:practicesessions

Practical4:UnderstandingExposureandArtofPre-Visualization

Practical5:RulesofCompositionandArtofPre-Visualization: practicesessionsPractical6:Post ProcessingPhotographsandPortfoliocreation

Practical7:PostProcessingPhotographs:practicesessions

Practical8:Portfoliofinalizationandpresentationinselectedgenre.

Referencematerial

1. Scott Kelby (2020) *The Digital Photography Book: The Step-by-Step Secrets for howtoMakeYourPhotosLookLikethePros*,RockyNook,USA
2. LarryHall(2014)*DigitalPhotographyGuide:FromBeginnertoIntermediate:ACompila tion of Important Information in Digital Photography*,SpeedyPublishingLLC,Newark
3. J Miotke (2010) *Better Photo Basics: The Absolute Beginner's Guide to TakingPhotosLikeaPro*,AMPHOTOBooks,CrownPublishingGroup,USA

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

Course Code : 24HS02PR0105-04
Course Name: Introduction to Basic Japanese Languag
L :0 Hrs., 0: 0 hr P : 2 Hrs., Per Week Credits: 1

Courseobjective

Thecourse aims todevelop basic communication skills in JapaneseLanguageand helpdevelopabasicunderstandingofJapaneseculture incross-culturalcommunication.

Courseoutcome

CO1: Gainabrief understanding aboutJapanasa country and Japanese culture.CO2:DevelopabilitytousevocabularyrequiredforbasiclevelcommunicationinJapanese language.
CO3:AbletowriteandreadthefirstscriptinJapaneselanguage.
CO4:AbletoframesimplesentencesinJapaneseinordertohandleeverydayconversations
CO5:AbletowriteinbasicJapaneseaboutthetopicscloselyrelatedtothelearner.

Syllabus

Practical-1:OrientationaboutJapan,itslanguage,anditsculture
Practical-2:CommunicationSkills1:VocabularyforbasicJapaneselanguage
Practical -3:Practicesessions

Practical-4:WritingSkills1:ReadingandwritingfirstscriptinJapanese

Practical-5: Practicesessions

Practical-6:CommunicationSkills2:framingsentences

Practical-7:Practicesessions

Practical-8:WritingSkills2:WritebasicJapaneseandpractice

Recommendedreading

1. MarugotoStarter(A1)Rikai-CourseBookforCommunicativeLanguageCompetences, by The Japan Foundation, Goyal Publishers & Distributors Pvt. Ltd(ISBN:9788183078047)
2. JapaneseKanaScriptPracticeBook– Vol.1Hiragana,byAmeyaPatki,DaiichiJapaneseLanguageSolutions(ISBN:9788194562900)

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

Course Code : 24HS02PR0105-05
Course Name Art of Theatre
L :0 Hrs., 0: 0 hr P : 2 Hrs., Per Week Credits: 1

Courseobjectives:

Thecourseaimstodevelopinthestudents,anactor'scraftthroughphysicalandmentaltraining.

CourseOutcomes:

Oncompletionofthecourse,studentswillbeabletoachievethe following:

CO1: Understand and synthesize the working of the prominent genres of theatreacrosstheworld.
CO2:Applytheskillofvoiceandspeechintheatreandpublic speaking
CO3: Apply the art of acting and also develop generic skills such as confidence,communicationskills,self-responsibility,motivation,commitment,interpersonalskills,problemsolving,andself-discipline.
CO4:Applyskillsacquiredrelatedtotechnical/productionaspectsoftheatreandalsodevelopproblemsolvingandinterpersonalskills.

Syllabus:

Syllabus

Practical1:Orientationintheatre
Practical2:VoiceandSpeechtraining
Practical3:VoiceandSpeechtraining:practicesessionsPractical4:
Art ofacting
Practical5:Artofacting:practicesessions
Practical6:Artofscript writing
Practical7:Artofscriptwriting:practicesessions
Practical8:Final performances

Referencebooks:

1. Boleslavsky,R.(2022).*Acting:TheFirstSixLessons*(1sted.,pp.1-92).DelhiOpenBooks.
2. Shakthi,C.(2017).*NoDramaJustTheatre*(1sted.,pp.1-171).Partridge.
3. Bruder,M.,Cohn,L.M.,Olnek,M.,Pollack,N.,Previto,R.,&Zigler,S.(1986).*APractical HandbookfortheActor*(1st ed.).VinatgeBooksNewYork.

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

Course Code : 24HS02PR0105-06
Course Name Introduction to French Language
L :0 Hrs., 0: 0 hr P : 2 Hrs., Per Week Credits: 1

Courseobjective:

Tohelpbuildafoundationandinterestin Frenchlanguagesothatthestudentscanpursuetheprofic iencylevels ofthelanguageinhighersemesters.

Courseoutcomes:

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

CO1.DemonstratebasicknowledgeaboutFrance,thecultureandsimilarities/differencesbetwee nIndiaandFrance
CO2.Learn to use simple language structures in everyday communication.CO3. Develop ability to write in basic French about themselves and others.CO4.Developabilitytounderstandbeginnerleveltextsin French

Syllabus

ListofPracticals

Practical-1:OrientationaboutFrance,thelanguage,andculture

Practical-2:CommunicationSkills1:Vocabularybuildingforeverydayconversations

Practical-3:Practicesessions

Practical-4:ReadingandwritingSkills:ReadingandwritingsimpletextinFrench

Practical-5: Practicesessions

Practical-6:CommunicationSkills2:listeningcomprehension

Practical-7: Practicesessions

Practical-8:WritingSkills:WritebasicFrenchandpractice

Recommendedreading

1. 15-minuteFrenchbyCarolineLemoine
2. CoursdeLangueetdeCivilisationFrançaisesbyG.MaugerVol.1.1
3. CosmopoliteIbyNatalieHirschsprung,TonyTricot

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

Course Code : 24HS02PR0105-07
Course Name Introduction to Spanish Language
L :0 Hrs., 0: 0 hr P : 2 Hrs., Per Week Credits: 1

Courseobjective:

TohelpbuildafoundationandinterestinSpanishlanguagesothatthestudentscanpursuetheprofi ciencylevels ofthelanguageinhighersemesters.

Courseoutcomes:

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

CO1. Demonstrate basic knowledge about Spain, the culture andsimilarities/differencesbetweenIndiaandFrance
CO2.Learn to use simple language structures in everyday communication.CO3.Develop ability to write in basic Spanish about themselves and others.CO4.DevelopabilitytoreadandunderstandbeginnerleveltextsinSpanish

Syllabus

ListofPracticals

Practical-1:OrientationaboutSpain,thelanguage,andculture

Practical-2:CommunicationSkills1:Vocabularybuildingforeverydayconversations

Practical-3:Practicesessions

Practical-4:ReadingandwritingSkills:ReadingandwritingsimpletextinSpanish

Practical-5: Practicesessions

Practical-6:CommunicationSkills2:listeningcomprehension

Practical-7: Practicesessions

Practical-8:WritingSkills:WritebasicSpanishandpractice

Recommendedreading

1. 15-MinuteSpanishbyAnaBremon
2. AulaInternacional1byJaimeCorpas,EvaGarcia,AgustinGarmendia.
3. ChicosChicasLibrodelAlumnobyMaríaÁngelesPalomino

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

Course Code 24HS02PR0105-08
Course Name Art of Painting
L :0 Hrs., 0: 0 hr P : 2 Hrs., Per Week Credits: 1

Courseobjective

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

Courseoutcome:

Attheendofthecoursethestudentswillbeabletoachievethe following:

CO1: Become familiar with the basic methods, techniques & tools of painting.CO2:Traintheeyeandhandtodevelopsenseofbalance,proportionandrhythm.CO3 :Developtheabilitytoobserveandrendersimplenaturalforms.
CO4:Enjoythechallengingandnuancedprocessofpainting.

Syllabus

Practical1:Orientation in Paintingtools&basics of lines, shapes, light, shadowsandtextures

Practical2:Theartofobservationhowtoseeshapesindrawing

Practical3:IntroductionWatercolorhowtohandlewaterpaints

Practical4:Introductiontoacryliccolorshowtohandleacrylicpaints

Practical5:Explorelayeringpaintandcapturingthequalityoflightwithpaint.

Practical6:Createlandscapepainting

Practical7:CreateAbstractpainting

Practical8:PaintonCanvas(trytorecreateanyfamouspainting)

Referencematerial

1. DrawingmadeeasybyNavneetGala;2015thedition
2. AllaPrimaIIEverythingIKnowaboutPainting--AndMorebyRichardSchmidwithKatieSwatland
3. DailyPainting:PaintSmallandOftenToBecomeaMoreCreative,Productive,andSuccessfulArtistbyCarolMarine

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

Course Code : 24HS02PR0105-09
Course Name Art of Drawing
L :0 Hrs., 0: 0 hr P : 2 Hrs., Per Week Credits: 1

Courseobjective

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

Courseoutcome:

Attheendofthecoursethestudentswillbeabletoachievethe following:

CO1: Become familiar with the basic methods, techniques & tools of drawing.CO2:Traintheeyeandhandtodevelopsenseofbalance,proportionandrhyt hm.CO3:Developtheabilitytoobserveandrendersimplenaturalforms. CO4:Enjoythechallengingandnuancedprocessofdrawing.

Syllabus

Practical1:OrientationinDrawingtools&basicsoflines,shapes,light,shadowsandtextures

Practical2:TheartofobservationhowtoseeshapesindrawingPractical3:O

ne/two-pointbasic linearperspective

Practical4:Naturedrawingandlandscapes

Practical5:Gestaltprinciplesofvisualcomposition

Practical6:Figuredrawing:structureandproportionsofhumanbody

Practical7:Gesturedrawing:expressionandcompositionsofhumanfigures

Practical8:Memorydrawing:anexercisetocombinethetechniqueslearnt

Referencematerial

1. DrawingmadeeasybyNavneetGala;2015thedition
2. PerspectiveMadeEasy(DoverArtInstruction)byErnestR.Norling

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

Course Code: 24HS02PR0105-10
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
Syllabus for Semester B.Tech I
Department of Civil Engineering

Course Code : 24HS02TH0104
Course Name: Foundation course in Universal Human Values
L : 1 Hrs., P : 0 Hrs., Per Week Credits: 01

CourseObjectives:

- Tohelpthestudentseetheneedfordevelopingaholisticperspectiveoflife
- To sensitizethestudentabout the scopeoflife– individual,family(inter-personalrelationship),societyandnature/existence
- Tostrengthenself-reflection
- Todevelopmoreconfidence and commitment to understand, learn and act accordingly

Courseoutcome:
On completion of course, students will be able to achieve the following:CO1: Developaholisticperspectiveoflife

CO2: Betterunderstandingofinter-personalrelationshipsandrelationshipwith societyandnature.
CO3: Anabilitytostrengthenself-reflection

Syllabus
Unit1:-Aspirationsandconcerns

NeedforValueEducation: Guidelinesandcontentofvalueeducation.

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

Unit2:-Health
Harmony of the Self and Body, Mental and physical health; Health for family, friendsandsociety.

Unit3:-RelationshipsandSociety
Harmonyinrelationships,Foundationalvalues:Trust,Respect,Reverenceforexcellence,Gratitudeandlove;harmonyinsociety;harmonywithnature.

ReferenceMaterial
Theprimaryresourcematerialforteachingthiscourseconsistsof

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

4. Referencebooks:

a) B L Bajpai, 2004, *Indian Ethos and Modern Management*, New Royal Book Co.,Lucknow.Reprinted2008.
b) PLDhar,RRGaur,1990,*ScienceandHumanism*,CommonwealthPurblishers.
c) SussanGeorge,1976,*HowtheOtherHalfDies,*PenguinPress.Reprinted1986,1991
d) Ivan Illich, 1974,*Energy & Equity,* The Trinity Press, Worcester,andHarperCollins,USA
e) DonellaH. Meadows, DennisL. Meadows, JorgenRanders, William W. BehrensIII,1972,limitstoGrowth,ClubofRome'sReport,UniverseBooks.
f) SubhasPalekar,2000,*HowtopracticeNaturalFarming,*Pracheen(Vaidik)KrishiTantraShodh,Amravati.
g) ANagraj,1998,*JeevanVidyaekParichay,*DivyaPathSansthan,Amarkantak.
h) E.F.Schumacher,1973,*SmallisBeautiful:astudyofeconomicsasifpeoplemattered*,Blond&Briggs,Britain.
i) A.N.Tripathy,2003,*HumanValues*,NewAgeInternationalPublishers.

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

Course Code : 24HS01TH0201
Course Name: Engineering Chemistry for Civil Engineers
L :3 Hrs., T-0, P : 0 Hrs., Per Week Credits: 3

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 dues 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, Geoplymer 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 Gyngell, 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.

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

Course Code : 24HS01PR0201
Course Name: Engineering Chemistry for Civil Engineers Lab
L :0 Hrs., T-0, P : 0 Hrs., Per Week Credits: 2

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. Handing 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 II

Course Code : 24HS03TH0211
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

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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 VidhyarthiGrihaPrakashan, Pune-411030 (India).
6. Biomedical Statistics -Shantikumar Yadav , Sompal Singh, Ruchika Gupta
7. Theory and Problems of Probability and Statistics - M.R. Spiegal (Mc Graw Hill) Schaum Series

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

Course Code : 24ES01TH0201
Course Name: Basics of Geotechnical Engineering
L :3 Hrs., P : 0 Hrs., Per Week Credits: 3

CourseOutcomes

Onsuccessfulcompletionofthecoursestudentswillbeableto;

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,Majordepositsfoundin India.Various type of soil.
8. Phasesofsoil: Varioussoilweight&volumeinter-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'stheory,point load, Newmark'sinfluencechart,andEquivalentpoint load method.

Unit–VI[5 hours]

ShearStrength –Conceptof Mohr's stresscircle,Mohr-Coloumb'stheory, 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. BasicsandAppliedSoilMechanics–GopalRanjan&ASRRao,NewAgeInt.Pub.
2. GeotechnicalEngineering–CVentakramaiah,NewAgeInternationalPublications
3. SoilMechanicsandFoundationEngineering–B.C.Punmia,LaxmiPublications
4. TextbookofSoilMechanics&FoundationEngineering-VNSMurthy,CBSPublishers.

Reference

1. Textbook of Geotechnical Engineering–BrajaM.Das,CengagePublications
2. FundamentalsofGeotechnicalEngineering–BrajaM.Das,CengagePublications

ModernGeotechnicalEngineering–AlamSingh,CBSPublishers

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

Course Code : 24ES01PR0201
Course Name: Basics of Geotechnical Engineering Lab
L :0 Hrs., P : 2 Hrs., Per Week Credits: 1

CourseOutcomes

Onsuccessfulcompletionofthecourse, studentswillbeableto;

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

List of Practicals:Minimum10ofthefollowing

1. Determination of moisture content by Oven drying method.
2. Determination of Free Swell Index of soil.
3. Determination of specific gravity ofsoil.
4. FielddensitydeterminationsbySandreplacementmethodandCorecuttermethod.
5. Grainsize distribution by Dry-Sieve Analysis.
6. Determination of Atterbergelimits.
7. Determination of coefficient of Permeabilitybyfallingheadtest.
8. Determination of OMC & MDD by StandardProctorscompactionTest.
9. Determination of Unconfinedcompressionstrength of clayey soil.
10. Determination of C-Ø parameters by DirectshearTest.
11. Triaxialcompressiontest(Demonstration)
12. One field visit

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

Course Code : 24ES01TH0202
Course Name: Solid Mechanics
L :3 Hrs., P :0 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)

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

Course Code : 24ES01TP0202
Course Name: Solid Mechanics Lab
L :0 Hrs., P :2 Hrs., Per Week Credits:1

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 : 24ES01TH0203
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 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.

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

Course Code : 24HS02TH0103
Course Name: Foundation Literature of Indian Civilization
L : 2 Hrs., P : 0 Hrs., Per Week Credits: 02

Courseoutcome:

At the end of the course the students will be able to achieve the following:CO1: UnderstandtheIndianknowledgesystemanditsscientificapproach

CO2: GetintroducedtotheVediccorpusandrecognizethemulti-facetednatureof theknowledgecontainedintheVediccorpus
CO3: Understandthesalientfeaturesofthephilosophicalsystemsoftheandnon-Vedicschools
CO4: Developabasicunderstandingoftheancientwisdomrecordedinvariousliterarywork

Syllabus

1. **Unit 1: Overview of Indian Knowledge System:** Importance ofancientknowledge,definingIKS,IKSclassificationframework,HistoricityofIKS,SomeuniqueaspectsofIKS.
2. **Unit2:TheVediccorpus:**IntroductionofVedas,fourVedas,divisionsoffour Vedas,sixVedangas,DistinctfeaturesofVediclife.
3. **Unit 3: Indian Philosophical systems:** 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 ofPhilosophy,Non-vedicphilosophies:Jainism,Buddhism,andotherapproaches
4. **Unit4:Indianwisdomthroughages:***Panchtantras,* ***Purans*****:**contentsandissuesof interests, ***Itihasa:*** uniqueness of the two epics (Ramayan and Mahabharata),Key issues and messages from Ramayana, Mahabharata – a source of worldlywisdom*;* **Indian ancient Sanskrit literature:** *Kalidas, Vishakadutta*, *Bhavbhuti,Shudraka*******

***anyonetextasdecidedbythecourseteacher**

Referencematerial

1. B.Mahadevan,VinayakRajatBhar,NagendraPavanaR.N.,*"IntroductiontoIndianKnowledgeSystem:ConceptsandApplications"*PHI,2022
2. S.C.ChatterjeeandD.M.Datta,*AnintroductiontoIndianPhilosophy,*Universityof Calcutta,1984

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

Course Code :24HS04PR0202
Course Name: Sport-Yoga-Recreation
L : Hrs., P : 2 Hrs., Per Week Credits: 1

AimoftheCourse

The course aims at creating awareness about the fundamentals of Physical Education, Sports,Yoga,RecreationanditseffectivenesstopromoteHealthandwellnessthroughHealthyLifestyle.

ObjectivesoftheCourse

1. ToimpartthestudentswithbasicconceptsofSports,YogaandRecreationalactivitiesforhealthandwellness.
2. TofamiliarizethestudentswithhealthrelatedExerciseandevaluatetheirHealthrelatedFitness.
3. TomakeOverallgrowth&developmentwithteamspirit,socialvaluesandleadershipqualitiesamongstudentsthroughvarioussports, games andYogicactivities.
4. To create Environment for better interaction and recreation among students as neutralizer forstress through variousminorandrecreational games.

CourseOutcomes:

Oncompletionofthecourse,studentswillbeableto:

1. UnderstandfundamentalskillsbasicprincipleandpracticesofsportsandYoga.
2. Practically learn the principles of implementing general and specific conditioning ofphysicalexercisesandyoga.
3. Develop Health-related fitness and Body-mind co-ordination through variousfitnessactivities, sports,recreational games andyoga.
4. practiceHealthy&activelivingwithreducingSedentaryLifestyle.

CourseContent:

Unit 1:-Practical-ExercisesforHealthandWellness

- Warm-UpandCoolDown -General&SpecificExercises
- PhysicalFitnessActivities
- StretchingExercises
- General & Specific Exercises for Strength, Speed, Agility, Flexibility, coordinativeabilities
- CardiovascularExercises
- AssessmentofBMI

- Relaxationtechniques
- PhysicalEfficiencyTests

Unit2:-Yoga

- ShukshmaVyayam
- Suryanamaskar
- BasicSetofYogasanas–Sitting,standing,supineandproneposition
- BasicSetofPranayama&Meditation

References:

1. Russell,R.P.(1994).HealthandFitnessThroughPhysicalEducation.USA:HumanKinetics.

2. Uppal,A.K.(1992).PhysicalFitness.NewDelhi:FriendsPublication.

3. AAPHERD"HealthrelatedPhysicalFitnessTestManual."1980PublishedbyAssociationdriveReston Virginia

4. Kumar,Ajith.(1984)YogaPravesha.Bengaluru:RashtrothannaPrakashana.

5. Dr.DevinderK.Kansal,ATextbookofTestEvaluation,Accreditation,MeasurementsandStandards(TEAMS'Science)

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

Course Code: 24ES01TH0301
Course Name: Fluid Mechanics
L :3 Hrs., T: hr P :0 Hrs., Per Week 3 Credits: 3

Course Objectives:
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 ofFluids, dynamic and kinematic viscosity, Newton's equation, Rheological Diagram, Ideal and real fluids. Compressibility and bulk modulus. Surface tension, capillarity, vapour pressure, cavitationand 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 Eularian 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 co-ordinates, 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 andLimitations, 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 NewDelhi.
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

Ramdeobaba University, Nagpur

Department of Civil Engineering

Syllabus for Semester B.Tech III

Course Code: 224ES01PR0301

Course Name: Fluid Mechanics Lab

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

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.
10. Verification of Bernoulli's Theorem.

Text Book and References:

1. R. K. Bansal, a Textbook of Fluid Mechanics and Hydraulic Machines, Laxmi Publications P Ltd NewDelhi.
2. Hydraulics and fluid mechanics by Dr. P. N. Modi and S. M. Seth, latest edition, Standard bookhouse.
3. Civil Engineering Department, RCOEM, Laboratory Manual.

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

Ramdeobaba University, Nagpur

Department of Civil Engineering

Syllabus for Semester B.Tech III

Course Code24ES01TH0302

Course Name:Concrete Technology

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

Course Outcomes:

1. The student shall be able to identify, and understand various building materials.
3. The students should be able to illustrate and control method of manufacture of concrete.
4. The students should be able to design and recommend the mix of concrete for given materials

Unit I

Introduction to various building components, Building materials such as; Masonry units, Flooring material,

Roofing materials. IS-875 Part 1.

Application of geology to civil engineering projects, engineering properties of rocks,/

Building-stones, application of geology in location, design, and construction of dams, bridges and tunnels and building.

Unit II

Constituents of concrete and Manufacturing process of concrete: batching, mixing, transporting, placing,

compacting, and finishing Concreting equipments: Weigh batcher, mixers, transportation equipments, vibrators, and batch mix plant. Workability: Factors affecting it, Testing of workability of concrete: Slump test,

Compaction factor test, flow table, vee-bee consistometer. Curing of concrete: Necessity, Methods, duration and frequency of curing, Maturity of concrete

Unit III: Strength of concrete

Gain of strength of concrete, water cement ration law.

Destructive test: Compressive strength, factors affecting it, determination of compressive strength, cube strength & cylinder strength, accelerated curing test.

Tensile and flexural strength: Significance and testing, indirect tension test, cylinder splitting test, centre point and third point loading method.

Non-destructive test: Significance, surface hardness test, pulse velocity method, semi destructive tests, x ray method, neutron tomography method.

Introduction to High Strength Concrete, Interfacial transition zone (ITZ)

Unit IV : Mix Design

Statistical parameters of quality control Factor affecting mix proportions

Method of mix design by IS: 10262- 1982 and IS: 10262-2009

Numericals based on IS method

Unit V : Failure modes in concrete

Failure in plastic concrete: Segregation and bleeding

Failure in hard concrete: Cracks and their causes, failure of bond between concrete & reinforcement

Shrinkage: Mechanism of shrinkage, types, Factor affecting it.

Creep: Factors influencing relation between creep & time, effect of creep.
Permeability of concrete Sulphate attack, sea water attack, acid attack, efflorescence, corrosion of reinforcement, abrasion and cavitation, Concept of durability of concrete

Text books :

1. Concrete Technology by M.S. Shetty, published by S. Chand , Faridabad.
2. Properties of concrete, by A.M. Nevile, E.L.B.S London.
3. A text book of Engineering Geology: Pasbin Singh, S.K Kataria & Sons, New Delhi.
4. Building construction by Sushil Kumar, 16th Edition, Standard Publishers Distributors, 2006.

Reference book :

1. Concrete Technology (Theory and Practice) by M.L gambhir, McGraw Hill Publications, fifth edition.
2. Concrete technology by Santhakumar, Oxford Publication, New Delhi
3. Principles of Petrology, G.W. Tyrrell, Science paper backs.

Ramdeobaba University, Nagpur

Department of Civil Engineering

Syllabus for Semester B.Tech III

Course Code: 24ES01PR0302

Course Name: Concrete TechnologyLab

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

Ramdeobaba University, Nagpur

Department of Civil Engineering

Syllabus for Semester B.Tech III

Course Code: 24ES01TH0303

Course Name: Structural Analysis

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

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. TimoshenkoS.P.&YoungD.H."TheoryofStructures;Internationaledition",McGrawHill,1965.
2. C.S.Reddy"Basics of StructuralAnalysis"McGrawHill3rdedition2010
3. Ghali,A.;&NevilleA.M."StructuralAnalysisAUnifiedClassicalandMatrixApproach(4th Edition)",E&FNSPON;VanNostrandReinhold,1997.
4. Wang,C.K."IndeterminateStructures",PrenticeHallofIndia;2000.

5. Schodek,D.L.“Structures(4thEdition)”,McGrawHillInternationaleditions;1983.
6. Meghre,A.S.;&Deshmukh,S.K.“MatrixMethodsofStructuralAnalysis(1st Edition)”,Anand; CharotarPubls,2003.
7. WeaverJ.M.;&Gere,W.“MatrixAnalysisofFramedStructures(3rdedition)”,VanNostrand Reinhold;NewYork,1990.
8. Jain,O.P.&Arya,A.S.“TheoryandAnalysisofStructures;Vol.I&II”,NemchandBr others; Roorkee.
9. KrishnamurthyD.,“TheoryofStructures”,J.K.JainBrothers,1976.
10. RajsekaranS.,ShankarasubramanianG.“ComputationalofStructuralMechanics”, PrenticeHallofIndiaPvt.Ltd.,NewDelhi,2001.

Ramdeobaba University, Nagpur

Department of Civil Engineering

Syllabus for Semester B.Tech III

Course Code: 24ES01PR0303

Course Name: Structural Analysis Lab

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

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. Todeterminethedeflectionoftwospancontinuousbeams.
6. Tofindhorizontalreactionof two hingedportalframe.
7. Todrawinfluencelinediagramofcentralreactionina two-spancontinuousbeam.
8. Todeterminehorizontalreactionoftwohingedparabolicarchanddrawtheinflue ncelinediagramforhorizontalthrust.
9. Applicationofstructuralanalysis software forverifyingSFD,BMDfordeterminantbeamsubjectedtodifferenttypesofloads.
10. Verification of Three Moment Theorem using structural analysis software.
11. VerificationofMomentDistributionMethodusingstructuralanalysis software.
12. VerificationofSlopeDeflectionMethodusingstructuralanalysis software.
13. StudyofPhotoelasticity.
14. To determine the material fringe constant using compressionmethod in two dimensional photoelasticityloading.

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

Course Code: 24ES01TH0304
Course Name: Technical Report Writing
L :1 Hrs., T: hr P : 0 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 anddiagrams 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

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

Course Code: 24ES01TH0306
Course Name: Finance Management for Civil Eng.. Projects
L :2 Hrs., T: hr P : 0 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: 24ES01PR0307
Course Name: Field Visit & Field project
L : Hrs., T: hr P : 4 Hrs., Per Week **Credits: 2**

Field visit to enhance field based knowledge./ Field based projects.

On completion, the student has to submit the report/ 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

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

Course Code: 24ES01TH0401
Course Name: Water Supply Engineering
L :3Hrs., T: hr P : Hrs., Per Week Credits: 3

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 SSFand 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

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

Course Code: 24ES01PR0401
Course Name: Water Supply Engineering Lab
L : Hrs., T: hr P : 2 Hrs., Per Week Credits: 1

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: 24ES01TH0402
Course Name: Reinforced Concrete Structures
L :3Hrs., T: hr P : Hrs., 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. Willbeabletounderstand, 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.

TextBooks

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 Draining by Neelam Sharma, S.K. Kataria& Sons.
4. Practical Design of Reinforced Concrete Structure HPKGhoshKarunaMoy,PHILearPvt.Ltd.

References

1. FundamentalsofRCDesign,M.L.Gambhir,PHILearningPvt.Ltd.
2. LimitStateDesignofReinforcedconcrete,P.C.Varghese,PHILearningPvt.Ltd.
3. RCC Design, Menon& Pillai, Tata McGraw-Hill publications
4. Reinforced Concrete: Limit State Design, Ashok K.Jain,Nem Chand Publishers.
5. DesignofRCCstructuralElementsVol.I,II,S.S.Bhavikatti,NedageInternationalPublish.
6. LimitStateTheoryandDesignofReinforcedConcrete,KarveS.R.andShahV.L,Structures Publications, Pune. 2007.

Bureau of Indian Standards, IS: 456- 2000: Plain and reinforced concrete, Code of Practice, Bureau of Indian Standards.Bureau of Indian Standards 1967. S.P. (16): Design Aids for Reinforced Concrete. (Interaction Charts Only), Bureau of Indian Standards and IS: 1343-2012.

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

Course Code: 24ES01TH0403
Course Name: Basics of Surveying
L :2Hrs., T: hr P : Hrs., Per Week Credits: 2

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

1. Understand the basics of surveying and the role of 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 its uses, such as theodolite,compass,etc.

Syllabus

Introduction: Definitionofsurveying,primarydivisionsofsurveying,objectandclassification of surveying, principles of surveying, approximate methods of chine 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, directandindirectmethodsofranging,methodsoftraversing,principlebasicdefinitions,bearings and meridians, prismatic compass, surveyors compass, azimuthal and quadrant al 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,contourinterval,horizontalequivalent,contourgradient,factorsaffectingcontourinterval, characteristics of contours, direct and indirect methods of contouring, uses of contourmaps.
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: Vernierandmicroscopictheodolite,construction,temporaryandpermanentadjustments, measurementsofhorizontalandverticalangles,methodsofrepetitionsandreiteration,sourcesoferrors,checks intraversing, omittedmeasurements.

Text Book

1. DuggalS.K., Surveying Volume I,TataMcGraw-Hill Publisher,NewDelhi, 2017.
2. Arora.K.R.,SurveyingVolume-I,StandardPublishersDistributors,2019.
3. Punmia,B.C,JainA.K, A.K.,SurveyingVolume-I, Laxmi Publications,2016.

Reference Book

1. Kanetkar TP, Surveying and Leveling, Pune VidyarthiGriha Prakashan,Pune,2006

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

Course Code: 24ES01PR0403
Course Name: Basics of Surveying Lab
L : Hrs., T: hr P : 2 Hrs., Per Week **Credits: 1**

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

1. Understandthe fieldconditionstoplanandcollectfielddata.
2. Preparefieldnotesfrom surveyeddata.
3. Interpretsurveydata andcomputeareaand volume.
4. Findtheelevationsfromfielddata
5. Setoutalignmentsofengineeringconstructionsinthefield.

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 vernierTheodoite
6. Measurement of Vertical angels by mechanical vernierTheodoite
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
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Syllabus for Semester B.Tech IV

Course Code: 24ES01TH0405
Course Name: Concrete Mix Design
L :1Hrs., T: hr P : Hrs., Per Week Credits: 1

Course Objectives:

4. To understand the properties of fresh and hardened concrete.
5. To proportioning the ingredients of concrete based on the different methods of concrete mix design.
6. To understand the statistical quality control criteria of concrete.

Course Outcomes:

After successful completion of the course students will be able to

CO 6. Understand principle and objectives of mix proportioning techniques of concrete.
CO 7. Assess the requirement of properties the concrete based its intended use in structural member.
CO 8. Evaluate the proportioning of the ingredients of concrete based on concrete mix design methods.
CO 9. Assess of statistical quality of concrete based on acceptance criteria.

Unit 1

Mix proportioning of concrete : General principles

Objective of mix design / proportioning Specifying the fresh concrete

Specifying the hardened concrete Other specification or information

Unit 2

Fixing concrete specifications Concrete properties Characteristic strength

Mix proportioning process Nature of strength variation Design Mix and Nominal Mix

Unit 3

The methods of mix design with design example

1. IS method
2. British DOE method
3. ACI 211.1 method

Unit 4

Statistical Quality Assurance Criterion for Concrete

Acceptability criteria, variability of results

Lower bound and upper bound theorem of conc

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Department of Civil Engineering
Syllabus for Semester B.Tech IV

Course Code: 24ES01TH0406
Course Name: Construction Engineering & Management
L :3Hrs., T: hr P : Hrs., Per Week Credits: 3

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 andcorrective 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 science4thEdition.
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, 3rdEdition.
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: 24ES01PR0407
Course Name: Computational Tools for Civil Engineering
L : Hrs., T: hr P :2 Hrs., Per Week Credits: 1

Design/Analysis based on softwares like

STAAD-Pro

Abaqus

Geo5

Other related software.