RCOEM

**Shri Ramdeobaba College of
Engineering and Management, Nagpur**

SHRI RAMDEOBABA COLLEGE OF ENGINEERING AND MANAGEMENT, NAGPUR – 440013

An Autonomous College affiliated to
Rashtrasant Tukadoji Maharaj Nagpur University,
Nagpur, Maharashtra (INDIA)

PROGRAMME SCHEME & SYLLABI
2023 – 2024

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B. Tech. (CIVIL ENGINEERING)

About the Department

Civil Engineering Department was established in 1984 at the time of inception of Shri Ramdeobaba College of Engineering & Management (previously RKNEC) with intake of 60 students. The department has experienced and highly qualified faculty; it is equipped with sophisticated laboratories and latest computational software's which helps the students to develop expertise in Civil Engineering. Civil Engineering Department offers Undergraduate Programme B. E. in Civil Engineering and two Post Graduate Programmes namely M. Tech., Structural Engineering (Full Time) and M. Tech., Geotechnical Engineering (Part Time). The Department of Civil Engineering is one of the prime partners in success stories of the institute. The department has all the state of the art laboratories and faculties that provide excellent opportunities for students as well as researchers. The department is accredited by National Board of Accreditation and well recognized by Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur. The department is closely associated with industry and extending its testing & consulting services. For overall development of the student, the department provides conducive atmosphere for organization & conduction of various co- curricular and extra-curricular programs while imparting outcome based quality education.

Departmental Vision

To be a knowledge centre in civil engineering education, training, research, entrepreneurship and industry outreach services for creating sustainable infrastructure and enhancing quality of life.

Department Mission

To generate quality civil engineers with strong technical and managerial skills through creation of conducive environment for creative learning and research in association with stake holders.

Programme Educational Objectives

1.   Demonstrate professional competence in various civil engineering fields.

2.   Exhibit technical ability to deal with and execute various civil engineering problems.

3.   Exhibit managerial skills, values and engage themselves in life long learning.

Program outcomes

Engineering Graduates will be able to :

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis:** Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate

consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems :** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage :** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society :** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability :** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics :** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work :** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication :** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance :** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning :** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program specific outcome

1. Analyse and design various civil engineering structures by analytical, numerical, graphical and simulation methods.

2. Plan, estimate, execute and manage civil engineering projects with due consideration to economic, safety and environmental issues while following ethical practices.

Teaching Scheme and Examination for Bachelor of Technology
(Civil Engineering)
Semester - I

Course Code	Category	Course Name	Hours/week L	Hours/week T	Hours/week P	Credits	Theory Course CA	Theory Course ESE	Theory Course Total	ESE Duration	Practical Course LA-1	Practical Course LA-2
PHT 1004	BSC-T	Physics for Civil Engineering	2	1	0	3	50	50	100	3	0	0
PHP 1004	BSC-P	Physics for Civil Engineering Lab	0	0	2	1	0	0	0	0	25	25
MAT1001	BSC-T	Applied Mathematics-I	2	1	0	3	50	50	100	3	0	0
MAP1001	BSC-P	Computation Mathematics Lab	0	0	2	1	0	0	0	0	25	25
CET1001	PCC-T	Infrastructure Components	1	0	0	1	50	0	50	0	0	0
CET1002	ESC-T	Basics of Surveying	2	0	0	2	50	50	100	2	0	0
CEP1002	ESC-P	Basics of Surveying Lab	0	0	2	1	0	0	0	0	25	25
CET1003	PCC-T	Building Services	2	0	0	2	50	50	100	2	0	0
CEP1004	VSEC	Conceptual Drawing and Drafting	0	0	4	2	0	0	0	0	25	25
HUT1002	AEC-T	English for Professional Communication	2	0	0	2	50	50	100	2	0	0
HUP1002	AEC-P	English for Professional Communication Lab	0	0	2	1	0	0	0	0	25	25
HUP1003-1 to HUP1003-10, PEP0001-21-22 and CHP0001-31-32*	CC-P	Liberal/Performing Art	0	0	2	1	0	0	0	0	25	25
HUT1004	VEC	Foundation course in Universal Human Values	1	0	0	1	50	0	0	0	0	0
		TOTAL	12	2	14	21	350	250	550	12	150	150

Teaching Scheme and Examination for Bachelor of Technology (Civil Engineering)
Syllabus and Scheme for Liberal/Performing arts basket

Sr. No.	Course Code	Course Name	Sem.	Hours/ Week	Credit	Max Marks Cont. Eval.	Department
1)	HUP0001-1	Fundamentals of Indian Classical Dance: Bharatnatayam	I/II	2	1	50	Humanities
2)	HUP0001-2	Fundamentals of Indian Classical Dance: Kathak	I/II	2	1	50	Humanities
3)	HUP0001-3	Introduction to Digital Photography	I/II	2	1	50	Humanities
4)	HUP0001-4	Introduction to Japanese Language and Culture	I/II	2	1	50	Humanities
5)	HUP0001-5	Art of Theatre	I/II	2	1	50	Humanities
6)	HUP0001-6	Introduction to French Language	I/II	2	1	50	Humanities
7)	HUP0001-7	Introduction to Spanish Language	I/II	2	1	50	Humanities
8)	HUP0001-8	Art of Painting	I/II	2	1	50	Humanities
9)	HUP0001-9	Art of Drawing	I/II	2	1	50	Humanities
10)	HUP0001-10	Nature camp	I/II	2	1	50	Humanities
11)	PEP0001-21	Disaster Management through Adventure Sports	I/II	2	1	50	Physical Education
12)	PEP0001-22	Self-defense Essentials and Basics Knowledge of Defense forces	I/II	2	1	50	Physical Education
13)	CHP0001-31	Art of Indian traditional cuisine	I/II	2	1	50	Chemistry
14)	CHP0001 -32	Remedies by Ayurveda	I/II	2	1	50	Chemistry

Teaching Scheme and Examination for Bachelor of Technology (Civil Engineering)
Semester - II

Course Code	Category	Course Name	Hours/week			Credits	Theory Course				Practical Course	
			L	T	P		CA	ESE	Total	ESE Duration	LA-1	LA-2
CHT2001	BSC-T	Engineering Chemistry for Civil Engineers	2	0	0	2	50	50	100	2	0	0
CHP 2001	BSC-P	Engineering Chemistry for Civil Engineers Lab	0	0	2	1	0	0	0	0	25	25
MAT2001	BSC-T	Applied Mathematics-II	2	1	0	3	50	50	100	3	0	0
CET2001	ESC-T	Construction Materials	3	0	0	3	50	50	100	3		
CEP2001	ESC-P	Construction Materials Lab	0	0	2	1	0	0	0	0	25	25
CET2002	ESC-T	Engineering Mechanics	3	1	0	4	50	50	100	3	0	0
CET2003	ESC-T	Programming for Civil Engineers	2	0	0	2	50	50	100	2		
CEP2003	VESC	Application of python in Civil Engineering	0	0	2	1	0	0	0	0	25	25
HUT2001	IKS-T	Foundation literature of Indian civilization	2	0	0	2	50	50	100	2	0	0
PET2001	CC-T	Yoga/Sports Recreation	1	0	0	1	50	0	50	0	0	0
PEP2001	CC-P	Yoga/Sports Recreation	0	0	2	1	0	0	0	0	25	25
		TOTAL	15	2	8	21	350	300	650	15	100	100

Exit Option

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

Teaching Scheme and Examination for Bachelor of Technology
(Civil Engineering)
Semester - III

Course Code	Category	Course Name	Hours/week			Credits	Theory Course				Practical Course	
			L	T	P		CA	ESE	Total	ESE Duration	LA-1	LA-2
CET3001	PCC-T	Fluid Mechanics I	2	0	0	2	50	50	100	2	0	0
CEP3001	PCC-P	Fluid Mechanics I	0	0	2	1	0	0	0	0	25	25
CET3002	PCC-T	Geotechnical Engineering	2	0	0	2	50	50	100	2	0	0
CEP3002	PCC-P	Geotechnical Engineering	0	0	2	1	0	0	0	0	25	25
CET3003	PCC-T	Solid Mechanics	2	0	0	2	50	50	100	2	0	0
CEP3003	PCC-P	Solid Mechanics	0	0	2	1	0	0	0	0	25	25
CET3004	PCC-T	Concrete mix design	2	0	0	2	50	50	100	2	0	0
CETM3005	MDM-T	Basic of Electrical Engineering	2	0	0	2	50	50	100	2	0	0
CET2980	OE-T	Open Elective - I	2	0	0	2	50	50	100	2	0	0
CET3006	MGMT-T	Finance Management for Civil	2	0	0	2	50	50	100	2	0	0
CET3007	VEC-T	Digital Technologies	2	0	0	2	50	50	100	2	0	0
CEP3008	FP-P	Site Visit / Mini Project	0	0	4	2	0	0	0	0	25	25
		TOTAL	16	0	10	21	400	400	800	16	100	100

Teaching Scheme and Examination for Bachelor of Technology
(Civil Engineering)
Semester - IV

Course Code	Category	Course Name	Hours/week			Credits	Theory Course				Practical Course	
			L	T	P		CA	ESE	Total	ESE Duration	LA-1	LA-2
CET4001	PCC-T	Structural Analysis	2	0	0	2	50	50	100	2	0	0
CEP4001	PCC-P	Structural Analysis	0	0	2	1	0	0	0	0	25	25
CET4002	PCC-T	Environmental Engineering - I	2	0	0	2	50	50	100	2	0	0
CEP4002	PCC-P	Environmental Engineering - I	0	0	2	1	0	0	0	0	25	25
CET4003	PCC-T	Reinforced Concrete Structures	2	1	0	3	50	50	100	3	0	0
CETM4004	MDM-T	Automation in Civil Engineering	2	0	0	2	50	50	100	2	0	0
CET2990	OE-T	Open Elective - II	3	0	0	3	50	50	100	3	0	0
CEP4005	VSEC-P	Drawing Assessment & calculation	0	0	2	1	50	50	100	2	0	0
CET4006	AEC-T	Technical Report Writing	2	0	0	2	50	50	100	2	0	0
CET4007	MGMT-T	Contracts Account and Work Management	2	0	0	2	50	50	100	3	0	0
CET4008	VEC-T	Geography and Informatics	2	0	0	2	50	50	100	2	0	0
		TOTAL	17	1	6	21	450	450	900	20	50	50

Exit Option

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

Teaching Scheme and Examination for Bachelor of Technology
(Civil Engineering)
Semester - V

Course Code	Category	Course Name	Hours/week			Credits	Theory Course				Practical Course	
			L	T	P		CA	ESE	Total	ESE Duration	LA-1	LA-2
CET5001	PCC-T	Transportation Engineering	2	0	0	2	50	50	100	2	0	0
CEP5001	PCC-P	Transportation Engineering	0	0	2	1	0	0	0	0	25	25
CET5002	PCC-T	Foundation Engineering	3	0	0	3	50	50	100	3	0	0
CET5003	PCC-T	Environmental Engineering - II	2	0	0	2	50	50	100	2	0	0
CEP5003	PCC-P	Environmental Engineering - II	0	0	2	1	0	0	0	0	25	25
CET5004	PCC-T	Irrigation Engineering	2	1	0	3	50	50	100	3	0	0
CET5005	PEC-T	Program Elective - I	2	1	0	3	50	50	100	3	0	0
CEP5005	PEC-P	Program Elective - I	0	0	2	1	0	0	0	0	25	25
CETM5006	MDM-T	Innovations in Civil Engineering	2	1	0	3	50	50	100	3	0	0
CET3980	OE-T	Open Elective - III	3	0	0	3	50	50	100	2	0	0
		TOTAL	**16**	**3**	**6**	**22**	**350**	**350**	**700**	**18**	**75**	**75**

Semester - VI

Course Code	Category	Course Name	Hours/week			Credits	Theory Course				Practical Course	
			L	T	P		CA	ESE	Total	ESE Duration	LA-1	LA-2
CET6001	PCC-T	Estimating & Costing	3	0	0	3	50	50	100	3	0	0
CET6002	PCC-T	Design of Steel Structures	3	0	0	3	50	50	100	3	0	0
CET6003	PCC-T	Fluid Mechanics - II	2	0	0	2	50	50	100	2	0	0
CEP6003	PCC-P	Fluid Mechanics - II	0	0	2	1	0	0	0	0	25	25
CET6004	PEC-T	Program Elective - II	2	1	0	3	50	50	100	3	0	0
CEP6004	PEC-P	Program Elective - II	0	0	2	1	0	0	0	0	25	25
CET6005	PEC-T	Program Elective - III	3	1	0	4	50	50	100	3	0	0
CETM6006	MDM-T	Remote Sensing & GIS	2	0	0	2	50	50	100	2	0	0
CET6007	VSEC-T	Computed Aided Design in Civil Engineering	1	0	4	3	50	50	100	0	25	25
		TOTAL	**16**	**2**	**8**	**22**	**350**	**350**	**700**	**16**	**75**	**75**

Exit Option

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

Teaching Scheme and Examination for Bachelor of Technology (Civil Engineering)

Semester - VII

Course Code	Category	Course Name	Hours/week			Credits	Theory Course				Practical Course	
			L	T	P		CA	ESE	Total	ESE Duration	LA-1	LA-2
CET7001	PCC-T	Hydrology and Water Resources	3	0	0	3	50	50	100	3	0	0
CET7002	PCC-T	Construction Engineering & Management	3	0	0	3	50	50	100	3	0	0
CET7003	PEC-T	Elective - IV	3	0	0	3	50	50	100	3	0	0
CEP7003	PEC-P	Elective - IV	0	0	2	1				0	50	50
CET7004	PEC-T	Elective - V	3	0	0	3	50	50	100	3	0	0
CETM7005	MDM-T	Metro Rail Transportation Design and Construction	2	0	0	2	50	50	100	2	0	0
CET7006	RM-T	Research Methodology	3	0	0	3	50	50	100	3	0	0
CEP7007	Project-P	Minor Project	0	0	8	4	0	0	0	0	50	50
		TOTAL	17	0	10	22	300	300	600	17	50	50

Semester - VIII

Course Code	Category	Course Name	Hours/week			Credits	Theory Course				Practical Course	
			L	T	P		CA	ESE	Total	ESE Duration	LA-1	LA-2
Option 1 - Project												
CEP8001	Project-P	Major Project	0	0	12	6	0	0	0	0	100	100
CET8002	PCC-T	Retrofitting & Rehabilitation of Civil Infrastructure	3	0	0	3	50	50	100	3	0	0
CET8003	PCC-T	Advanced Construction Materials	3	0	0	3	50	50	100	3	0	0
Option 2 – Industry Internship												
CEP8004	II-P	Industry Internship	0	0	24	12	0	0	0	0	100	100
Option 3 - Research Internship												
CEP8005	RI-P	Research Internship	0	0	18	9	0	0	0	0	100	100
CET8006	PCC	MOOC/Classwork suggested by Supervisor	3	0	0	3	50	50	100	3	0	0
Option 4 - TBI Internship												
CEP8007	TBI	TBI Internship	0	0	24	12	0	0	0	0	100	100
		TOTAL	0	0	0	12	0	0	0	0	100	100

Breakup of Semester wise Credits

Semester	Lecture	Tutorial	Practical	Credits
1	12	2	14	21
2	15	2	8	21
3	16	0	10	21
4	17	1	6	21
5	16	3	6	22
6	16	2	8	22
7	17	0	10	22
8	0	0	24	12
Total	**109**	**10**	**86**	**162**

B. Tech. Semester I
Department of Civil Engineering

Course Code : PHT1004

Course : Physics for Civil Engineering

L : 2 Hrs., T :1 Hrs., P : 0 Hrs.,Per week 3

Total 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

B. Tech. Semester I
Department of Civil Engineering

Course Code : PHP1004   Course : Physics for Civil Engineering Lab

L : 0 Hrs., T :0 Hrs., P : 2 Hrs.,Per week   Total 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.

B. Tech. Semester I
Department of Civil Engineering

Course Code : MAT1001   **Course : Applied Mathematics - I**

L : 2 Hrs., T :1 Hrs., P : 0 Hrs.,Per week   **Total Credits : 3**

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 welltowards 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.

6.   Analyze and compare different sets of data and classify the data by means of diagrams and graph.

Syllabus

Module 1: Matrices: (8hours)

Algebra of matrices, Inverse and rank of a matrix, rank-nullity theorem; System of linearequations; Symmetric, skew-symmetric and orthogonal matrices; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, Orthogonaltransformation and quadratic to canonical forms, Introduction to n-dimensional space.

Module 2 : Integral Calculus: (8hours)

Evaluation of definite and improper integrals; Beta and Gammafunctions 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 ofintegration in double integrals, Change of variables (Cartesian to polar), Applications: area, massand 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, Scalarpotential function.

Module 5 : Vector Calculus (Integration)(7 hours)(All Branches except Biomedical Engineering)

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.

OR

Module 5 : Descriptive Statistics (7- Lectures)(Only for Bio-Medical Engineering)

Types of statistical data: categorical, ranked, discrete, and continuous. Distinction between univariate, bi-variate, and multivariate statistics, Visualization techniques such as joint contingency tables, scatter plots, 2D histograms and line graphs , Measures of central tendency and Dispersion .

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 -ShantikumarYadav ,Sompal Singh, Ruchika Gupta

7.   Theory and Problems of Probability and Statistics - M.R. Spiegal (Mc Graw Hill) Schaum Series

B. Tech. Semester I
Department of Civil Engineering

Course Code : MAP1001 **Course : Computation Mathematics Lab**

L : 0 Hrs., T :0 Hrs., P : 2 Hrs.,Per week **Total Credits : 1**

Course Objectives

The computational Mathematics Lab course will consist of experiments demonstrating the principles of Mathematics 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 the lab and draw valid conclusions. On successful completion of the course students shall be able to:

Proposed Course Outcomes

By using open source software SageMath Students will be able to

CO1: Download SageMath and use it as an advance calculator.

CO2: Sketch and analyze function graphs.

CO3: Apply the concepts of differential calculus to find extreme value of continuous functions and analyze solutions of differential equations

CO4: Evaluate improper integrals and its applications to find length, area, volume, centre of gravity and mass.

CO5: Analyze and calculate eigen values, eigen vectors, rank nullity, and solve system of linear equations of a matrix / linear map.

CO6: Analyze the data to find best fit curve.

Mapping of Course outcomes (COs) with Experiments

Exp. No.	Name of Experiments	Mapped COs
1	To use SageMath as advanced calculator	CO1
2	2D Plotting with SageMath	CO2
3	3D Plotting with SageMath	CO2
4	Differential Calculus with SageMath	CO3
5	Solution of differential equations in SageMath	CO3
6	Basics of Linear Algebra	CO5
7	Curve Fitting by using SageMath	CO6
8	Integral Calculus with SageMath	CO4

B. Tech. Semester I
Department of Civil Engineering

Course Code : CET1001   **Course : Infrastructure Components**

L : 1 Hrs., T :0 Hrs., P : 0 Hrs.,Per week   **Total Credits : 1**

Course Outcomes

After completion of course students will be able to:

1. Identify the various Civil Engineering Structures

2. Understand the role of different agency in infrastructure development

3. Understand the functions of structural Element of building.

4. Identify the various masonry units and its suitability

5. Identify the various building Components and its 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.

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

Unit - II : Non structural elements

Types of Walls. Masonry construction using various building units such as Mud bricks, Stone, Red bricks, Fly bricks, AAC, hallow concrete block with suitability and constrains.

Unit - III : Doors

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

Windows and ventilators: Necessity and types of window.

Unit - IV : Stairs

functions and terminologies used suitability and types of stairs.

Roof: Types and functions of Roof,

Flooring: Types and utility of Flooring

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.

B. Tech. Semester I
Department of Civil Engineering

Course Code : CET1002   Course : Basics of Surveying

L : 2 Hrs., T :0 Hrs., P : 0 Hrs.,Per week   Total Credits : 2

Course Outcomes

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

1.   Understand the basics of survey in gand the role of surveyor

2.   Awareoftheroleofsurveyinginthesiteinvestigationbeforecarryingoutanyconstructionwork.

3.   Understand the methods of chain and compass surveying

4.   Recognize the concepts of leveling and contouring

5.   Havetheknowledgeofvarioussurveyingequipmentandtheirusessuchastheodolite,compass,etc.

Syllabus

Introduction : Definition of surveying, primary divisions of surveying, object and classification 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, direct and indirect methods of ranging, methods of traversing, principle basic definitions, bearings and meridians, prismatic compass, surveyors compass, azimuthal and quadrantal bearing systems, true north and magnetic north, magnetic declination, local attraction and its correction.

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

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

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

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

Text Book

1.   Duggal S. K., Surveying Volume-I,TataMcGrawHillPublisher,NewDelhi, 2017.

2.   Arora. K. R., Surveying Volume-I, Standard Publishers Distributors, 2019.

3.   Punmia, B. C, Jain A. K, Jain A. K., Surveying Volume-I, Laxmi Publications, 2016.

Reference Book

1.   Kanetkar T P, Surveying and Levelling, Pune Vidyarthi Griha Prakashan, Pune, 2006

B. Tech. Semester I
Department of Civil Engineering

Course Code : CEP1002   **Course : Basics of Surveying Lab**

L : 0 Hrs., T :0 Hrs., P : 2 Hrs.,Per week   **Total Credits : 1**

Course Outcomes

On successful completion of the course students will be able;

1.   Understand the field conditions to plan and collect field data.

2.   Prepare field notes from surveyed data.

3.   Interpret survey data and compute area and volume.

4.   Find the elevations from field data

5.   Set out alignments of engineering constructions in the field.

Any Six

1.   Measurement of fore and back bearing by compass

2.   Measurement and booking of levels by auto level

3.   Profile & cross section levelling

4.   Traversing by plane table survey

5.   Measurement of Horizontal angle by mechanical vernier Theodoite

6.   Measurement of Vertical angels by mechanical vernier Theodoite

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

B. Tech. Semester I
Department of Civil Engineering

Course Code : CET1003 **Course : Building Services**

L : 2 Hrs., T :0 Hrs., P : 0 Hrs.,Per week **Total Credits : 2**

Course Outcome

1. The Students will be able to identified pipe fitting & system required for single & multistoried buildings.

2. The Students will be able to identified sanitary fitting & system required for single & multistoried buildings.

3. The Students will be able to prepared water supply & sanitary drawings   for single & multistoried buildings as per NBC 2016.

4. The Students will be able to execute relevant system for lighting, Ventilation & air conditioning for buildings as per NBC 2016.

5. The Students will be able proposed fire fighting requirement for buildings.

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.

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 : Design of Plumbing Systems

Design considerations on drainage scheme. 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 - IV :

Basics of electricity – Single / Three phase supply – Protective devices in electrical installations – Earthing for safety – Types of earthing – ISI specifications – Types of wires, wiring systems and their choice. Air Conditioning: Introduction & Purpose,   Introduction to Types of Lifts, Escalators.

Unit -V

Fire control systems; Causes of fire in buildings – Safety regulations – NBC 2016 , Fire alarm system, introduction to Automatic sprinklers

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.

B. Tech. Semester I
Department of Civil Engineering

Course Code : CEP1004

Course : Conceptual Drawing and Drafting

L : 0 Hrs., T :0 Hrs., P : 4 Hrs.,Per week

Total Credits : 2

Course Outcomes

After completion of course students will be able to:

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

Principles of Planning

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

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

Auto Cad

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

Drawings in AutoCAD

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

Text Books

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

Reference Books

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

B. Tech. Semester I
Department of Civil Engineering

Course Code : HUT1002   **Course : English for Professional Communication**

L : 2 Hrs., T :0 Hrs., P : 0 Hrs.,Per week   **Total 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 freading comprehension 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: Create precise and accurate written communication products.

Unit - 1: Vocabulary Building

Importance of using appropriate vocabulary

Techniques 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

Identifying Common Errors in use of articles, prepositions, modifiers, modalauxiliaries, redundancies, and clichés.

Tense Subject-verb agreement, noun-pronoun agreement Voic

Unit - 4 : Writing Skills

Sentence Structures

Sentence Types

Paragraph Writing: Principles, Techniques, and Styles

Unit - 5 : Writing Practices

Art of Condensation: Précis, Summary, and Note Making

Correspondence writing techniques and etiquettes–academic writing Essay Writing

Books

1. Communication Skills. Sanjay Kumar and Pushp Lata. Oxford University Press.2011.

2. Practical English Usage. Michael Swan. OUP. 1995.

3. Remedial English Grammar. F. T. Wood. Macmillan. 2007

4. On Writing Well. William Zinsser. Harper Resource Book. 2001

5. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.

6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press.

B. Tech. Semester I
Department of Civil Engineering

Course Code : HUP1002   **Course : English for Professional Communication Lab**

L : 0 Hrs., T :0 Hrs., P : 2 Hrs.,Per week   **Total Credits : 1**

Course Objective

To enhance competency of communication in English among learners

Course Outcomes

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

CO1: Apply effective listening and speaking skills in professional and everyday conversations.

CO2: Demonstrate the techniques of effective Presentation Skills

CO3: Evaluate and apply the effective strategies for Group Discussions

CO4: Analyse and apply the effective strategies for Personal Interviews

CO5: Implement essential language skills- listening, speaking, reading, and writing

Syllabus

List of Practicals

Computer Assisted + Activity Based Language Learning

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

Practical 2: Pronunciation, Intonation, Stress, and Rhythm

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

Activity Based Language Learning

Practical 4: Presentation Skills: Orientation & Mock Session

Practical 5: Presentation Skills: Practice

Practical 6: Group Discussions: Orientation & Mock Session

Practical 7: Group Discussions: Practice

Practical 8: Personal Interviews: Orientation & Mock Session

Practical 9: Personal Interviews: Practice

B. Tech. Semester I
Department of Civil Engineering

Course Code : HUP0001-1　　　　　　　**Course : Fundamentals of Indian Classical Dance: Bharatnatayam**

L : 0 Hrs., T :0 Hrs., P : 2 Hrs.,Per week　　　**Total Credits : 1**

Course Objective

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

Course Outcomes

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

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

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

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

Syllabus

Practical - 1 : Orientation in Bharatnatayam

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

Practical - 3 : Practice sessions

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

Practical - 5 : Practice sessions

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

Practical - 7 : practice sessions

Practical - 8 : final practice sessions and performances.

Recommended Reading

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

B. Tech. Semester I
Department of Civil Engineering

Course Code : HUP0001-2   **Course : Fundamentals of Indian**

                                                      Classical Dance: Kathak

L : 0 Hrs., T :0 Hrs., P : 2 Hrs.,Per week   Total Credits : 1

Course Objective

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

Course Outcomes

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

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

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

CO3: Evaluate their strengths and interest to take bridge course to give Prarambhik

(1st level formal exam of Kathak).

Syllabus

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

Practical -2: practice sessions of practical 1

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

Practical -4: practice sessions of practical 3

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

Practical -6: practice sessions of practical 5

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

Practical -8: Final performances.

Recommended Reading

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

B. Tech. Semester I
Department of Civil Engineering

Course Code : HUP0001-3   **Course : Introduction to Digital Photography**

L : 0 Hrs., T :0 Hrs., P : 2 Hrs.,Per week   **Total Credits : 1**

Course Objective

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

Course Outcome

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

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

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

CO3 : Develop skills to enhance photographs through post processing.

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

Syllabus

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

Practical 2 : Rules of Composition

Practical 3 : Rules of Composition: practice sessions

Practical 4 : Understanding Exposure and Art of Pre-Visualization

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

Practical 6 : Post Processing Photographs and Portfolio creation

Practical 7 : Post Processing Photographs: practice sessions

Practical 8 : Portfolio finalization and presentation in selected genre.

Reference Material

1. Scott Kelby (2020) The Digital Photography Book: The Step-by-Step Secrets for how to Make Your Photos Look Like the Pros, Rocky Nook, USA

2. Larry Hall (2014) Digital Photography Guide: From Beginner to Intermediate: A Compilation of Important Information in Digital Photography, Speedy Publishing LLC, Newark

3. J Miotke (2010) Better Photo Basics: The Absolute Beginner's Guide to Taking Photos Like a Pro, AMPHOTO Books, Crown Publishing Group, USA

B. Tech. Semester I
Department of Civil Engineering

Course Code : HUP0001-4   **Course : Introduction to Japanese Language and Culture**

L : 0 Hrs., T :0 Hrs., P : 2 Hrs.,Per week   **Total Credits : 1**

Course Objective

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

Course Outcome

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

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

CO3: Able to write and read the first script in Japanese language.

CO4: Able to frame simple sentences in Japanese in order to handle everyday conversations

CO5: Able to write in basic Japanese about the topics closely related to the learner.

Syllabus

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

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

Practical - 3 : Practice sessions

Practical - 4 : Writing Skills 1: Reading and writing first script in Japanese

Practical - 5 : Practice sessions

Practical - 6 : Communication Skills 2: framing sentences

Practical - 7 : Practice sessions

Practical - 8 : Writing Skills 2: Write basic Japanese and practice

Recommended Reading

1. Marugoto Starter (A1) Rikai - Course Book for Communicative Language Competences, by The Japan Foundation, Goyal Publishers & Distributors Pvt. Ltd (ISBN: 9788183078047)

2. Japanese Kana Script Practice Book – Vol. 1 Hiragana, by Ameya Patki, Daiichi Japanese Language Solutions (ISBN: 9788194562900)

B. Tech. Semester I
Department of Civil Engineering

Course Code : HUP0001-5   Course : Art of Theatre

L : 0 Hrs., T :0 Hrs., P : 2 Hrs.,Per week   Total Credits : 1

Course Objectives

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

Course Outcomes

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

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

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

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

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

Syllabus:

Practical 1 : Orientation in theatre

Practical 2 : Voice and Speech training

Practical 3 : Voice and Speech training: practice sessions

Practical 4 : Art of acting

Practical 5 : Art of acting: practice sessions

Practical 6 : Art of script writing

Practical 7 : Art of script writing: practice sessions

Practical 8 : Final performances

Reference Books

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

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

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

B. Tech. Semester I
Department of Civil Engineering

Course Code : HUP0001-6   **Course : Introduction to French Language**

L : 0 Hrs., T :0 Hrs., P : 2 Hrs.,Per week   **Total Credits : 1**

Course Objective

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

Course Outcomes

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

CO1 : Demonstrate basic knowledge about France, the culture and similarities/differences between India and France

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

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

CO4 : Develop ability to understand beginner level texts in French

Syllabus

List of Practicals

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

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

Practical - 3 : Practice sessions

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

Practical - 5 : Practice sessions

Practical - 6 : Communication Skills 2: listening comprehension

Practical - 7 : Practice sessions

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

Recommended Reading

1.   15-minute French by Caroline Lemoine

2.   Cours de Langue et de Civilisation Françaises by G. Mauger Vol. 1.1

3.   Cosmopolite I by Natalie Hirschsprung, Tony Tricot

B. Tech. Semester I
Department of Civil Engineering

Course Code : HUP0001-7   **Course : Introduction to Spanish Language**

L : 0 Hrs., T :0 Hrs., P : 2 Hrs.,Per week   **Total Credits : 1**

Course Objective

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

Course Outcomes

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

CO1 : Demonstrate basic knowledge about Spain, the culture and similarities / differences between India and France.

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

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

CO4 : Develop ability to read and understand beginner level texts in Spanish

Syllabus

List of Practicals

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

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

Practical - 3 : Practice sessions

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

Practical - 5 : Practice sessions

Practical - 6 : Communication Skills 2: listening comprehension

Practical - 7 : Practice sessions

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

Recommended Reading

1.   15-Minute Spanish by Ana Bremon

2.   Aula Internacional 1 by Jaime Corpas ,Eva Garcia, Agustin Garmendia.

3.   Chicos Chicas Libro del Alumno by María Ángeles Palomino

B. Tech. Semester I
Department of Civil Engineering

Course Code : HUP0001-8   **Course : Art of Painting**

L : 0 Hrs., T :0 Hrs., P : 2 Hrs.,Per week   **Total Credits : 1**

Course Objective

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

Course Outcome

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

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

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

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

CO4 : Enjoy the challenging and nuanced process of painting.

Syllabus

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

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

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

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

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

Practical - 6 : Create landscape painting

Practical - 7 : Create Abstract painting

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

Reference Material

1.   Drawing made easy by Navneet Gala; 2015th edition

2.   Alla Prima II Everything I Know about Painting--And More by Richard Schmid with Katie Swatland

3.   Daily Painting: Paint Small and Often To Become a More Creative, Productive, and Successful Artist by Carol Marine

B. Tech. Semester I
Department of Civil Engineering

Course Code : HUP0001-9   **Course : Art of Drawing**

L : 0 Hrs., T :0 Hrs., P : 2 Hrs.,Per week   **Total Credits : 1**

Course Objective

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

Course Outcome

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

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

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

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

CO4 : Enjoy the challenging and nuanced process of drawing.

Syllabus

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

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

Practical 3 : One/two-point basic linear perspective.

Practical 4 : Nature drawing and landscapes.

Practical 5 : Gestalt principles of visual composition.

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

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

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

Reference Material

1.   Drawing made easy by Navneet Gala; 2015th edition

2.   Perspective Made Easy (Dover Art Instruction) by Ernest R. Norling

B. Tech. Semester I
Department of Civil Engineering

Course Code : HUP0001-10   **Course : Nature Camp**

L : 0 Hrs., T :0 Hrs., P : 2 Hrs.,Per week   **Total 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

B. Tech. Semester I
Department of Civil Engineering

Course Code : PEP0001-21   Course : Dissaster Management through Adventure Sports

L : 0 Hrs., T :0 Hrs., P : 2 Hrs.,Per week   Total Credits : 1

Course Objectives

To enable the student:

1. To inculcate rational thinking and scientific temper among the students.

2. To develop critical awareness about the social realities among the students.

3. To build up confidence, courage and character through adventure sports.

Course Outcomes

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

1. Understand the meaning and importance of Adventure sports.

2. Learn the various types of adventure sports, the equipment and resources required to practice disaster Management activities.

3. Learn the safety measures about different risk and their management.

4. To apply Disaster management theory to institutional & Societal problems and situations.

Course Content

1. Basic adventure

2. First AID

3. various types of knots

4. Shelter making

5. Disaster management

6. Team building and goal setting

B. Tech. Semester I
Department of Civil Engineering

Course Code : PEP0001-22　　　　　　　**Course : Self defense Essentials and Basics**

Knowledge of Defense forces

L : 0 Hrs., T :0 Hrs., P : 2 Hrs.,Per week　　　　**Total Credits : 1**

Course Outcomes

On completion of the Course the student will be able to:

- Understand the meaning, need and fitness requirements to implement self-defense

- Learn the basic techniques of selected combative sports.

- Learn to prepare basic Physical Training for Defense forces.

- Implement survival techniques during emergencies.

Course Content

- General conditioning and self-defense specific conditioning

- Applications of techniques of combative sports for self-defense.

- Self-defense techniques for specific situations: chain snatching, knife or stick attack, holding from back or front etc.

- Basic Military Knowledge and exposure making students Confident, bold, disciplined and trains them to join Armed Forces.

B. Tech. Semester I
Department of Civil Engineering

Course Code : CHP0001-31   **Course : Art of Indian Traditional Cuisine**

L : 0 Hrs., T :0 Hrs., P : 2 Hrs.,Per week   **Total Credits : 1**

Course Outcome

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

CO1: Understand the factors that affect regional eating habits and the unique ingredients found in various states of India

CO2: Get insight to prepare popular dishes from various regions of India.

Module 1 : Indian Regional foods and snacks - factors effecting eating habits.

Module 2 : Indian gravies – ingredients, their importance

Module 3 : Indian Sweets - ingredients, their importance

Module 4 : Presentation of Indian Meals, Menu Planning, Food Costing

Module 5 : Food Preservatives and Safety

List of Experiments

1) Introduction to cookery : does and don'ts
2) Introduction to Indian cuisine, philosophy and classification.
3) Regional influence on Indian Food- factors affecting eating habits
4) Preparation of Garam masala and or Chat masala with ingredients and their importance
5) Preparation of different gravies such as white, yellow or brown gravies with ingredients and their importance
6) Preparation of Indian sweets like Besan ke laddu with ingredients and their importance
7) Presentation of meal, Menu planning and Food costing
8) Common chemical food preservatives and their safety standards.

Reference Books

1. Arora, K.,; Theory of cookery; First Edition, Frank Brothers Company (Pub) Pvt. Ltd., 2008 ISBN: 9788184095036, 8184095031
2. Philip, Thangam . E.,; Modern Cookery: Vol. 1; Sixth Edition, Orient BlackSwan., 2008 ISBN: 9788125040446, 8125040447ali
3. Parvinder S; Quantity Food Production Operations and Indian Cuisine (Oxford Higher Education); First Edition; Oxford University Press, 2011 ISBN 10:0198068492 ISBN 13: 9780198068495
4. Singh, Yogesh; A Culinary Tour of India; First Edition I.K. International Publishing House Pvt. Ltd. ISBN 978-93-84588-48-9
5. Singh Shakesh;Simplifying Indian Cuisine;First Edition, Aman Publications, ISBN81-8204-054-X
6. Dubey Krishna Gopal; The Indian Cuisine; PHI Learning Pvt. Ltd.ISBN978-81 203-4170-8

B. Tech. Semester I
Department of Civil Engineering

Course Code : CHP0001-32　　　　　　　　　**Course : Remedies by Ayurveda**

L : 0 Hrs., T :0 Hrs., P : 2 Hrs.,Per week　　　　**Total Credits : 1**

Course Outcome

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

CO1: Know basic principle of Ayurvedic formulations.

CO2: Different types of Natural Remedies.

CO3: Basic idea about their Characterization

Module - 1 : Introduction to Ayurveda

Module - 2 : Different types of Ayurvedic formulations: Churn, Bhasma, Vati, Tailum

Module - 3 : Introduction to Methods of preparation

Module - 4 : Characterization, applications

Practicals based on above Syllabus

1) Preparations of some medicinal oils like Bramhi tel, Bramhi Awala, Vatnashak Tel, Bhurngraj Tel etc.

2) Preparation of Churn, like Trifala Churn, Hingastak Churn, Trikut Churn etc.

3) Preparation of some Bhasmas and vati

Books

1) Chemistry and Pharmacology of Ayurvedic Medicinal Plants by Mukund Sabnis, Chaukhambha Amarbharati Prakashan.

2) Everyday Ayurveda by Shailesh Rathod

3) A text Book of Rasashastra by Vikas Dhole and Prakash Paranjpe

4) A text Book of Bhạiajya Kalpana Vij¯nana

B. Tech. Semester I
Department of Civil Engineering

Course Code : HUT1004   **Course : Foundation course in Universal Human Values**

L : 1 Hrs., T :0 Hrs., P : 0 Hrs.,Per week   **Total Credits : 1**

Course Objectives

- To help the student see the need for developing a holistic perspective of life

- To sensitize the student about the scope of life – individual, family (inter-personal relationship), society and nature/existence

- To strengthen self-reflection

- To develop more confidence and commitment to understand, learn and act accordingly

Course Outcome

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

CO1 : Develop a holistic perspective of life

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

CO3 : An ability to strengthen self-reflection

Syllabus

Unit 1: Aspirations and Concerns

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

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

Unit 2 : Health

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

Unit 3 : Relationships and Society

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

Reference Material

The primary resource material for teaching this course consists of

Text book

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

Reference Books

1.   B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

2.   PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Purblishers.

3.   Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991

4.   Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA

5.   Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, limits to Growth, Club of Rome's Report, Universe Books.

6.   Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.

7.   A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.

8.   E. F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.

9.   A. N. Tripathy, 2003, Human Values, New Age International Publishers.

B. Tech. Semester II
Department of Civil Engineering

Course Code : CHT2001   **Course : Chemistry for Civil Engineering**

L : 2 Hrs., T :0 Hrs., P : 0 Hrs.,Per week   **Total Credits : 2**

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.

Text Books

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.

B. Tech. Semester II
Department of Civil Engineering

Course Code : CHP2001   **Course : Chemistry for Civil Engineering Lab**

L : 0 Hrs., T :0 Hrs., P : 2 Hrs.,Per week   **Total Credits : 1**

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.

B. Tech. Semester II
Department of Civil Engineering

Course Code : MAT2001   **Course : Applied Mathematics II**

L : 2 Hrs., T : 1 Hrs., P : 0 Hrs.,Per week   **Total 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. Recognize and understand discrete, continuous probability distributions and apply Binomial distribution, Poisson distribution and Normal distribution to appropriate problems.

5. Internalize multivariable calculus and apply it find Jacobians, maxima and minima of function.

6. Solve numerical integrations by Newton coat formulas and Gauss-Legendre Quadrature.

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 of parameters, Cauchy-Euler equation. Applications of Higher order Differential Equations.

Module - 3 : Statistics (7 hours)

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

Module - 4 : Differential Calculus (10 hours)

Taylor's and Maclaurin's series expansions, radius of curvature (Cartesian form), evolutes and involutes, 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)(For All Branches except Mechanical Branch)

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

OR

Module - 5 : Numerical Integration(8 hours) (Only for Mechanical Branch)

Simpson's 1/3rd rule, 3/8th rule, Trapezoidal rule, Gauss-Legendre Quadrature.

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 : 2nded :J. R. Spiegal ,Schaum series

8.   A text book of Applied Mathematics Volume I & II, by P. N. Wartikar and J. N. Wartikar, Pune Vidhyarthi Griha Prakashan, Pune - 411030 (India).

9.   S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.

B. Tech. Semester II
Department of Civil Engineering

Course Code : CET2001   **Course : Construction Materials**

L : 3 Hrs., T : 0 Hrs., P : 0 Hrs.,Per week   **Total Credits : 3**

Course Outcomes

1.   The students should be able to identify and select different constituent of concrete.

2.   The students should be able to illustrate and control method of manufacture of concrete.

3.   The students should be able to understand strength of concrete concept & its testing as per codal provision for field projects.

4.   The students should be able to analyze various environmental factors which affect durability of concrete.

5.   The students should able to understand the properties and utilities of construction material other than concrete

Unit - 1 : Constituent of Concrete

Basics : Historical background, composition of concrete, general note on strength mechanism, recent practice and future trends.

Constituent of Concrete

Cement - Chemical composition, types of cement, testing of cement as per Indian standards Aggregates-Utility in concrete, classification, effect of geometry &texture, strength, mechanical properties, moisture content, water absorption, bulking of sand, deleterious substances, sieve analysis, various grading and grading requirements, sampling & testing as per Indian Standards.

Water- General Requirements & limiting values of impurities.

Admixtures- Additives and admixtures, types, necessity and benefits

Unit - 2 : Fresh Concrete

Methods of mixing, transporting and placing of concrete. Work ability – Definition and requirement, factors affecting work ability, various tests as per IS and ASTM. Segregation and bleeding, stiffening, re-tempering. Curing: necessity and various methods ,micro-cracking.

Unit - 3 : Hardened Concrete

Compressive and tensile strength and their relationship, various tests as per IS and ASTM. Factors affecting strength – water cement ratio, gel space ratio, aggregate cement ratio, properties of ingredients, effect of age, maturity, aggregate ITZ, various finishes of concrete. Tests for strength of concrete: Destructive, semi destructive and non-destructive tests with their limitations, test methods as per IS and ASTM.

Unit - 4 : Durability and Permeability of Concrete

Definitions, causes, carbonation, shrinkage, creep, cracking Concrete in aggressive environment:

Alkali – aggregate reaction, sulphate attack, chloride attack, acid attack, effect of seawater, special coating for water proofing, sulphate chloride and acid attack, concrete for hot liquids.

Unit - 5 : Other Construction Materials

Introduction to Other Construction material used like Tiles, Timber, plywood, facade, paints and their Application.

Text Books

1.   Properties of concrete. By A.M. Neville, E.L.B.S. London

2.   Concrete Technology by M. S. Shetty. Published by S. Chand, Faridabad

Reference Books

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.   Reinforce concrete design by Pillai and Menon, McGraw Hill.

IS Codes

1.   IS456:2000: plain and reinforced concrete - code of practice

2.   IS516 (Part 1 to 6):2021: Methods of test for strength of concrete.

3.   IS12269:2013: Ordinary Portland Cement, 53 grade — specification

4.   IS8112:2013: ordinary portland cement,43 grade — specification

5.   National Building Code of India 2016 (Volume -1)

Web Materials

http://www.nptel.iitm.ac.in

https://jntuh239529920.files.wordpress.com/2018/08/concrete-technology.pdf

http://www.pkace.org/Lecture_Notes/Concrete-technology-NOTE.pdf

Group Assignments

1.   To collect samples from live construction site and perform the material testing at laboratory.

2.   To manufacture the mix as per site concrete mix design and evaluate the fresh and hardened properties of concrete.

B. Tech. Semester II
Department of Civil Engineering

Course Code : CEP2001   **Course : Construction Materials Lab**

L : 0 Hrs., T : 0 Hrs., P : 2 Hrs.,Per week   **Total Credits : 1**

Course Outcomes

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.

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 work ability by slump test

2.   Determination of work ability by compaction factor test

3.   Determination of work ability by flow test

4.   Determination of work ability by Vee-bee test.

5.   Determination of strength by cube strength of concrete

B. Tech. Semester II
Department of Civil Engineering

Course Code : CET2002 **Course : Engineering Mechanics**

L : 3 Hrs., T : 1 Hrs., P : 0 Hrs.,Per week **Total Credits : 4**

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.

Text Books

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.

B. Tech. Semester II
Department of Civil Engineering

Course Code : CET2003 **Course : Programming for Civil Engineers**

L : 2 Hrs., T : 0 Hrs., P : 0 Hrs.,Per week **Total 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.

B. Tech. Semester II
Department of Civil Engineering

Course Code : CEP2003   Course : Application of Python in Civil Engineering

L : 0 Hrs., T : 0 Hrs., P : 2 Hrs.,Per week   Total Credits : 1

Course Outcomes

1. The student should be able to understand fundamental of Python Programming

2. The student should be able to develop, execute and text Python codes.

Course Content

Development and Execution of Python Codes listed below

1. Program to illustrate arithmetic and logical operators

2. Program to read and print data of different types

3. Program to calculate area and volume of various geometrical shapes

4. Program to compute biggest/smallest of N numbers

5. Program to illustrate decision making

6. Program to compute Factorial, Fibonacci series and sum of n numbers

7. Program to compute sum and average of N Numbers stored in an array.

8. Program to illustrate various operations on matrices.

9. Program to illustrate use of functions

10. Program to illustrate plotting of various objects/shapes/markers.

B. Tech. Semester II
Department of Civil Engineering

Course Code : HUT2001   **Course : Foundation Literature of Indian Civilization**

L : 2 Hrs., T : 0 Hrs., P : 0 Hrs.,Per week   **Total Credits : 2**

Course Outcome

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

CO1: Understand the Indian knowledge system and its scientific approach

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

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

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

Syllabus

Unit - 1: Overview of Indian Knowledge System

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

Unit - 2 : The Vedic corpus

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

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 of Philosophy, Non-vedic philosophies: Jainism, Buddhism, and other approaches

Unit - 4 : Indian wisdom through ages

Panchtantras, Purans: contents and issues of interests, Itihasa: uniqueness of the two epics (Ramayan and Mahabharata), Key issues and messages from Ramayana, Mahabharata – a source of worldly wisdom; Indian ancient Sanskrit literature: Kalidas, Vishakadutta, Bhavbhuti, Shudraka**any one text as decided by the course teacher

Reference Material

1.   B. Mahadevan, Vinayak Rajat Bhar, Nagendra Pavana R. N., "Introduction to Indian Knowledge System: Concepts and Applications" PHI, 2022

2.   S. C. Chatterjee and D. M. Datta, An introduction to Indian Philosophy, University of Calcutta, 1984

B. Tech. Semester II
Department of Civil Engineering

Course Code : PET2001   **Course : Sport-Yoga-Recreation**

L : 1 Hrs., T : 0 Hrs., P : 2 Hrs.,Per week   **Total Credits : 2**

Aim of the Course

The course aims at creating awareness about the fundamentals of Physical Education, Sports, Yoga, Recreation and its effectiveness to promote Health and wellness through Healthy Lifestyle.

Course Objectives

1. To impart the students with basic concepts of Sports, Yoga and Recreational activities for health and wellness.

2. To familiarize the students with health-related Exercise and evaluate their Health-related Fitness.

3. To make Overall growth & development with team spirit, social values and leadership qualities among students through various sports, games and Yogic activities.

4. To create Environment for better interaction and recreation among students as neutralizer for stress through various minor and recreational games.

Course Outcomes

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

1. Understand fundamental skills, basic principle and practices of sports and Yoga.

2. Practically learn the principles of implementing general and specific conditioning of physical exercises and yoga.

3. Develop Health-related fitness and Body-mind co-ordination through various fitness activities, sports, recreational games and yoga.

4. practice Healthy & active living with reducing Sedentary Life style.

Course Content

Unit - 1 : Theory : Introduction

*   Meaning, Definition and Importance of Health & Wellness

*   Dimensions of Health and Wellness

*   Factors influencing Health and Wellness

*   Physical Fitness, Nutrition, Habits, Age, Gender, Lifestyle, Body Types

*   Health & Wellness through Physical Activities, Sports, Games, Yoga and Recreation activities

*   Causes of Stress & Stress relief through Exercise and Yoga

*   Safety in Sports

Unit - 2 : Practical- Exercises for Health and Wellness

- Warm-Up and Cool Down - General & Specific Exercises
- Physical Fitness Activities
- Stretching Exercises
- General & Specific Exercises for Strength, Speed, Agility, Flexibility, coordinative abilities
- Cardiovascular Exercises
- Assessment of BMI
- Relaxation techniques
- Physical Efficiency Tests

Unit - 3 : Yoga

- Shukshma Vyayam
- Suryanamaskar
- Basic Set of Yogasanas – Sitting, standing, supine and prone position
- Basic Set of Pranayama & Meditation

References

1. Russell, R.P. (1994). Health and Fitness Through Physical Education. USA: Human Kinetics.

2. Uppal, A.K. (1992). Physical Fitness. New Delhi: Friends Publication.

3. AAPHERD "Health related Physical Fitness Test Manual."1980 Published by Association drive Reston Virginia

4. Kumar, Ajith. (1984) Yoga Pravesha. Bengaluru: Rashtrothanna Prakashana.

5. Dr. Devinder K. Kansal, A Textbook of Test Evaluation, Accreditation, Measurements and Standards (TEAMS 'Science)

NOTES