



MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)

#14, Ramohalli Cross, Kumbalagodu, Mysore Road, Bengaluru-560074



Civil Engineering

V & VI Semester Scheme and Syllabus

(2024 Scheme)

VISION

To empower young minds through technology, research and innovation, to produce technically competent and socially responsible professionals in higher education.

MISSION

1. To deliver excellence in education through innovative teaching, impactful research, and continuous skill development, preparing students to meet global challenges with technical expertise and ethical responsibility.
2. To foster a transformative learning environment that integrates technology, research and practical experience, empowering students to become skilled professionals and socially conscious leaders.
3. To cultivate a culture of lifelong learning and professional excellence by encouraging creativity, research, and community engagement, equipping students with the skills to thrive in a dynamic world.
4. To provide a holistic educational experience that combines advanced technology, hands-on research, and community-focused learning, shaping students into competent, ethical professionals who contribute positively to society.

QUALITY POLICY

Rajarajeswari College of Engineering is committed to imparting quality technical education that nurtures competent, ethical professionals with global relevance. We ensure academic excellence through a dynamic, outcome-based curriculum, experienced faculty, and cutting-edge infrastructure. Continuous improvement is driven by innovation, research and strong industry collaboration. We foster holistic development and a progressive environment that supports lifelong learning, teamwork, and professional growth.

CORE VALUES

Academic Excellence, Integrity, Innovation, Global Competence, Continuous Improvement.

Civil Engineering

DEPARTMENT VISION

To initiate graduate and research programmes in civil engineering for the country's long-term growth and sustainable development.

DEPARTMENT MISSION

1. To generate high skilled civil engineers with moral principles who can benefit society.
2. Transforming the department into a premier hub for civil engineer and allied research.
3. To offer community support in all facets of civil engineering and provide consultancy services.
4. To encourage young engineers to think creative and innovative to meet potential challenges in the civil engineering career

PROGRAM OUTCOMES (POs)

PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems /components / processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modeling, analysis & interpretation of data to provide valid conclusions. (WK8).

PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modeling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, WK7).

PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

PO8: Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO9: Communication: Communicate effectively and inclusively within the community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change.
(WK8)

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Demonstrate proficiency in applying fundamental mathematical, scientific and engineering principles in identifying, formulating, analyzing and solving civil engineering problems.

PEO2: To achieve expertise in design and analysis of various civil engineering structures.

PEO3: Exhibit professionalism, ethical attitude, communication skills, team work in their profession and adapt to current trends by engaging in lifelong learning.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Competence in Civil Engineering: Educating students with fundamental mathematical, scientific, and Engineering knowledge to have a significant and positive long-term impact on the field of civil engineering.

PSO2: Usage of Cutting Edge Technology: Inspiring students and preparing them for successful professional careers using appropriate techniques, resources and modern attitudes and modeling to complex engineering activities with practical knowledge and research exposure.

PSO3: Continuous improvement: Motivate students in learning to learn and the ability to keep learning for a lifetime to increase their professionalism, update and deepen their knowledge through the development of the profession.

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DEPARTMENT OF CIVIL ENGINEERING

Scheme of Teaching and Examinations -2024 Scheme

Outcome based Education (OBE) and Choice Based Credit System (CBCS) Effective from the Academic Year 2026-27

V Semester

S. No	Course Category and Course Code		Course Title	TD / PSB	Teaching Hours / Week				Examination				Credits
					Lecture	Tutorial	Practical	Self-Learning	CIE Marks	SEE Duration in Hrs	SEE Marks	Total Marks	
					L	T	P	S					
1.	HSMC	B24CV501	Construction Management and Entrepreneurship	CV	3	0	0	3	50	3	50	100	3
2.	IPCC	B24CV502	Concrete Technology	CV	3	0	2	3	50	3	50	100	4
3.	PCC	B24CV503	Design of RCC Structures	CV	2	2	0	2	50	3	50	100	3
4.	PCC	B24CV504	Hydrology and irrigation Engineering	CV	3	0	0	3	50	3	50	100	3
5.	PCCL	B24CV505L	Computer Aided Building Planning and RCC Structures Drawing	CV	0	0	2	0	50	3	50	100	1
6.	PEC	B24CV 56X	Professional Elective Course- I	CV	3	0	0	3	50	3	50	100	3
7.	BSC	B24BEK507	Biology for Engineers	CV / Che	2	0	0	2	50	2	50	100	2
8.	AEC	B24CV58X	Ability Enhancement Course Lab - V	CV	0	0	2	0	50	3	50	100	1
9.	NCMC	B24NCK59X	NSS / NCC / PE / Yoga / Music	HSS	2	0	0	0	100	-	-	100	PP
10.	NCMC	B24ESK510	Environmental Science and E-Waste Management	CV	2	0	0	0	100	-	-	100	PP
11	SDC	B24CVP511	Mini-Project	CV	0	0	4	0	50	3	50	100	2
TOTAL									650		450	1100	22

BSC: Basic Science Course, HSMC: Humanity Social sciences including Management courses, IPCC: Integrated Professional Core Course, PCC: Professional Core Course, PCCI: Professional Core Course laboratory, NCMC: Non-Credit Mandatory Course, AEC: Ability Enhancement Course, PEC: Professional Elective Course, SDC- Skill Development Course, I: Lecture, T: Tutorial, P: Practical S: Self-Learning, CIE: Continuous Internal Evaluation, SEE: Semester End Evaluation. K: Indicates common course to all the streams of engineering PP/NP: Pass/ Not Pass, YY: Programme Code (EC, CS, IS etc.), X: 1/2/3/4.



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Professional Elective Courses (PEC) - I			
B24CV561	Remote Sensing and GIS	B24CV562	Railways, Harbors, Tunneling and Airports
B24CV563	Numerical Methods in Civil Engineering	B24CV564	Design of formwork and scaffolding
Ability Enhancement Course / Skill Enhancement Course (AEC/SEC) – V			
B24CV581	Basics AutoCAD 3D	B24CV582	Basics of 3DS MAX
B24CV583	Basics of GIS for civil engineers	B24CV584	Revit Architecture
Non-Credit Mandatory Courses (NMC)			
B24NCK591	National Service Scheme	B24NCK592	National Cadet Corps
B24NCK593	Physical Education	B24NCK594	Yoga
B24NCK595	Music		

National Service Scheme /National Cadet Corps/Physical Education/Yoga/Music: All the students have to register the same course namely National Service Scheme (NSS), National Cadet Corps (NCC), Physical Education (PE), Yoga (YOG) and Music (MUS) during the first week of III/IV/V/VI semesters. However, the option is given to students to change the activity. He/she may opt for the change of the course in ensuing semester. If the student is opting new course in V semester first time, he/she may take the basic modules from the syllabus to complete and if they repeat the same course in ensuing semester, subsequent modules can be offered.

These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the course is mandatory for the award of degree.

Professional Elective Courses (PEC): A PEC is intended to enhance the depth and breadth of educational experience in the engineering and technology curriculum. Multidisciplinary courses that are added supplement the latest trend and advanced technology in the selected stream of engineering. Each group will provide an option to select one course. The minimum number of student's strength for offering a professional elective is 10. However, this condition shall not be applicable to cases where the admission to the programme is less than 10 students.

HoD

Dean-Academics

Principal



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VI Semester

Sl. No.	Course Category and Course Code		Course Title	TD / PSB	Teaching Hours / Week				Examination				Credits
					Lecture	Tutorial	Practical	Self-Learning	CIE Marks	SEE Duration Hrs	SEE Marks	Total Marks	
					L	T	P	S					
1.	PCC	B24CV601	Natural Disaster Management	CV	2	2	0	2	50	3	50	100	3
2.	IPCC	B24CV602	Geotechnical Engineering	CV	3	0	2	3	50	3	50	100	4
3.	PEC	B24CV63X	Professional Elective Course- II	CV	3	0	0	3	50	3	50	100	3
4.	OEC	B24CV 64X	Open Elective Course - I	Any Dept	3	0	0	3	50	3	50	100	3
5.	PCCL	B24CV605L	Extensive survey Laboratory	CV	0	0	2	0	50	3	50	100	1
6.	AEC	B24RMK606	Research Methodology and IPR	CV	1	0	0	1	50	1	50	100	1
7.	SDC	B24PRJ607	Capstone Project work : Phase - I	CV	0	0	4	0	100	-	-	100	2
8.	AEC	B24CV 68X	Ability Enhancement Course Lab – VI	CV	0	0	2	0	50	3	50	100	1
9.	NCMC	B24NCK69X	NSS / NCC / PE / Yoga / Music	HSS	2	0	0	0	100	-	-	100	PP
10.	HSMC	B24IKK610	Indian Knowledge System	CV	2	0	0	0	100	-	-	100	PP
TOTAL									600		400	1000	18

HSMC: Humanity Social sciences including Management courses, IPCC: Integrated Professional Core Course, PCC: Professional Core Course, PCCL: Professional Core Course laboratory, NCMC: Non-Credit Mandatory Course, AEC: Ability Enhancement Course, PEC: Professional Elective Course, OEC: Open Elective Course, SDC- Skill Development Course, L: Lecture, T: Tutorial, P: Practical S: Self-Learning, CIE: Continuous Internal Evaluation, SEE: Semester End Evaluation. K: Indicates common course to all the streams of engineering, PP/NP: Pass/ Not Pass, YY: Programme Code (EC, CS, IS etc.), X: 1/2/3/4



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Professional Elective Courses (PEC) - II			
B24CV631	Design of Bridges	B24CV632	Solid Waste Management
B24CV633	Materials and Construction of Highway Pavements	B24CV634	Open Channel Hydraulics
Open Elective Course (OEC)- I			
B24CV641	Energy Efficiency, Acoustics and Day lighting In Building	B24CV642	Integrated Waste Management for a Smart City
B24CV643	Conservation Of Natural Resources	B24CV644	Road Safety Engineering
Ability Enhancement Course (AEC) – VI			
B24CV681	Civil 3D	B24CV682	Advanced 3DS MAX
B24CV683	GIS for civil engineers	B24CV684	Revit Structures
Non-Credit Mandatory Courses (NMC)			
B24NCK691	National Service Scheme	B24NCK692	National Cadet Corps
B24NCK693	Physical Education	B24NCK694	Yoga
B24NCK695	Music		
PROJECT WORK: Phase – I: The objective of the Project work is (i) To encourage independent learning and the innovative attitude of the students. (ii) To develop interactive attitude, communication skills, organization, time management, and presentation skills. (iii) To impart flexibility and adaptability. (iv) To inspire team working. (v) To expand intellectual capacity, credibility, judgment and intuition. (vi) To adhere to punctuality, setting and meeting deadlines. (vii) To install responsibilities to oneself and others. (viii) To train students to present the topic of project work in a seminar without any fear, face the audience confidently, enhance communication skills, involve in group discussion to present and exchange ideas. CIE Procedure for Project Work: The CIE marks shall be awarded by a committee consisting of the Head of the concerned department and two senior faculty members of the department, one of whom shall be the Guide. The CIE marks awarded for the project work shall be based on the evaluation of the Project Work Report, Project Reviews and Viva-Voce. The marks awarded for the project report shall be the same for all the batch mates. SEE procedure for Project Work: SEE for project work will be conducted by the two examiners appointed by the Institution. The SEE marks awarded for the project work shall be based on the evaluation of Project Demonstration, Project Presentation and Viva-Voce in the ratio 20:60:20. Open Elective Courses: Students belonging to a particular stream of Engineering are not entitled to the open electives offered by their parent department. However, they can opt for an elective offered by other departments, provided they satisfy the prerequisite condition if any. Registration to open electives shall be documented under the guidance of the Program Coordinator/ Mentor. The minimum number of students' for offering Open Elective Course is 10. However, this condition shall not be applicable to class where the admission to the program is less than 10.			

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Department of Civil Engineering

Semester - V					
Construction Management and Entrepreneurship					
Category: HSMC					
Course Code	:	B24CV501	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	3:0:0:3	SEE	:	50 Marks
Total Hours	:	45	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3 Hrs

Course Learning Objective is	
1.	To understand the concept of planning, scheduling, cost and quality control, safety during construction, organization and use of project information necessary for construction project.
2.	To inculcate Human values to grow as responsible human beings with proper personality.
3.	Keep up ethical conduct and discharge professional duties.
4.	To develop an entrepreneurial outlook and mindset along with critical skills and knowledge to manage risks associated with entrepreneurs.
5.	To evaluate alternatives and develop capital budget for different scenarios.

Module – 1	No. of Hours
Management: Characteristics of management, functions of management, importance and purpose of planning process, types of plans. Construction Project Formulation: Introduction to construction management, project organization, management functions, management styles. Construction Planning and Scheduling: Introduction, types of project plans, work break down structure, Grant Chart, preparation of network diagram-event and activity based and its critical path Critical Path Method, PERT method.	9
Module – 2	No. of Hours
Resource Management: Basic concepts of resource management, class of labour, Wages & statutory requirement, Labour Production rate or Productivity, Factors affecting labour output or productivity. Construction Equipments: classification of construction equipment, estimation of productivity for: excavator, dozer, compactors, graders and dumpers. Estimation of ownership cost, operational and maintenance cost of construction equipments. Materials: material management functions, inventory management.	9
Module – 3	No. of Hours
Construction Quality, safety and Human Values: Construction quality process, inspection, quality control and quality assurance, cost of quality, ISO standards. Introduction to concept of Total Quality Management. HSE: Introduction to concepts of HSE as applicable to Construction. Importance of safety in construction, Safety measures to be taken during Excavation, Explosives, drilling and blasting, hot bituminous works, scaffolds/platforms/form work for high rise structures and equipment operation. Storage of materials. Safety through legislation, safety campaign. Insurances. Ethics: Morals, values and ethics, integrity, trust worthiness, work ethics, need of engineering ethics, Professional Duties, Professional and Individual Rights, Confidential and Proprietary Information, Gifts and Bribes, Price Fixing, Whistle Blowing.	9
Module – 4	No. of Hours
Introduction: Principles of Engineering Economy, Engineering Decision: Makers, Engineering and Economics, Problem solving and Decision making, Intuition and Analysis, Tactics and Strategy. Interest and Interest Factors: Interest rate, Simple interest, Compound interest Comparison of alternatives: Present worth, annual equivalent, capitalized and rate of return methods, Minimum Cost analysis and break even analysis. Replacement Analysis: Replacement studies, replacement due to deterioration, obsolescence, inadequacy, economic life for cyclic replacements. Depreciation: Causes of Depreciation, Basic methods of computing depreciation charges, Exercises, Problems.	9
Module – 5	No. of Hours
Introduction to Entrepreneurship: Learn how entrepreneurship has changed the world. Identify six entrepreneurial myths and uncover the true facts. Listen to Some Success Stories: Global legends Understand how ordinary people become successful	9



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global entrepreneurs, their journeys, their challenges, and their success stories. Characteristics of a Successful Entrepreneur Understand the entrepreneurial journey and learn the concept of different entrepreneurial styles. Identify your own entrepreneurship style based on your personality traits, strengths, and weaknesses. Learn about the 5M Model, each of the five entrepreneurial styles in the model, and how they differ from each other. Communicate Effectively: Learn how incorrect assumptions and limiting our opinions about people can negatively impact our communication. Business Planning Process: Business planning process, marketing plan, financial plan, project report and feasibility study, guidelines for preparation of model project report for starting a new venture. Introduction to international entrepreneurship opportunities, entry into international business, exporting, direct foreign investment, venture capital.	
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Course Outcomes: At the end of the course, the students will be able to	
CO1	Understand various management principles of construction industry.
CO2	Use planning, organizing, scheduling, monitoring and controlling techniques for managing construction activity.
CO3	Understand importance of quality control and safety in construction.
CO4	Understand managing data pertaining to construction project.
CO5	Evaluate alternatives and develop capital budget for different scenarios.

Text Books	
1.	PC Tripathi and PN Reddy, "Principles of Management", Tata McGraw-Hill Education.
2.	Chitkara, K.K, "Construction Project Management: Planning Scheduling and Control", Tata McGraw Hill Publishing Company, New Delhi.

Reference Text Books	
1.	Dr.U.K.Shrivastava "Construction Planning and Management",Galgotia publications Pvt.Ltd. NewDelhi.
2.	Bureau of Indian standards – IS 7272 (Part-1)- 1974 : Recommendations for labour output constant for building works:
3.	"Engineering Economics",RPanneerselvam, Eastern Economy Edition 2001, PHI, ISBN–81-203-1743-2.

ASSESSMENT DETAILS BOTH (CIE AND SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.

CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	Internal Assessment-1	50	30 (Average of Best two Assessments)	50
	Internal Assessment-2	50		
	Internal Assessment-3	50		
AAT	Two Assessments as per regulations	20	20	
SEE	Semester End Examination	100	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

- The question paper shall be set for 100 marks and duration of SEE is 3 hours.
- The question paper will have two parts: Part-A and Part-B.
- Part-A** should contain minimum **Two or Four** quiz questions from each module of 02 marks/ 01 marks each. **Part-A is Compulsory** and carries 20 Marks.
- Part-B** contains total 10 questions.
- Two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice.



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6. Students should answer five full questions, selecting one full question from each module.
7. Question papers to be set as per the Blooms Taxonomy levels.

CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	-	-	-	1	-	1	2	2	3
CO2	-	-	-	-	-	-	-	-	1	1	1
CO3	-	-	-	-	-	-	-	-	-	-	-
CO4	-	1	-	-	-	1	-	1	1	2	2
CO5	-	1	1	-	-	1	-	1	-	-	-

Level 3 - High, Level 2 - Moderate, Level 1 - Low



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Semester- V					
Concrete Technology					
Category: IPCC					
Course Code	:	B24CV502	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	3:0:2:3	SEE	:	50 Marks
Total Hours	:	45+30	Total	:	100 Marks
Credits	:	4	SEE Duration	:	3 Hrs

Course Learning Objective is	
1.	To recognize material characterization of ingredients of concrete and its influence on properties of concrete
2.	Proportion ingredients of Concrete to arrive at most desirable mechanical properties of Concrete.
3.	To ascertain and measure engineering properties of concrete in fresh and hardened state which meet the requirement of real time structures.
4.	To learn the procedure of testing concrete ingredients and properties of concrete as per standard code recommendations.
5.	To relate material characteristics to various application of construction.

Module – 1	No. of Hours
Concrete Ingredients Cement: Cement manufacturing process, steps to reduce carbon footprint, chemical composition and their importance, hydration of cement, types of cement. Testing of cement. Fine aggregate: Functions, requirement, Alternatives to River sand, M-sand introduction and manufacturing. Coarse aggregate: Importance of size, shape and texture. Grading and blending of aggregate. Testing on aggregate, requirement. Recycled aggregates Water – qualities of water. Chemical admixtures –plasticizers, accelerators, retarders and air entraining agents. Mineral admixtures – Pozzolanic and cementations materials, Fly ash, GGBS, silica fumes, Metakaolin and rice huskash.	9
Module – 2	No. of Hours
Fresh Concrete Workability: factors affecting workability. Measurement of workability–slump, Compaction factor and Vee-Bee Consistometer tests, flow tests. Segregation and bleeding. Process of manufacturing of concrete- Batching, Mixing, Transporting, Placing and Compaction. Curing – Methods of curing – Water curing, membrane curing, steam curing, accelerated curing, self- curing. Good and Bad practices of making and using fresh concrete and Effect of heat of hydration during mass concreting at project sites.	9
Module – 3	No. of Hours
Hardened Concrete Factors: influencing strength, W/C ratio, gel/space ratio, Maturity concept, Testing of hardened concrete, Creep –factors affecting creep. Shrinkage of concrete – plastic shrinking and drying shrinkage, Factors affecting shrinkage. Definition and significance of durability. Internal and external factors influencing durability, Mechanisms- Sulphate attack – chloride attack, carbonation, freezing and thawing. Corrosion, Durability requirements as per IS-456, In situ testing of concrete- Penetration and pullout test, rebound hammer test, ultrasonic pulse velocity, core extraction – Principal, applications and limitations.	9
Module – 4	No. of Hours
Concrete Mix Proportioning: Concept of Mix Design with and without admixtures, variables in proportioning and Exposure conditions, Selection criteria of ingredients used for mix design, Procedure of mix proportioning. Numerical Examples of Mix Proportioning using IS-10262:2019.	9
Module – 5	No. of Hours
Special Concretes: RMC- manufacture and requirement as per QCI-RMCPCS, properties, advantages and disadvantages. Self-Compacting concrete- concept, materials, tests, properties, application and typical mix Fiber reinforced concrete - Fibers types, properties, application of FRC. Light weight concrete-material properties and types. Typical light weight concrete mix and applications, materials, requirements, mix proportion and properties of Geo polymer Concrete, High Strength Concrete and High Performance Concrete, ultra high performance concrete, Self-healing concrete.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Relate material characteristics and their influence on microstructure of concrete.
CO2	Illustrate proportioning of different types of concrete mixes for required fresh and hardened properties using professional codes.
CO3	Adopt suitable concreting methods to place the concrete based on requirement.
CO4	Design appropriate concrete mix Using Professional codes & determine strength and quality of concrete.



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CO5	Evaluate the strength of structural elements using NDT techniques
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LABORATORY

Practical Component of IPCC (12 Experiments)

Sl. No	Name of the experiments
1.	Tests on Cement: Normal Consistency, Setting time
2.	Tests on Cement: Compressive strength, fineness by air permeability test e. specific gravity
3.	Design of concrete mix as per IS-10262
4.	Tests on fresh concrete: slump, compaction factor and, Vee Bee test
5.	Tests on hardened concrete: compressive strength test
6.	Tests on hardened concrete: split tensile strength test
7.	Tests on hardened concrete: flexural strength test
8.	NDT tests by re bound hammer and pulse velocity test.
9.	Design of self-compacting concrete, As per IS 10262:2019
10.	Tests on Self-Compacting Concrete: slump flow test
11.	Tests on Self-Compacting Concrete: V-funnel test and J-Ring test
12.	Tests on Self-Compacting Concrete: U Box test and L Box test

Web links and Video lectures (e-Resources):

Cement <https://nptel.ac.in/courses/105102012/1>
Aggregates <https://nptel.ac.in/courses/105102012/6>
Mineral admixtures <https://nptel.ac.in/courses/105102012/11>
Chemical admixtures <https://nptel.ac.in/courses/105102012/9>
<https://nptel.ac.in/courses/105102012/10>
Concrete mix design <https://nptel.ac.in/courses/105102012/14>
Concrete production & fresh concrete <https://nptel.ac.in/courses/105102012/19>
Engineering properties of concrete <https://nptel.ac.in/courses/105102012/23>
Dimensional stability & durability <https://nptel.ac.in/courses/105102012/27>
Durability of concrete <https://nptel.ac.in/courses/105102012/31>
Special concretes <https://nptel.ac.in/courses/105102012/36>

ASSESSMENT DETAILS BOTH (CIE AND SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.



CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	Internal Assessment-1	50	30 (Average of Best Two Assessments)	50/2 = 25
	Internal Assessment-2	50		
	Internal Assessment-3	50		
AAT	Any One Assessments as per regulations	20	20	
Laboratory	Lab conduction & Record	Evaluating each expt. for 10 marks.	05	25
	Internal Test	50	20	
Total Marks				50
SEE	Semester End Examination	100	50	50
Total marks				100

SEMESTER END EXAMINATION (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part-A and Part-B.
3. **Part-A** should contain minimum **Two or Four** quiz questions from each module of 02 marks/ 01 marks each. **Part-A is Compulsory** and carries 20 Marks.
4. **Part-B** contains total 10 questions. Two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module.
5. Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
6. The maximum marks from the practical component to be included in the SEE question paper is **16 marks**.
7. Question papers to be set as per the Blooms Taxonomy levels.
8. The laboratory component of the **integrated course** shall be CIE only. However, in SEE, the questions from the practical component shall be included.

CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	-	-	-	2	-	-	2	-	1
CO2	3	2	-	-	-	2	-	-	2	-	1
CO3	3	2	-	-	-	2	-	-	2	-	1
CO4	3	3	2	-	-	2	-	-	3	-	2
CO5	3	3	2	-	-	2	-	-	3	-	2

Level 3 - High, Level 2 - Moderate, Level 1 – Low



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Semester - V					
Design of RCC Structures					
Category: PCC					
Course Code	:	B24CV503	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	2:2:0:2	SEE	:	50 Marks
Total Hours	:	55	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3 Hrs

Course Learning Objective is	
1.	To identify, formulate and solve engineering problems of RC elements subjected to different kinds of loading.
2.	To follow a procedural knowledge in designing various structural RC elements.
3.	To impart the usage of codes for strength, serviceability and durability.
4.	To Provide knowledge in analysis and design of RC elements.

Module – 1	No. of Hours
Introduction to working stress and limit State Design: Introduction to working stress method, Difference between Working stress and Limit State Method of design, Modular Ratio and Factor of Safety and evaluation of design constants for working stress method. Philosophy and principle of limit state design with assumptions. Partial Safety factors, Characteristic load and strength. Stress block parameters, concept of balanced section, under reinforced and over reinforced section. Limiting deflection, short term deflection, long term deflection, Calculation of deflection of singly reinforced beam only. Cracking in reinforced concrete members, calculation of crack width of singly reinforced beam. Side face reinforcement, slender limits of beams for stability.	11
Module – 2	No. of Hours
Limit State Analysis of Beams: Analysis of singly reinforced, doubly reinforced and flanged beams for flexure and shear.	11
Module – 3	No. of Hours
Limit State Design of Beams: Design of singly and doubly reinforced beams, Design of flanged beams, design for combined bending, shear and torsion as per IS-456.	11
Module – 4	No. of Hours
Limit State Design of Slabs and Stairs: Introduction to one way and two way slabs, Design of cantilever, simply supported and one way continuous slab. Design of two way slabs for different boundary conditions. Design of dog legged and open well staircases. Importance of bond, anchorage length and lap length.	11
Module – 5	No. of Hours
Limit State Design of Columns and Footings: Analysis and design of short axially loaded RC column. Design of columns with uniaxial and biaxial moments, Design concepts of the footings. Design of Rectangular and square column footings with axial load and also for axial load & moment.	11

Course Outcomes: At the end of the course, the students will be able to	
CO1	Understand the design philosophy and principles.
CO2	Solve engineering problems of RC elements subjected to flexure, shear and torsion.
CO3	Demonstrate the procedural knowledge in designs of RC structural elements such as slabs, columns and footings.
CO4	Owens professional and ethical responsibility.

Text Books	
1.	Unnikrishnan Pillai and Devdas Menon, “ Reinforced Concrete Design” , McGraw Hill, New Delhi
2.	Subramanian, “ Design of Concrete Structures” , Oxford university Press
3.	H J Shah, “Reinforced Concrete Vol. 1 (Elementary Reinforced Concrete)” , Charotar Publishing House Pvt. Ltd.

Reference Text Books	
1.	P C Varghese, “Limit State design of reinforced concrete” , PHI, New Delhi.
2.	W H Mosley, R Husle, J H Bungey, “Reinforced Concrete Design” , MacMillan Education, Palgrave publishers.



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3.	Kong and Evans, "Reinforced and Pre-Stressed Concrete", Springer Publications.
4.	A W Beeby and Narayan R S, "Introduction to Design for Civil Engineers", CRC Press.
5.	Robert Park and Thomas Paulay, "Reinforced Concrete Structures", John Wiley & Sons, Inc.

ASSESSMENT DETAILS BOTH (CIE AND SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.

CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	Internal Assessment-1	50	30 (Average of Best two Assessments)	50
	Internal Assessment-2	50		
	Internal Assessment-3	50		
AAT	Two Assessments as per regulations	20	20	
SEE	Semester End Examination	100	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part-A and Part-B.
3. **Part-A** should contain minimum **Two or Four** quiz questions from each module of 02 marks/ 01 marks each. **Part-A is Compulsory** and carries 20 Marks.
4. **Part-B** contains total 10 questions.
5. Two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice.
6. Students should answer five full questions, selecting one full question from each module.
7. Question papers to be set as per the Blooms Taxonomy levels.

CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	-	-	-	-	3	1	-	-	-	1
CO2	3	-	-	-	-	3	1	-	-	-	1
CO3	3	-	-	-	-	3	1	-	-	-	1
CO4	3	-	-	-	-	3	1	-	-	-	1

Level 3 - High, Level 2 - Moderate, Level 1 – Low



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Semester - V				
Hydrology and Irrigation Engineering				
Category: PCC				
Course Code	:	B24CV504	CIE	: 50 Marks
Teaching Hours L:T:P:S	:	3:0:0:3	SEE	: 50 Marks
Total Hours	:	45	Total	: 100 Marks
Credits	:	3	SEE Duration	: 3 Hrs

Course Learning Objective is	
1.	To concept of hydrology, components of hydrologic cycle, hydrologic processes such as precipitation, infiltration, evaporation and transpiration.
2.	To estimation of runoff and use the concept of unit hydrograph.
3.	To systems and methods of irrigation, crop water requirement.
4.	To canals, canal alignment, design methods of canals. Computation of reservoir capacity.
5.	To concepts of floods and droughts, importance of water conservation and water management.

Module – 1	No. of Hours
Hydrology: Introduction, Global distribution of water and Indian water availability. Hydrologic cycle (Horton's) qualitative and engineering representation. Precipitation: Forms and types, measurement of rain fall using Syphon type of rain gauges, optimum number of rain gauge stations, consistency of rainfall data (double mass curve method), computation of mean rainfall, estimation of missing data, presentation of precipitation data, moving average curve, mass curve, rainfall hyetographs. Losses from Precipitation: Evaporation process, factors affecting evaporation, measurement using IS class-A Pan, reservoir evaporation and control. Factors affecting Evapo-transpiration. Infiltration, Factors affecting in filtration capacity, measurement by double ring in filtrometer, Horton's in filtration equation, in filtration indices.	9
Module – 2	No. of Hours
Runoff: Definition, concept of catchment, factors affecting runoff, rainfall – runoff relationship using regression analysis. Hydrographs: Definition, components of hydrograph, base flow separation, unit hydrograph, assumption, application and limitations, derivation from simple storm hydrographs, S curve and its computations, Conversion of UH of different durations.	9
Module – 3	No. of Hours
Irrigation: System of irrigation: surface and groundwater, flow irrigation, lift irrigation. Methods of irrigation: surface, sprinkler and drip/micro irrigation. Water Requirements of Crops: Duty, delta and base period, relationship between them, /factors. Affecting duty of water crops and crop seasons in India, irrigation efficiency, frequency of irrigation.	9
Module – 4	No. of Hours
Canals: Types of canals. Alignment of canals. Definition of gross command area, cultural command area, intensity of irrigation, time factor, crop factor. Unlined and lined canals. Standard sections. Regime channels, Design of canals by Lacey's and Kennedy's method (No numerical examples). Reservoirs: Definition, investigation for reservoir site, storage zones determination of storage Capacity using mass curves, economical height of dam.	9
Module – 5	No. of Hours
Flood Management: Indian rivers and floods, Causes of floods, Alleviation, Levees and floodwalls, Floodways, Channel improvement, Flood damage analysis. Drought Management: Definition of drought, Causes of drought, measures for water conservation and augmentation, drought contingency planning. Water harvesting: rainwater collection, small dams, run off enhancement, run off collection, Restoration and rejuvenation of water bodies (ponds and lakes).	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Provide a background in the theory of hydrological processes and their measurement
CO2	Estimate runoff and develop unit hydrographs.
CO3	Find the water requirement and frequency of irrigation for various crops.
CO4	Find the canal capacity and compute the reservoir capacity.



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CO5	Analyze floods and droughts. Emphasize on the importance of conservation of water and water bodies.
Text Books	
1.	K.Subramanya, "Engineering Hydrology", Tata McGraw Hill Publishers, New Delhi.
2.	Jayarami Reddy, "A Text Book of Hydrology", Lakshmi Publications, New Delhi.

Reference Text Books	
1.	H.M.Raghunath, "Hydrology", Wiley Eastern Publication, New Delhi.
2.	Sharma R.K., "Irrigation Engineering and Hydraulics", Oxford & IBH Publishing Co., New Delhi.
3.	Garg S.K., "Irrigation Engineering and Hydraulic Structures", Khanna Publications, New Delhi.

ASSESSMENT DETAILS BOTH (CIE AND SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.

CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	Internal Assessment-1	50	30 (Average of Best two Assessments)	50
	Internal Assessment-2	50		
	Internal Assessment-3	50		
AAT	Two Assessments as per regulations	20	20	
SEE	Semester End Examination	100	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

- The question paper shall be set for 100 marks and duration of SEE is 3 hours.
- The question paper will have two parts: Part-A and Part-B.
- Part-A** should contain minimum **Two or Four** quiz questions from each module of 02 marks/ 01 marks each. **Part-A is Compulsory** and carries 20 Marks.
- Part-B** contains total 10 questions.
- Two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice.
- Students should answer five full questions, selecting one full question from each module.
- Question papers to be set as per the Blooms Taxonomy levels.

CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	1	-	-	-	-	-	-	-	-
CO2	3	2	1	1	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	1	-	-	-	-
CO4	3	2	-	1	-	-	1	-	-	-	-
CO5	3	2	-	1	-	-	1	-	-	-	-

Level 3 - High, Level 2 - Moderate, Level 1 - Low



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Semester- V					
Computer Aided Building Planning and RCC Structures Drawing					
Category: PCCL					
Course Code	:	B24CV505L	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	0:0:2:0	SEE	:	50 Marks
Total Hours	:	30	Total	:	100 Marks
Credits	:	1	SEE Duration	:	3 Hrs

Course Learning Objective is	
1.	To achieve skill sets to prepare computer aided engineering drawings
2.	To understand the details of construction of different building elements.
3.	To visualize the completed form of the building and the intricacies of construction based on the engineering drawings

Sl. No.	List of the experiment
1.	Introduction to AutoCAD (2D): Setup, coordinate systems, and drawing tools (lines, circles, polygons). Using modification tools like Move, Copy, Rotate, Scale, Trim, and Extend.
2.	Drawings are to be prepared for the data given using CAD Software, Cross section of Foundation, masonry wall, RCC columns with isolated & combined footings
3.	Different types of bonds in brick masonry.
4.	Different types of staircases – Dog legged, Open well.
5.	Lintel and chajja. RCC slabs and beams.
6.	Cross section of a pavement.
7.	Septic Tank and sedimentation Tank.
8.	Layout plan of Rainwater recharging and harvesting system. Note: Students should sketch to dimension the above in a sketch book before doing the computer drawing.
9.	Drawing of Plan, elevation and sectional elevation including electrical, plumbing and sanitary services using CAD software for Single story residential building.
10.	Drawing of Plan, elevation and sectional elevation including electrical, plumbing and sanitary services using CAD software for Hostel building.
11.	Drawing of Plan, elevation and sectional elevation including electrical, plumbing and sanitary services using CAD software for Hospital building.
12.	Drawing of Plan, elevation and sectional elevation including electrical, plumbing and sanitary services using CAD software for School building.

Course Outcomes: At the end of the course, the students will be able to	
CO1	Prepare, read and interpret the drawings in a professional set up.
CO2	Know the procedures of submission of drawings and Develop working and submission drawings for building.
CO3	Plan and design a residential or public building as per the given requirements.



ASSESSMENT DETAILS BOTH (CIE AND SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Laboratory	Lab Conduction & Record	Evaluating each expt. for 10 marks	20	50
	Laboratory Test -1	50	15	
	Laboratory Test -2	50	15	
SEE	Semester End Examination	100	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

- SEE marks for the practical course are 50 Marks. Practical examinations are to be conducted between the schedules mentioned in the academic calendar of the Institution.
- All laboratory experiments are to be included for practical examination.
- Evaluation of test write-up, conduction procedure, result and viva will be conducted jointly by examiners.
- Rubrics suggested for SEE, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks.
- Change of experiment is allowed only once and 15% of Marks allotted to the Conduction procedure part are to be made zero. The minimum duration of SEE is 03 hours.

CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	3	-	-	-	2	-	-	-	3
CO2	3	2	3	-	-	-	2	-	-	-	3
CO3	3	2	3	-	-	-	2	-	-	-	3

Level3 –High, Level2–Moderate, Level1 -Low



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Semester - V				
Remote Sensing and GIS				
Category: PEC-I				
Course Code	:	B24CV561	CIE	: 50 Marks
Teaching Hours L:T:P:S	:	3:0:0:3	SEE	: 50 Marks
Total Hours	:	45	Total	: 100 Marks
Credits	:	3	SEE Duration	: 3 Hrs

Course Learning Objective is	
1.	To understand concept to f using photographic data to determine relative positions of points.
2.	To study the methods of collection of land data using Terrestrial and Aerial camera.
3.	To analyze the data gathered from various sensors and interpret for various applications.
4.	To apply the principles of RS, GIS and GP Sin various scopes of Civil Engineering.

Module – 1	No. of Hours
Remote Sensing: Definition, types of remote sensing, components of remote sensing, electromagnetic spectrum, Black body, Atmospheric windows, energy interaction with earth surface features. Spectral reflectance curve. Platforms and sensors. Sensor resolutions. Types of satellites- Indian and other remote sensing satellites (IRS, IKON Sand Landsat). Principle of visual interpretation-key elements.	9
Module – 2	No. of Hours
Photogrammetry: Introduction types of Photogrammetry, Advantages Photogrammetry. Introduction to digital Photogrammetry. Aerial Photogrammetry: Advantages over ground survey methods- geometry of vertical photographs, scales of vertical photograph. Ground coordination-relief displacement, scale round coordinates –flight planning.	9
Module – 3	No. of Hours
Geographic Information System: Introduction, Functions and advantages, sources of data for GIS. Database–Types, advantages and disadvantages. Data Analysis. –overlay operations, network analysis, spatial analysis. Output sand map generation. GPS-components and working principles.	9
Module – 4	No. of Hours
Applications of GIS, Remote Sensing and GPS: Water Resources engineering and management (prioritization of river basins, water perspective zones and its mapping), Highway and transportation (highway alignment, Optimization of routes, accident analysis), Environmental Engineering (Geo statistical analysis of water quality, rainfall).	9
Module – 5	No. of Hours
Applications of GIS, Remote sensing and GPS: Urban Planning & Management, urban sprawl, Change detection studies, forests and urban area, agriculture, Disaster Management. Layouts: Dead end, Radial, Gridiron, Circular system.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Understand and remember the principle of Remote Sensing (RS) and Geographical Information Systems (GIS) data acquisition and its applications.
CO2	Apply RS and GIS technologies in various fields of engineering and social needs.
CO3	Analyze and evaluate the information obtained by applying RS and GIS technologies.
CO4	Create a feasible solution in the different fields of application of RS and GIS.

Text Books	
1.	Remote Sensing, Robert A.Schowengerdt, 2009, 3 rd Edition,ElsevierIndiaPvt Ltd,NewDelhi.
2.	RemoteSensingandGIS,BhattaB,2011,OxfordUniversityPress,NewDelhi,ISBN-0198072392

Reference Text Books	
1.	GeographicInformationSystem-AnIntroduction,TorBernharadsen,2009,3rdEdition,WileyIndiaPvt.Ltd. New Delhi,ISBN-9788126511389.
2.	PrinciplesofRemotesensingandImageInterpretation,LillesandandKiefer,2011,6thEdition,JohnWileyPublishers, New Delhi,ISBN– 8126532238.
3.	HigherSurveying,ChandraA.M,2015,3rdEdition,Newageinternational(P)Ltd,ISBN:8122438121



ASSESSMENT DETAILS BOTH (CIE AND SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.

CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	Internal Assessment-1	50	30 (Average of Best two Assessments)	50
	Internal Assessment-2	50		
	Internal Assessment-3	50		
AAT	Two Assessments as per regulations	20	20	
SEE	Semester End Examination	100	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part-A and Part-B.
3. **Part-A** should contain minimum **Two or Four** quiz questions from each module of 02 marks/ 01 marks each. **Part-A is Compulsory** and carries 20 Marks.
4. **Part-B** contains total 10 questions.
5. Two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice.
6. Students should answer five full questions, selecting one full question from each module.
7. Question papers to be set as per the Blooms Taxonomy levels.

CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	2	1	2	-	3	-	2	-	2
CO2	-	2	2	2	2	-		-		-	2
CO3	-	-	2	2	2	-	2	-	2	-	
CO4	-	1	2	2	2	-	2	-	2	2	1

Level 3 - High, Level 2 - Moderate, Level 1 – Low



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Semester -V				
Railways, Harbors, Tunneling and Airports				
Category: PEC-I				
Course Code	:	B24CV562	CIE	: 50 Marks
Teaching Hours L:T:P:S	:	3:0:0:3	SEE	: 50 Marks
Total Hours	:	45	Total	: 100 Marks
Credits	:	3	SEE Duration	: 3 Hrs

Course Learning Objective is	
1.	To Understand the history and development, role of railways, railway planning and development based on essential criteria.
2.	To Learn different types of structural components, engineering properties of the materials, to calculate the material quantities required for construction.
3.	To Understand various aspects of geometrical elements, points and crossings, significance of maintenance of tracks.
4.	To Design and plan airport layout, design facilities required for runway, taxiway and impart knowledge about visual aids
5.	To Apply design features of tunnels, harbours, dock and necessary navigational aids; also expose them to various methods of tunnelling and tunnel accessories.

Module – 1	No. of Hours
Railway Planning: Significance of Road, Rail, Air and Water transports – Coordination of all modes to achieve sustainability – Elements of permanent way, - Rails, Sleepers, Ballast, rail fixtures and fastenings, – Track Stress, coning of wheels, creep in rails, defects in rails Route alignment surveys, conventional and modern methods- – Soil suitability analysis – Geometric design of railways, gradient, super elevation, widening of gauge on curves- Points and Crossings (Explanation & Sketches of Right- and Left-hand turnouts only).	9
Module – 2	No. of Hours
Railway Construction and Maintenance: Earthwork – Stabilization of track on poor soil, Calculation of Materials required for track laying – Construction and maintenance of tracks – Modern methods of construction & maintenance – Railway stations and yards and passenger amenities- Urban rail – Infrastructure for Metro, Mono and underground railways.	9
Module – 3	No. of Hours
Airport Planning: Air transport characteristics, airport classification, airport planning: objectives, components, layout characteristics, and socio-economic characteristics of the catchment area, criteria for airport site selection and ICAO stipulations, typical airport layouts, Parking and circulation area.	9
Module – 4	No. of Hours
Airport Design: Runway Design: Orientation, Wind Rose Diagram, Runway length, Problems on basic and Actual Length, Geometric design of runways, Configuration and Pavement Design Principles, Elements of Taxiway Design, Airport Zones, Passenger Facilities and Services, Runway and Taxiway Markings and lighting.	9
Module – 5	No. of Hours
Harbour and Tunnel Engineering: Definition of Basic Terms: Planning and Design of Harbours: Requirements, Classification, Location and Design Principles – Harbour Layout and Terminal Facilities, Coastal Structures, Inland Water Transport – Wave action on Coastal Structures and Coastal Protection Works. Tunneling: Introduction, size and shape of the tunnel, tunnelling methods in soils, tunnel lining, tunnel drainage and ventilation.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Acquires capability of choosing alignment and also design geometric aspects of railway system, runway and taxiway.
CO2	Suggest and estimate the material quantity required for laying a railway track and also will be able to Determine the hauling capacity of a locomotive.
CO3	Understand various aspects of geometrical elements, points and crossings, significance of maintenance of tracks.
CO4	Develop layout plan of airport and will be able to relate the gained knowledge to identify required type of visual and/or navigational aids for the same.



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CO5	Apply the knowledge gained to conduct surveying, understand the tunnelling and harbours activities.
Text Books	
1.	Saxena, Subhash C. and Satyapal Arora. <i>A Course in Railway Engineering</i> . Dhanpat Rai and Sons, Delhi
2.	Venkatramaiah, C. <i>Transportation Engineering, Volume II: Railways, Airports, Docks and Harbours, Bridges and Tunnels</i> . Universities Press.

Reference Text Books	
1.	Oza.H.P.and Oza.G.H., "A course in Docks & Harbour Engineering". Charotar Publishing Co.,
2.	Mundrey J. S. "A course in Railway Track Engineering". Tata McGraw Hill

ASSESSMENT DETAILS BOTH (CIE AND SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.

CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	Internal Assessment-1	50	30 (Average of Best two Assessments)	50
	Internal Assessment-2	50		
	Internal Assessment-3	50		
AAT	Two Assessments as per regulations	20	20	
SEE	Semester End Examination	100	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

- The question paper shall be set for 100 marks and duration of SEE is 3 hours.
- The question paper will have two parts: Part-A and Part-B.
- Part-A** should contain minimum **Two or Four** quiz questions from each module of 02 marks/ 01 marks each. **Part-A is Compulsory** and carries 20 Marks.
- Part-B** contains total 10 questions.
- Two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice.
- Students should answer five full questions, selecting one full question from each module.
- Question papers to be set as per the Blooms Taxonomy levels.

CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	2	3	-	-	-	-	-	-	2	-
CO2	-	-	2	-	-	2	3	-	2	-	2
CO3	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	2	-	2	-	-	-	-
CO5	-	-	2	-	-	-	-	-	-	-	-

Level 3 - High, Level 2 - Moderate, Level 1 - Low



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Semester - V					
Numerical Methods in Civil Engineering					
Category: PEC - I					
Course Code	:	B24CV563	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	3:0:0:3	SEE	:	50 Marks
Total Hours	:	45	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3 Hrs

Course Learning Objective is	
1.	To introduce numerical methods to solve different types of equations.
2.	To introduce regression and interpolation techniques.
3.	To know various methods of Differentiation & Integration.
4.	To apply the knowledge of these methods to solve practical problems.

Module – 1	No. of Hours
Introduction: a) Errors: Introduction, Types of errors, Rules for estimate errors, Error propagation, Error in the approximation of function. b) Roots of Equation: Bracketing Method: Bisection Method, False position method . Open method: Newton-Raphson's method for Single root, multiple root, Iterative method for Non-linear equations. Roots of polynomial: Muller's Method, limited to TWO Iterations. Initial guesses not to be given.	9
Module – 2	No. of Hours
Linear Algebraic Equation: a. Gauss Elimination Method. Pitfalls and improving techniques. b. LU decomposition method, Gauss-Jacobi and Gauss-Seidel Iteration method	9
Module – 3	No. of Hours
Curve Fitting & Interpolation: a. Least Square Regression – Linear regression, Parabolic regression b. Interpolation–Interpolating polynomial, Lagrange's interpolating polynomial, Divided Difference Formula	9
Module – 4	No. of Hours
Numerical Differentiation and Integration: a. Newton-Cote's Integration of equation: Trapezoidal rule, Simpson's rules. Integration of Equation: Gauss Quadrature methods. b. Numerical differentiation: For Equally spaced Data: Forward difference Formula, Central difference Formula, Backward difference Formula. For unequally spaced Data: Divided difference Formula.	9
Module – 5	No. of Hours
Ordinary Differential Equation: a. Taylor's series method, Picard's Method, Euler's Method, Runge-Kutta 4th Order method b. Boundary value Problem: Finite Difference Method . Eigen value problem: Eigen value problem based on Power method	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Understand and apply various methods to find roots of equations.
CO2	Understand and apply the methods of Regression and interpolation.
CO3	Implement various numerical methods for differentiation and Integration.
CO4	Apply various methods to solve engineering problems with Ordinary differential equations.

Text Books	
1.	"Higher Engineering Mathematics", Dr. B. S. Grewal, Khanna Publishers, New Delhi, 7 th Edition, 2005.
2.	"Numerical Methods", Dr. B.S. Grewal, Khanna Publishers, New Delhi, 7th Edition, 2005.

Reference Text Books	
1.	"Numerical Methods", E Balguruswamy Tata McGraw-Hill Publication Company Ltd. 8 th Edition, 2002.
2.	"Numerical Methods", Dr. P. Kandasamy, Dr. K. Gunavathi, Dr. K. Thilagavathy. S Chand Publication, New Delhi, 2nd Edition, 2006



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3.	“Numerical Methods”, S. Arumugam, A. Thangapandi Isaac and A.Somasundaram, SciTechPublications India Pvt. Ltd. Chennai, 2nd Edition, 2007.
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ASSESSMENT DETAILS BOTH (CIE AND SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.

CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	Internal Assessment-1	50	30 (Average of Best two Assessments)	50
	Internal Assessment-2	50		
	Internal Assessment-3	50		
AAT	Two Assessments as per regulations	20	20	
SEE	Semester End Examination	100	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

- The question paper shall be set for 100 marks and duration of SEE is 3 hours.
- The question paper will have two parts: Part-A and Part-B.
- Part-A** should contain minimum **Two or Four** quiz questions from each module of 02 marks/ 01 marks each. **Part-A is Compulsory** and carries 20 Marks.
- Part-B** contains total 10 questions.
- Two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice.
- Students should answer five full questions, selecting one full question from each module.
- Question papers to be set as per the Blooms Taxonomy levels.

CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	-	-	-	2	3	-	-	2	-	2
CO2	3	-	-	-	2	3	-	-	2	-	2
CO3	3	-	-	-	2	3	-	-	2	-	2
CO4	3	-	-	-	2	3	-	-	2	-	2

Level 3 - High, Level 2 - Moderate, Level 1 - Low



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Semester - V				
Design of Formwork and Scaffolding				
Category: PEC-I				
Course Code	:	B24CV564	CIE	: 50 Marks
Teaching Hours L:T:P:S	:	3:0:0:3	SEE	: 50 Marks
Total Hours	:	45	Total	: 100 Marks
Credits	:	3	SEE Duration	: 3 Hrs

Course Learning Objective is	
1.	To select the appropriate formwork system
2.	To design the formwork system
3.	To compute the bill of quantity for the formwork system
4.	To incorporate safer design and construction aspects including assembling and dismantling
5.	to prevent formwork failures To comprehend plan, layout and detailed drawing for formwork systems

Module – 1	No. of Hours
Introduction to Formwork: Classification, benefits, objectives, areas of competitiveness, selection of Formwork, formwork materials, accessories and consumables, application of Tools. Formwork for Foundation, Wall, Columns, Slab and Beam. Conventional drawings. Vertical Application of Conventional Foundation Formwork, Formwork components, Components, assembly and de-shuttering of formwork System, Flex System, Heavy Duty Tower System, safety of work, Formwork for stairs, Load Bearing Tower.	9
Module – 2	No. of Hours
Planning and Design of formwork: Formwork planning and monitoring, basics of formwork design, design assumptions and design methods. Design of wall formwork, slab formwork and checks. Formwork drawing Concept and Preparation Guidelines, BOQ Calculation and Checklist.	9
Module – 3	No. of Hours
Formwork cost estimation and optimization: Schedule of formwork, Mobilization distribution, BOQ, Quantity Calculation, Cost optimization	9
Module – 4	No. of Hours
Modular and Special formwork, scaffolding: Modular and Special formwork: Advantages and Limitations, Shuttering and de-shuttering, applications, Aluminum formwork - Drawings & Components, Activities, High rise construction, Table lifting system. Scaffolding: Modular scaffold Installation sequence, Tie and material specification, Ladder safety, Loading Classification, application, Components of L&T Modular Scaffolding system, Access scaffold Do's and Don'ts. Innovation and Global practices.	9
Module – 5	No. of Hours
Formwork building and erection, Formwork Failures: Formwork assembly for Wall & Column Panels, Equipment and Layout, Plant and Machinery, Formwork erection and safety, Inspection and Corrections, Plant and Machinery, Code and Contractual Requirements. Formwork Failures: Causes, design deficiency, safety in formwork, prevention of formwork failures.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Analyze the project, and decide appropriate formwork materials and suitable formwork system
CO2	Design formwork systems as per Industrial requirement
CO3	Estimate the bill of quantity and optimize the formwork cost
CO4	Prepare the layout and detailed drawing for the formwork system

Text Books	
1.	Jha, K.N., Formwork for Concrete Structures, First Edition, McGraw Hill. 2012
2.	Robert L. Peurifoy and Garold D. Oberiender, Formwork for Concrete Structures, McGraw-Hill, 1996.

Reference Books	
1.	IS 14687 -Guidelines for false work for concrete structures
2.	Concrete pressure on formwork (R108D) - CIRIA
3.	IS 456: Plain and Reinforced Concrete - Code of Practice



ASSESSMENT DETAILS BOTH (CIE AND SEE)

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CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	Internal Assessment-1	50	30 (Average of Best two Assessments)	50
	Internal Assessment-2	50		
	Internal Assessment-3	50		
AAT	Two Assessments as per regulations	20	20	
SEE	Semester End Examination	100	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part-A and Part-B.
3. **Part-A** should contain minimum **Two or Four** quiz questions from each module of 02 marks/ 01 marks each. **Part-A is Compulsory** and carries 20 Marks.
4. **Part-B** contains total 10 questions.
5. Two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice.
6. Students should answer five full questions, selecting one full question from each module.
7. Question papers to be set as per the Blooms Taxonomy levels.

CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	1	2	-	-	-	-	-	-	-	-
CO2	3	3	2	2	1	-	-	-	-	-	-
CO3	2	1	1	1	1	-	1	-	-	-	-
CO4	2	2	3	1	2	-	-	-	-	-	-

Level 3 - High, Level 2 - Moderate, Level 1 - Low



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Semester- V					
Basics of AutoCAD 3D					
Category: AEC-V					
Course Code	:	B24CV581	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	0:0:2:0	SEE	:	50 Marks
Total Hours	:	30	Total	:	100 Marks
Credits	:	1	SEE Duration	:	3 Hrs

Course Learning Objective is	
1.	To Discover basic interface
2.	To Navigation in 3D within AutoCAD
3.	To Creation of 3D solids

Sl. No.	List of the experiment
1.	Basic Primitives: Create a table with a box (top)
2.	Create a table with a cylinder (legs).
3.	2D to 3D House Plan: Convert a 2D floor plan into a 3D model using Extrude and Presspull.
4.	2D to 3D -Create Door & Window Openings
5.	Water Tank Model: Model a cylindrical water tank with a conical or spherical top using Union
6.	Model a cylindrical water tank with a conical or spherical top using Revolve
7.	Model a cylindrical water tank with a conical or spherical top using Loft
8.	Simple Mechanical Part: Create a gear or a bolt using Revolve and Subtract
9.	Basic Interior Scene: Model simple furniture (sofa, table) and apply basic materials and lights
10.	Rendering: Add materials, adjust lighting

Course Outcomes: At the end of the course, the students will be able to	
CO1	Discover basic interface
CO2	Navigation in 3D within AutoCAD
CO3	Creation of 3D solids

ASSESSMENT DETAILS BOTH (CIE AND SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.



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CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Laboratory	Lab Conduction & Record	Evaluating each expt. for 10 marks	20	50
	Laboratory Test -1	50	15	
	Laboratory Test -2	50	15	
SEE	Semester End Examination	100	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

1. SEE marks for the practical course are 50 Marks. Practical examinations are to be conducted between the schedules mentioned in the academic calendar of the Institution.
2. All laboratory experiments are to be included for practical examination.
3. Evaluation of test write-up, conduction procedure, result and viva will be conducted jointly by examiners.
4. Rubrics suggested for SEE, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks.
5. Change of experiment is allowed only once and 15% of Marks allotted to the Conduction procedure part are to be made zero. The minimum duration of SEE is 03 hours.

CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	-	-	2	-	-	-	-	-	-	3
CO2	-	-	-	-	-	-	1	-	-	-	-
CO3	-	2	-	-	-	-	-	-	-	-	2

Level3 –High, Level2–Moderate, Level1 -Low



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Semester-V					
Basics of 3DS MAX					
Category: AEC-V					
Course Code	:	B24CV582	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	0:0:2:0	SEE	:	50 Marks
Total Hours	:	30	Total	:	100 Marks
Credits	:	1	SEE Duration	:	3 Hrs

Course Learning Objective is	
1.	To develop proficiency in Autodesk 3ds Max tools and techniques.
2.	To master 3D modeling for products, environments, architecture, and characters.
3.	To create realistic textures, lighting setups, and materials for high-quality outputs

Sl. No.	Title of the program / list of the experiment
1.	Touring the 3ds Max Interface: Viewports, Command Panel, and Toolbar customization.
2.	Setting System Units to Metric/Imperial and establishing project folders for civil data.
3.	Navigating 3D space using ViewCube and SteeringWheels.
4.	Creating Basic Geometric Shapes: Standard Primitives (Box, Cylinder) to model simple structural elements.
5.	Using Extended Primitives: Modeling chamfered beams, railings, and pipes (ChamferBox, Hose).
6.	Spline Modeling & Editing: Drawing 2D site layouts using lines and converting them to 3D surfaces.
7.	Lofting & Lathe Techniques: Creating complex profiles like tunnels, pipes, or ornamental columns along a path.
8.	Modifiers in Modeling: Applying Bend, Twist, and Taper modifiers to structural elements.
9.	Importing CAD Data: Importing 2D AutoCAD plans and 3D Civil 3D data into 3ds Max.
10.	Civil View Setup: Using the Civil View plugin to import surface, alignment, and feature line data.
11.	Parametric Road Modeling: Creating road surfaces, curbs, and sidewalks from Civil 3D alignments.
12.	Infrastructure Populating: Placing street lights, traffic signs, and gantries using the Civil View Object Placement tool.

Course Outcomes: At the end of the course, the students will be able to	
CO1	Develop proficiency in Autodesk 3ds Max tools and techniques.
CO2	Master 3D modeling for products, environments, architecture, and characters.
CO3	Create realistic textures, lighting setups, and materials for high-quality outputs

ASSESSMENT DETAILS BOTH (CIE AND SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.



CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Laboratory	Lab Conduction & Record	Evaluating each expt. for 10 marks	20	50
	Laboratory Test -1	50	15	
	Laboratory Test -2	50	15	
SEE	Semester End Examination	100	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

1. SEE marks for the practical course are 50 Marks. Practical examinations are to be conducted between the schedules mentioned in the academic calendar of the Institution.
2. All laboratory experiments are to be included for practical examination.
3. Evaluation of test write-up, conduction procedure, result and viva will be conducted jointly by examiners.
4. Rubrics suggested for SEE, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks.
5. Change of experiment is allowed only once and 15% of Marks allotted to the Conduction procedure part are to be made zero. The minimum duration of SEE is 03 hours.

CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	-	-	2	-	-	-	-	-	-	3
CO2	-	-	-	-	-	-	1	-	-	-	-
CO3	-	2	-	-	-	-	-	-	-	-	2

Level3 –High, Level2–Moderate, Level1 -Low



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Semester-V					
Basics GIS for Civil Engineers					
Category: AEC-V					
Course Code	:	B24CV583	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	0:0:2:0	SEE	:	50 Marks
Total Hours	:	30	Total	:	100 Marks
Credits	:	1	SEE Duration	:	3 Hrs

Course Learning Objective is	
1.	To Learn to create, edit, and structure spatial data (vector/raster), including digitization, georeferencing, and data integration from various sources.
2.	To Develop hands-on skills using industry-standard GIS software (e.g., ArcGIS Pro, QGIS) and its extensions (Spatial Analyst, Network Analyst).
3.	To Apply GIS concepts to solve complex spatial decision-making problems and interpret analysis results

Sl. No.	List of the experiment
1.	Familiarization with GIS Software & Interface: Introduction to GIS software (e.g., QGIS or ArcGIS), navigation, and data loading.
2.	Data Input and Data Formats: Importing vector (shapefiles) and raster data, understanding coordinate systems.
3.	Geo-Referencing and Projections: Assigning spatial reference (geo-referencing) to scanned maps or aerial images and setting projections.
4.	Digitization of Maps/Toposheets: Creating vector layers (points, lines, polygons) by digitizing scanned toposheets or base maps.
5.	Topology Creation and Editing: Establishing spatial relationships (connectivity, adjacency) between digitized features.
6.	Adding Attribute Data: Creating attribute tables, adding fields, and entering data for digitized features.
7.	Data Querying and Selection: Performing attribute queries (SQL queries) and spatial queries (e.g., Select by Location).
8.	Base Map Preparation: Creating a thematic map with features like roads, rivers, and land use for a specific region.
9.	Vector Analysis: Performing vector-based spatial analysis such as buffering, intersection, and union.
10.	Raster Analysis: Performing raster-based analysis (e.g., Map Algebra, reclassification).
11.	Digital Elevation Model (DEM) Development: Creating a 3D model (DEM) from contour data or GPS points to represent terrain.
12.	GIS Applications in Civil Engineering: Practical exercises, such as finding the shortest path (Transportation) or delineating a watershed.

Course Outcomes: At the end of the course, the students will be able to	
CO1	Learn to create, edit, and structure spatial data (vector/raster), including digitization, georeferencing, and data integration from various sources.
CO2	Develop hands-on skills using industry-standard GIS software (e.g., ArcGIS Pro, QGIS) and its extensions (Spatial Analyst, Network Analyst).
CO3	Apply GIS concepts to solve complex spatial decision-making problems and interpret analysis results



ASSESSMENT DETAILS BOTH (CIE AND SEE)

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A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Laboratory	Lab Conduction & Record	Evaluating each expt. for 10 marks	20	50
	Laboratory Test -1	50	15	
	Laboratory Test -2	50	15	
SEE	Semester End Examination	100	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

1. SEE marks for the practical course are 50 Marks. Practical examinations are to be conducted between the schedules mentioned in the academic calendar of the Institution.
2. All laboratory experiments are to be included for practical examination.
3. Evaluation of test write-up, conduction procedure, result and viva will be conducted jointly by examiners.
4. Rubrics suggested for SEE, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks.
5. Change of experiment is allowed only once and 15% of Marks allotted to the Conduction procedure part are to be made zero. The minimum duration of SEE is 03 hours.

CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	-	-	2	-	-	-	-	-	-	3
CO2	-	-	-	-	-	-	1	-	-	-	-
CO3	-	2	-	-	-	-	-	-	-	-	2

Level3 –High, Level2–Moderate, Level1 -Low



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Semester-V					
Revit Architecture					
Category: AEC-V					
Course Code	:	B24CV584	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	0:0:2:0	SEE	:	50 Marks
Total Hours	:	30	Total	:	100 Marks
Credits	:	1	SEE Duration	:	3 Hrs

Course Learning Objective is	
1.	To Understand the concept of Building Information Modelling
2.	To Create the workflow followed in industry during creation of BIM 3D model which includes
3.	To Building the discipline-based model and create the federated models

Sl. No.	List of the experiment
1.	Introduction Building Information Modelling
2.	Revit Projects: Project Templates, Revit File Types Working with Revit Elements and Families Exploring the User Interface Starting a Project
3.	Setting Up Levels and Grids (Datum Planes) Setting up Levels & Modifying Creating Grids
4.	Modelling Walls Creating Walls Modify wall types
5.	Working with Doors and Windows Loading Door and Window Types from the Library Creating Additional Door and Window Sizes
6.	Using Editing Tools & Working with Views: Using Editing Commands Setting the view display
7.	Visibility Graphics, Duplicate Views Elevations & Sections
8.	Adding Callout Views Creating and Modifying 3D Views
9.	Modelling Floors Creating and Modifying Floors
10.	Modelling Stairs, Railings, and Ramps Creating
11.	Modifying Stairs Working with Railings Sketching Custom Stairs Creating Ramps
12.	Modelling Roofs Creating Roofs by Footprint Using Join & un join roof

Course Outcomes: At the end of the course, the students will be able to	
CO1	Prepare, read and interpret the drawings in a professional set up.
CO2	Know the procedures of submission of drawings and Develop working and submission drawings for building.
CO3	Plan of residential or public building as per the given requirements with details

ASSESSMENT DETAILS BOTH (CIE AND SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.



CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Laboratory	Lab Conduction & Record	Evaluating each expt. for 10 marks	20	50
	Laboratory Test -1	50	15	
	Laboratory Test -2	50	15	
SEE	Semester End Examination	100	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

1. SEE marks for the practical course are 50 Marks. Practical examinations are to be conducted between the schedules mentioned in the academic calendar of the Institution.
2. All laboratory experiments are to be included for practical examination.
3. Evaluation of test write-up, conduction procedure, result and viva will be conducted jointly by examiners.
4. Rubrics suggested for SEE, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks.
5. Change of experiment is allowed only once and 15% of Marks allotted to the Conduction procedure part are to be made zero. The minimum duration of SEE is 03 hours.

CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	-	-	2	-	-	-	-	-	-	3
CO2	-	-	-	-	-	-	1	-	-	-	-
CO3	-	2	-	-	-	-	-	-	-	-	2

Level3 –High, Level2–Moderate, Level1 -Low



Semester -V				
Mini - Project				
Category: SDC				
Course Code	:	B24CVP511	CIE	: 50 Marks
Teaching Hours L:T:P:S	:	0:0:4:0	SEE	: 50 Marks
Total Hours	:	60	Total	: 100 Marks
Credits	:	2	SEE Duration	: 3 Hrs

Mini-Project Work Evaluation:

Mini Project is a hands on course that will provide a platform to students to enhance their practical knowledge and skills by the development of small applications etc. Based on the ability/abilities of the student/s and recommendations of the supervisor, a single discipline or a multidisciplinary Mini- project can be assigned to an individual student or to a group having not more than 4 students.

CIE procedure for Mini-project: (i) Single discipline: The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two faculty members of the Department, one of them being the Guide. The CIE marks awarded for the Mini-project work shall be based on the evaluation of the **Project Reviews, Project report and Viva-Voce in the ratio of 60:20:20**. The marks awarded for the project report shall be the same for all the batches mates.

(ii) Interdisciplinary: Continuous Internal Evaluation shall be group-wise at the college level with the participation of all the guides of the project.

CIE Evaluation: The CIE marks awarded for the Mini-project, shall be based on the evaluation of the **Project Reviews, Project report and Viva-Voce in the ratio of 60:20:20**. The marks awarded for the project report shall be the same for all the batches mates.

SEE Evaluation: SEE for project work will be conducted by the two examiners appointed by the Principal / CoE. The SEE marks awarded for the project work shall be based on the evaluation of **Write-up, Presentation Skills, Project Demonstration and Viva-Voce** in the ratio of 20:60:20

Rubrics for Mini-Project

Sl. No	Criteria	Scale of Assessment		
		Satisfactory (0-5)	Good (6-8)	Excellent (9-10)
1	Objective, Existing method with proposed method	Incomplete justification to the objectives proposed; Steps are mentioned but unclear; without justification to objectives	Good justification to the objectives; Methodology to be followed is specified but detailing is not done	All objectives of the proposed work are well defined. Steps to be followed to solve the defined problem are clearly specified.
2	Analysis/Description of the project	Incomplete explanation of the key concepts and insufficient description of the technical requirements of the project	Complete explanation of the key concepts but insufficient description of the technical requirements of the project	Complete explanation of the key concepts and strong description of the technical requirements of the project
3	Result Analysis	All defined objectives are achieved.	All defined objectives are achieved.	All defined objectives are achieved.



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		• Modules are working well in isolation and properly demonstrated • Modules of project are not properly integrated.	• Each module working well and properly demonstrated. • Integration of all modules not done and system working is not very satisfactory.	• Each module working well and properly demonstrated • All modules of project are well integrated and system working is accurate
4	Project Report	• Project report is according to the specified format but some mistakes. • In-sufficient references	• 1. Project report is according to the specified format. • References are appropriate but not mentioned well.	• Project report is according to the specified Format. • References are appropriate and well mentioned
5	Queries	Lacks sufficient knowledge and awareness	Fair knowledge and awareness related to the project.	Extensive knowledge and awareness related to the project



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Semester - VI					
Natural Disaster Management					
Category: PCC					
Course Code	:	B24CV601	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	2:2:0:2	SEE	:	50 Marks
Total Hours	:	55	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3 Hrs

Course Learning Objective is	
1.	To understand concepts of hazards, vulnerability, risk, and disaster types.
2.	To develop skills to manage the four phases: Mitigation, Preparedness, Response, and Recovery.
3.	To analyze risks and formulate strategies to reduce vulnerability.
4.	To learn techniques for, search, rescue, evacuation, and community-based disaster management.
5.	To understand legal frameworks, institutional arrangements, and disaster management acts.

Module – 1	No. of Hours
Introduction: Disasters, causes and impacts, scope of disaster management, disaster Managers-professionals and specialists active in various phases of disasters, Risk management, preparedness, operational functions of disaster management, Resource management, impact reduction.	11
Module – 2	No. of Hours
Disasters: Natural disasters - Drought, Floods, Flash flood, Earth Quake, Volcanoes, Land Slides, Cyclones, Tsunami; Manmade - Air accidents, Rail and Road accidents, Industrial, Chemical, Biological (Bioterrorism) nuclear Disasters, accidental oil spills and other types of Disasters.	11
Module – 3	No. of Hours
Vulnerability Assessment and Disaster Preparedness: Vulnerability assessment (VA). Importance and advantages, Process of VA, Steps in VA, Report, Prioritization, Emergency Response Plan (ERP).	11
Module – 4	No. of Hours
Pre disaster Planning: Earthquakes, cyclones, epidemics outbreak, drought and famine. Disaster resistant constructions, rehabilitation and reconstruction. Coping mechanism and relief assistance, disaster management continuum, Early warning and management, Global Disaster alerting and coordination system (GDACS), Flood forecasting, flood control systems.	11
Module – 5	No. of Hours
Disaster Response Planning, Preparedness and Mitigation: Earthquake, Cyclone, Landslide, Flood preparedness and response. NDMA act 2005, National Disaster Management Policy, Disaster Management Plans (DMP), Guidelines. Information Technology in Disaster Management: Application of GIS and Remote sensing for Disaster Management, Simulation studies. Use of Unmanned aerial vehicles (UAVs) in disaster management and monitoring.	11

Course Outcomes: At the end of the course, the students will be able to	
CO1	State and classify disasters and identify the cause- effect relationships.
CO2	Apply the knowledge of vulnerability assessment for pre-planning, early warning systems and response plan. Prepare on-site and off-site ERPs.
CO3	Recognize the role of IT in creating vulnerability scenarios through simulation exercises using GIS and other related software and prepare Disaster and Environmental Management Plans.
CO4	Consolidate the information on National policy on disaster management along with required legal framework for effective mitigation.
CO5	Comprehend the lessons learnt from different natural and manmade disasters leading to newer initiatives



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	for forecasting, planning and mitigation.
Text Books	
1.	Trim, P.R.J. (2004), "An integrative approach to disaster management and planning", Disaster Prevention and Management, Vol. 13 No. 3, pp. 218- 225.
2.	R Subramanian, "Disaster Management", Vikas Publishing House, 2018.

Reference Text Books	
1.	S Vaidyanathan, "An Introduction to Disaster Management", CBS Publishers & Distributors, Latest edition.
2.	National Research Council, "Improving Disaster Management: The Role of IT in Mitigation, Preparedness, Response, and Recovery", Washington, DC: The National Academies Press, 2007.
3.	National Research Council, "Facing Hazards and Disasters: Understanding Human Dimensions. Washington, DC: The National Academies Press, 2006.

ASSESSMENT DETAILS BOTH (CIE AND SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.

CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	Internal Assessment-1	50	30 (Average of Best two Assessments)	50
	Internal Assessment-2	50		
	Internal Assessment-3	50		
AAT	Two Assessments as per regulations	20	20	
SEE	Semester End Examination	100	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part-A and Part-B.
3. **Part-A** should contain minimum **Two or Four** quiz questions from each module of 02 marks/ 01 marks each. **Part-A is Compulsory** and carries 20 Marks.
4. **Part-B** contains total 10 questions.
5. Two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice.
6. Students should answer five full questions, selecting one full question from each module.
7. Question papers to be set as per the Blooms Taxonomy levels.



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CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	2	-	-	-	2	-	-	-	2	1
CO2	1	2	2	-	-	2	-	-	2	2	2
CO3	2	1	1	2	-	-	-	2	1	1	-
CO4	2	3	1	2	2	-	-	2	2	1	-
CO5	2	1	1	1	2	-	-	2	2	2	-

Level 3 - High, Level 2 - Moderate, Level 1 - Low



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Semester- VI					
Geotechnical Engineering					
Category: IPCC					
Course Code	:	B24CV602	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	3:0:2:3	SEE	:	50 Marks
Total Hours	:	45+30	Total	:	100 Marks
Credits	:	4	SEE Duration	:	3 Hrs

Course Learning Objective	
1.	To appreciate basic concepts of soil mechanics as an integral part in the knowledge of civil engineering.
2.	Comprehend basic engineering and mechanical properties of different types of soil
3.	To become broadly familiar with geotechnical engineering problems such as, flow of water through soil medium and terminologies associated with geotechnical engineering.
4.	To assess the improvement in mechanical behavior by densification of soil deposits using compaction.
5.	To model and measure strength-deformation characteristics and bearing capacity of soils

Module – 1	No. of Hours
Introduction: Phase Diagram, phase relationships, definitions and their inter relationships. Determination of Index properties: Specific gravity, water content, in-situ density, relative density, particle size analysis, Atterberg's Limits, consistency indices. Activity of clay, Field identification of soils, Plasticity chart, BIS soil classification.	9
Module – 2	No. of Hours
Permeability: Darcy's law- assumption, coefficient of permeability and its determination in laboratory, factors affecting permeability, permeability of stratified soils, Seepage velocity, Superficial velocity and coefficient of percolation Effective Stress Geostatic stresses, Effective stress concept-total stress, effective stress and Neutral stress and impact of the effective stress in construction of structures, quick sand phenomena.	9
Module – 3	No. of Hours
Compaction: Principle of compaction, Standard and Modified proctor's compaction tests, factors affecting compaction, effect of compaction on soil properties. Consolidation: Definition, Mass-spring analogy, Terzaghi's one dimensional consolidation theory-assumption, Consolidation characteristics of soil (C_c , a_v , m_v and C_v). Laboratory one dimensional consolidation test, characteristics of e -log (σ') curve, Pre-consolidation pressure and its determination by Casagrande's method. Over consolidation ratio.	9
Module – 4	No. of Hours
Shear Strength: Concept of shear strength, Mohr-Coulomb Failure Criterion, Total and effective shear strength parameters, factors affecting shear strength of soils. Thixotrophy and sensitivity, Measurement of shear strength parameters - Direct shear test, unconfined compression test, triaxial compression test, Tests under different drainage conditions.	9
Module – 5	No. of Hours
Bearing Capacity of Soil: Determination of bearing capacity by Terzaghi's and BIS method (IS:6403), Modes of shear failure, Factors affecting Bearing capacity of soil. Effects of water table and eccentricity on bearing capacity of soil. Foundation Settlement: Types of settlements and importance, Computation of Immediate, consolidation and creep settlements, permissible, differential and total settlements.	9



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Course Outcomes: At the end of the course, the students will be able to	
CO1	Determine the index properties of soil and hence classify the soil
CO2	Assess the compaction and consolidation characteristics of soil
CO3	Determine the permeability of soils and assess the seepage in hydraulic structures
CO4	Evaluate shear parameters of the soil using shear tests
CO5	Ability to determine bearing capacity of soil and achieve proficiency in proportioning shallow isolated and combined footings for uniform bearing pressure

LABORATORY

Practical Component of IPCC (12 Experiments)

Sl. No	Name of the experiments
1.	Specific gravity test(pycnometer and density bottle method).Water content determination by oven drying method
2.	Grain Size Analysis Sieve Analysis
3.	In-situ density tests Core-cutter method Sand replacement method
4.	In-situ density tests Sand replacement method
5.	Consistency limits Liquid limit test (by casagrande's and cone penetration method) Plastic limit test
6.	Standard compaction test(light and heavy compaction)
7.	Co-efficient of permeability test Constant head test
8.	Co-efficient of permeability test Variable head test
9.	Shear strength tests Unconfined compression test (unconsolidated undrained test only)
10.	Shear strength tests Direct shear test (unconsolidated undrained test only)
11.	Shear strength tests Triaxial test (unconsolidated undrained test only)
12.	Consolidation test: to determine preconsolidation pressure only (half an hour perloadingtest).

Web links and Video lectures (e-Resources):

Online study material
NPTEL video lectures

ASSESSMENT DETAILS BOTH (CIE AND SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.



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CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	Internal Assessment-1	50	30 (Average of Best Two Assessments)	50/2 = 25
	Internal Assessment-2	50		
	Internal Assessment-3	50		
AAT	Any One Assessments as per regulations	20	20	
Laboratory	Lab conduction & Record	Evaluating each expt. for 10 marks.	05	25
	Internal Test	50	20	
Total Marks				50
SEE	Semester End Examination	100	50	50
Total marks				100

SEMESTER END EXAMINATION (SEE)

- The question paper shall be set for 100 marks and duration of SEE is 3 hours.
- The question paper will have two parts: Part-A and Part-B.
- Part-A** should contain minimum **Two or Four** quiz questions from each module of 02 marks/ 01 marks each. **Part-A is Compulsory** and carries 20 Marks.
- Part-B** contains total 10 questions. Two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module.
- Students have to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
- The maximum marks from the practical component to be included in the SEE question paper is **16 marks**.
- Question papers to be set as per the Blooms Taxonomy levels.
- The laboratory component of the **integrated course** shall be CIE only. However, in SEE, the questions from the practical component shall be included.

CO-PO Mapping

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	-	-	-	-	-	-	-	-	-	-
CO2	2	-	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-
CO4	2	3	-	-	-	-	-	-	-	-	1
CO5	2	3	-	-	-	-	-	-	-	-	1

Level 3 - High, Level 2 - Moderate, Level 1 - Low



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Semester - VI					
Design of Bridges					
Category: PEC-II					
Course Code	:	B24CV631	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	3:0:0:3	SEE	:	50 Marks
Total Hours	:	45	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3 Hrs

Course Learning Objective is	
1.	To introduce students to various aspects of Bridge structures, its components.
2.	To understand the hydraulic design concepts of Bridges, various IRC loading standards.
3.	To design small span bridges like culverts, slab decks, and T-beam decks and post tensioned ☐ slabs. ☐
4.	To understand various types of bearings, analysis of substructures, and foundations.
5.	To understand super structure construction methods and practices.

Module – 1	No. of Hours
Introduction and Conceptual Design of Bridges: Introduction, components of a bridge and their functions, Site investigations prior to bridge construction, classification of bridges, IRC loading standards, IRC A, AA, and 70 R. Hydraulic design of bridges, natural and artificial water ways, afflux, Economical span, problems.	9
Module – 2	No. of Hours
Pipe culverts. Hydraulic design and structural design: IRC standards. Design problems. Design of Box culverts, general procedure of design for all the conditions of culvert , reinforcement details, Design example (students should be given to design the culvert for any one condition of loading)	9
Module – 3	No. of Hours
Design of Deck slab (Limit state method): Introduction, Design of deck slab. Effective dispersion of wheel load along the span and effective width concept, Arrangement of wheel loads of IRC A for obtaining maximum bending moment and shear force. Design example, Arrangement of IRC class AA obtaining maximum bending moment and shear force. Design example. Arrangement of IRC 70R loading for obtaining maximum bending moment and shear force. Design example.	9
Module – 4	No. of Hours
Introduction to T-beam bridges: Code provisions, Balanced Cantilever Beam, typical arrangement of longitudinal and cross girders, Pigeaud's method, design of interior panel (for IRC class AA & 70R), methods for finding load distribution among longitudinal girders (Courbon's, HednryJaguer's method), general steps of design (only design concepts).	9
Module – 5	No. of Hours
Bridge substructures, abutments and Piers: Types of abutments and piers, stability analysis of piers and abutments, base pressure distribution. Bridge bearings, types and their suitability.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Select the type of the bridge based on the site investigation inputs and be able to compute design discharge, linear water way, economic span and depth of scour.
CO2	Design pipe culverts.
CO3	Design deck slabs for critical loads.
CO4	Analyze the stability of bridge piers and abutments.
CO5	Recommend suitable bearings for the given type of bridge and support condition.



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Text Books	
1.	D. Johnson Victor, Essentials of Bridge Engineering, 6 th edition, Oxford IBH publications, New Delhi, 2019 ,ISBN:978-81-204-1717-5
2.	T.R.Jagadeesh& M A Jayaram, Design of Bridge Structures, 3 rd edition, PHI, New Delhi, 2020, ISBN:978-81-203-3385-29

Reference Text Books	
1.	Krishna Raju N, Design of Bridges, Oxford-IBH publishing, 5 th edition, New Delhi
2.	Rajagopalan, Bridge Super Structures, Narosa Publishing House, 2013, ISBN :817-31-964-78
3.	IRC : 112- 2020: Code of Practice for Concrete Bridges, July 2020, New Delhi

ASSESSMENT DETAILS BOTH (CIE AND SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.

CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	Internal Assessment-1	50	30 (Average of Best two Assessments)	50
	Internal Assessment-2	50		
	Internal Assessment-3	50		
AAT	Two Assessments as per regulations	20	20	
SEE	Semester End Examination	100	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part-A and Part-B.
3. **Part-A** should contain minimum **Two or Four** quiz questions from each module of 02 marks/ 01 marks each. **Part-A is Compulsory** and carries 20 Marks.
4. **Part-B** contains total 10 questions.
5. Two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice.
6. Students should answer five full questions, selecting one full question from each module.
7. Question papers to be set as per the Blooms Taxonomy levels.



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CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	2	2	1	1	-	-	-	-	-	-
CO2	2	2	2	2	2	-	-	-	-	-	-
CO3	2	2	2	1	1	-	-	-	-	-	-
CO4	2	2	2	1	1	-	-	-	-	-	-
CO5	1	1	2	2	2	-	-	-	-	-	-

Level 3 - High, Level 2 - Moderate, Level 1 – Low



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Semester - VI					
Solid Waste Management					
Category: PEC-II					
Course Code	:	B24CV632	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	3:0:0:3	SEE	:	50 Marks
Total Hours	:	45	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3 Hrs

Course Learning Objective is	
1.	To provide detailed knowledge and skills in the management, treatment, disposal and recycling options for solid wastes, while focusing on key engineering and technical aspects involved.
2.	To understanding of the basic principles of waste and resource management will be supplemented, where appropriate, by practical problem-solving exercises in the context of civil engineering.
3.	To conceive the design aspects of engineered disposal options and apply the gained knowledge

Module – 1	No. of Hours
Introduction: Functional elements of municipal solid waste (MSW) management system, Sources: Sources of Solid waste, Types of solid waste, Physical and Chemical composition of municipal solid waste. Generation rate, Numerical Problems. Environmental implications of open dumping of MSW, Construction debris – management & handling. Rag pickers and their role, Solid waste management 2000 rules with 2016 amendments.	9
Module – 2	No. of Hours
Collection: Collection of solid waste- services and systems Haul and stationary container system numericals, equipments, Transportation: Need of transfer operation, transfer station, transport means and methods, route optimization.	9
Module – 3	No. of Hours
Treatment / Processing Techniques: Components separation, volume reduction, size reduction, chemical reduction and biological processing problems. COMPOSTING: Aerobic and anaerobic composting, factors affecting composting, Indore and Bangalore processes, mechanical and semi mechanical composting processes. Vermi composting.	9
Module – 4	No. of Hours
Sanitary Land Filling: Different types, trench area, Ramp and pit method, site selection, basic steps involved, cell design, prevention of site pollution, leachate & gas collection and control methods, geosynthetic fabrics in sanitary land fills. INCINERATION: Process – 3 T's, factors affecting incineration process, incinerators – types, prevention of air pollution, pyrolysis, design criteria for incineration.	9
Module – 5	No. of Hours
Sources, collection, treatment and disposal: Biomedical waste and E-waste, RECYCLE AND REUSE: Material and energy recovery operations, reuse in other industries, plastic wastes, environmental significance and reuse.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Identify improper practices of solid waste disposal and their environmental implications. Know the basic engineering principles of solid waste management
CO2	Describe the need for economics in collection and transportation of solid waste and clearly discuss various types of collection systems and analyze system dynamics
CO3	Understand the management concepts, define 4 R approach, apply PPP model and community



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	involvement for effective management of solid waste
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Text Books	
1.	Tchobanoglous G., Theissen H., and Eliassen R., “Solid Waste Engineering Principles and Management Issues”, McGraw Hill, New York. Pavoni J.L., “Handbook of Solid Waste Disposal”
2.	Peavy, Rowe and Tchobanoglous, “Environmental Engineering”, McGraw Hill.

Reference Text Books	
1.	Mantell C.L., (1975), “Solid Waste Management”, John Wiley

ASSESSMENT DETAILS BOTH (CIE AND SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.

CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	Internal Assessment-1	50	30 (Average of Best two Assessments)	50
	Internal Assessment-2	50		
	Internal Assessment-3	50		
AAT	Two Assessments as per regulations	20	20	
SEE	Semester End Examination	100	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

- The question paper shall be set for 100 marks and duration of SEE is 3 hours.
- The question paper will have two parts: Part-A and Part-B.
- Part-A** should contain minimum **Two or Four** quiz questions from each module of 02 marks/ 01 marks each. **Part-A is Compulsory** and carries 20 Marks.
- Part-B** contains total 10 questions.
- Two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice.
- Students should answer five full questions, selecting one full question from each module.
- Question papers to be set as per the Blooms Taxonomy levels.

CO-PO Mapping

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	-	3	-	-	-	-	3	-	1
CO2	-	-	-	3	-	-	-	-	3	-	1
CO3	-	-	-	3	-	-	-	-	3	-	1

Level 3 - High, Level 2 - Moderate, Level 1 - Low



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Semester -VI					
Materials and Construction of Highway Pavements					
Category: PEC-II					
Course Code	:	B24CV633	CIE	:	50 Marks
Teaching Hours L : T : P : S	:	3:0:0:3	SEE	:	50 Marks
Total Hours	:	45	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3 Hrs

Course Learning Objective is	
1.	To expose students to different materials which are used in pavement construction, impart knowledge about the engineering properties required.
2.	To train students to perform various types of bituminous mix designs as per the guidelines (MORTH).
3.	To get knowledge about different highway construction equipment with their suitability and adaptability in various field scenarios
4.	To expose students to construction practice and quality control aspects of embankment, flexible and rigid pavement as per the required specifications (MORTH).
5.	To introduce students to possible improvisation in various layers of pavement to increase the structural strength by the use of non-basic materials (DLC, polythene sheets).

Module – 1	No. of Hours
Aggregates- Origin, Classification, Requirements, properties and tests on Road aggregates, Concepts of size and gradation- design gradation, maximum aggregate size, aggregate blending by different methods to meet specification. Bituminous Binders- Origin, Preparation, Properties and Chemical Constitution of bituminous road binders, Requirements. Bituminous emulsion and Cutbacks- Preparation, Characteristics, uses and test. Adhesion of bitumen binders to road aggregates, Adhesion failure, Mechanism of stripping, tests and methods of improving adhesion.	9
Module – 2	No. of Hours
Bituminous mixes: Mechanical properties, dense and open textured mixes, flexibility and brittleness, (NoHveemstabilometer and Hubbard- field tests) bituminous mixes, Design methods using Rothfutch's method only and specification, Marshall mix design, volumetric properties, Problems on above.	9
Module – 3	No. of Hours
Cement and Cement concrete: Material requirement for DLC and PQC, Admixtures, Temp Reinforcement, materials for joints construction, Fibers Recycled and Alternate Materials – Use of RAP, RCA, Fly ash, Blast furnace Slag, waste plastic, etc. in sustainable pavement construction	9
Module – 4	No. of Hours
Equipment in highway construction: Various types of equipment for excavation, grading and compaction their working principles, advantages and limitations. Special equipment for bituminous and cement concrete pavement and stabilized soil road construction. Sub grade: Earthwork grading and Construction of embankments and cuts for roads, Preparation of subgrade, quality control tests	9
Module – 5	No. of Hours
Flexible Pavements: Specifications of materials, Construction method and field control checks for various types of flexible pavement layers.	9



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Cement Concrete Pavements: Specifications and method of cement concrete pavement construction (PQC, DLC, White topping, Quality control tests, Construction of various types of joints).	
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Course Outcomes: At the end of the course, the students will be able to	
CO1	Evaluate and assess the suitability of any pavement material to be used in various components of pavement by conducting required tests as per IS, IRC specifications
CO2	Formulate the proportions of different sizes of aggregates to suit gradation criteria for various mixes as per MORTH and also design bituminous mixes
CO3	Improvisation in various layers of pavement to increase the structural strength by the use of non-basic materials (DLC, polythene sheets).
CO4	Competent to adapt suitable modern technique and equipment for speedy and economic construction.
CO5	Execute the construction of embankment, flexible, rigid pavement and perform required quality control tests at different stages of pavement construction

Text Books	
1.	Highway Engineering- Khanna, S.K., and Justo, C.E.G.: Nem Chand and Bros. Roorkee.
2.	Construction Equipment and its Management- Sharma, S.C.: Khanna Publishers.

Reference Text Books	
1.	Hot Mix Asphalt Materials, Mixture Design and Construction- Freddy L. Roberts, Kandhal, P.S: University of Texas Austin, Texas. NAPA Education Foundation Lanham, Maryland.
2.	RRL, DSIR, 'Soil Mechanics for Road Engineers', HMSO Publication.
3.	RRL, DSIR, 'Bituminous Materials in Road Construction', HMSO Publication.

ASSESSMENT DETAILS BOTH (CIE AND SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.

CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	Internal Assessment-1	50	30 (Average of Best two Assessments)	50
	Internal Assessment-2	50		
	Internal Assessment-3	50		
AAT	Two Assessments as per regulations	20	20	
SEE	Semester End Examination	100	50	50
Total Marks				100



SEMESTER END EXAMINATION (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part-A and Part-B.
3. **Part-A** should contain minimum **Two or Four** quiz questions from each module of 02 marks/ 01 marks each. **Part-A is Compulsory** and carries 20 Marks.
4. **Part-B** contains total 10 questions.
5. Two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice.
6. Students should answer five full questions, selecting one full question from each module.
7. Question papers to be set as per the Blooms Taxonomy levels.

CO-PO Mapping

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3		2	-	-	-	-	-	-	2	1
CO2	2	2	-	2	-	1	-	-	2	-	-
CO3	-	-	-	-	2	-	2	-	-	-	2
CO4	1	-	-	3	-	-	-	-	-	1	-
CO5	-	-	2	-	-	-	-	-	-	-	1

Level 3 - High, Level 2 - Moderate, Level 1 - Low



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Semester - VI					
Open Channel Hydraulics					
Category: PEC-II					
Course Code	:	B24CV634	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	3:0:0:3	SEE	:	50 Marks
Total Hours	:	45	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3 Hrs

Course Learning Objectives is	
1.	To know different classification of flows in open channel.
2.	To understand Concept o energy for channel design.
3.	To know Characteristics of GVF and RVF.
4.	To learn Characteristics of flow profiles.
5.	To study different possible energy dissipaters.

Module – 1	No. of Hours
Difference between pipe flow and open channel flow, classification of flow, energy equation, momentum equation, kinetic energy and momentum factors. Concepts, uniform flow equations, conveyance and hydraulic exponent for uniform flow, design of channels for uniform flow.	9
Module – 2	No. of Hours
Concept of specific Energy – Classification of flow. Design of channel, Section Factor, Hydraulic exponent for critical flow critical depth as a flow measurement.	9
Module – 3	No. of Hours
Concepts, GVF equation, its different forms, Basic assumptions, Dynamic equation, Characteristics of flow profile and classification. Analysis of flows profiles, Method of singular point and transitional depth, Methods of computation, Practical problems.	9
Module – 4	No. of Hours
Gradually Varied Flow Computations: Different methods, direct integration method, Bress's Solution, Chow's solution, direct method, standard step method.	9
Module – 5	No. of Hours
Rapidly Varied Flow: Concepts, hydraulic jump in rectangular channels, classification of jumps, characteristics of jump – length location height, application of hydraulic jump stilling basins, shape type-2 and type-4. Hydraulic jump in rectangular channels, Sloping channels, Jump in non-rectangular channels, application of hydraulic jump as energy dissipaters.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Identify flow type in open channel
CO2	Apply concept of energy for channel design
CO3	Compute GVF and RVF profiles for the flow
CO4	Design energy dissipaters for the flow conditions
CO5	Study different possible energy dissipaters

Text Books	
1.	Flow through open channel by K. G. Rangaraju, ISBN: 007096565X, 9780070965652, Tata McGraw-Hill, 2001



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2.	Flow in open channels by K Subramanya, 5th Edition, Tata McGraw-Hill, 2019
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Reference Text Books	
1.	Open Channel Hydraulics by VenTe Chow, The Blackburn Press, ISBN-10: 1932846182, ISBN-13: 978-1932846188
2.	Open-Channel Flow, Subhash C. Jain, ISBN: 978-0-471-35641-7 October 2000, Wiley Publication
3.	Open Channel Hydraulics, 3rd Edition, Terry W. Sturm, ISBN: 9781260469707, 2021

ASSESSMENT DETAILS BOTH (CIE AND SEE)

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CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	Internal Assessment-1	50	30 (Average of Best two Assessments)	50
	Internal Assessment-2	50		
	Internal Assessment-3	50		
AAT	Two Assessments as per regulations	20	20	
SEE	Semester End Examination	100	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

- The question paper shall be set for 100 marks and duration of SEE is 3 hours.
- The question paper will have two parts: Part-A and Part-B.
- Part-A** should contain minimum **Two or Four** quiz questions from each module of 02 marks/ 01 marks each. **Part-A is Compulsory** and carries 20 Marks.
- Part-B** contains total 10 questions.
- Two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice.
- Students should answer five full questions, selecting one full question from each module.
- Question papers to be set as per the Blooms Taxonomy levels.

CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	3	-	1	-	-	-	-	-	-	1
CO2	2	3	-	1	-	-	-	-	-	-	1
CO3	2	3	-	1	-	-	-	-	-	-	1
CO4	2	3	-	1	-	-	-	-	-	-	1
CO5	2	3	-	1	-	-	-	-	-	-	1

Level 3 - High, Level 2 - Moderate, Level 1 - Low



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Semester - VI					
Energy Efficiency, Acoustics and Daylighting in Building					
Category: OEC-I					
Course Code	:	B24CV641	CIE	:	50 Marks
Teaching Hours L : T : P : S	:	3:0:0:3	SEE	:	50 Marks
Total Hours	:	45	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3 Hrs

Course Learning Objectives is	
1.	To study the climatic conditions and impact of those on Buildings.
2.	To know the Indoor air quality and IAQ management
3.	To study the Energy efficient buildings, water management and life cycle assessment.

Module – 1	No. of Hours
Introduction to Climatology and heat ingress in building: Basics of climatology, Earth – Sun relationship, Solar angles and sun path diagram, Design of shading systems. Basics of Thermodynamics, Convection/radiation heat transfer, Heat gain through various elements of a building, Thermal comfort models and case studies.	9
Module – 2	No. of Hours
Building acoustics, Indoor air quality and Lighting in buildings: Basics of sound and Building acoustics – Acoustic defects, prevention of sound transmission and acoustic measure for office building. Indoor Air Quality – Effects, control of contaminants and moisture in indoor environment, Integrated approach for IAQ management. Fundamentals of lighting- Day lighting and its metrics – Strategies for day lighting and its control. Artificial lighting – Design and control strategies – Visual comfort enhancement.	9
Module – 3	No. of Hours
Energy efficient buildings, Water and Waste management in buildings: Energy efficiency – Energy efficiency in building envelope and energy efficient HVAC and Lighting as per Energy conservation building code (ECBC) 2017, Energy simulation, Energy management system – Renewable energy and Energy Audit. (demand control ventilation) Water Efficiency – Planning and design of water management system, Rain water harvesting, Water efficient design and fixtures, Treatment and reuse and Water efficient landscape system. Waste management – Types of waste and its treatment methods, Construction and demolition waste management, Waste management in residential, commercial buildings, healthcare facilities.	9
Module – 4	No. of Hours
Life Cycle Assessment of Buildings and Green project management: Materials – Green product certifications, features of sustainable building materials and sustainable alternatives for structural, envelope and finishing materials. Low carbon cement, Zero emission bricks and lean construction practices. Life cycle assessment and its types – Modeling and Analysis, Greenhouse gas emission. Different phases of Green building project management.	9
Module – 5	No. of Hours
Energy Efficient rating: Energy efficiency rating for distribution transformers, diesel generator set, motors, pumps, electrical appliances, lighting fixtures and lifts as per Bureau of Energy Efficiency (BEE).	9



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Energy efficiency in HVAC system – Variable Frequency Drive (VFD), Air volume drive. Roof top solar installations and solar water heaters, Heat recovery system in buildings, Building Management System (BMS) – Occupancy sensors and energy efficient lighting controls, Smart Buildings.	
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Course Outcomes: At the end of the course, the students will be able to

CO1	Able to study the climatic conditions and impact of those on Buildings.
CO2	know the Indoor air quality and IAQ management
CO3	Study the Energy efficient buildings, water management and life cycle assessment.

Text Books

1.	HarharaIyer G, Green Building Fundamentals, Notion Press
2.	Dr. Adv. HarshulSavla, Green Building: Principles & Practices

Reference Text Books

1.	The Sustainable Habitat Handbook (6 Volume Set), GRIHA Version 2019
2.	National Building Code – 2016, Volume 1&2, Bureau of Indian Standards
3.	Energy Conservation Building Code – 2017 (with amendments up to 2020), Bureau of Energy Efficiency.

ASSESSMENT DETAILS BOTH (CIE AND SEE)

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CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	Internal Assessment-1	50	30 (Average of Best two Assessments)	50
	Internal Assessment-2	50		
	Internal Assessment-3	50		
AAT	Two Assessments as per regulations	20	20	
SEE	Semester End Examination	100	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part-A and Part-B.
3. **Part-A** should contain minimum **Two or Four** quiz questions from each module of 02 marks/ 01 marks each. **Part-A is Compulsory** and carries 20 Marks.
4. **Part-B** contains total 10 questions.
5. Two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice.
6. Students should answer five full questions, selecting one full question from each module.
7. Question papers to be set as per the Blooms Taxonomy levels.



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CO-PO Mapping

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	-	2	-	1	-	-	-	-	1
CO2	-	-	-	3	-	1	-	-	-	-	1
CO3	-	-	-	3	-	1	-	-	-	-	1

Level 3 - High, Level 2 - Moderate, Level 1 - Low



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Semester - VI					
Integrated Waste Management for a Smart City					
Category: OEC-I					
Course Code	:	B24CV642	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	3:0:0:3	SEE	:	50 Marks
Total Hours	:	45	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3 Hrs

Course Learning Objectives is	
1.	To introduce the fundamentals of Solid Waste Management
2.	To provide details of Sustainable Cities
3.	To understand the Sustainable Development Goals.

Module – 1	No. of Hours
Introduction to Solid Waste Management: Municipal Solid Waste Characteristics and Quantities generation rates and waste composition; Integrated waste management issues, collection, recovery, reuse, recycling, energy-from-waste, and land filling;	9
Module – 2	No. of Hours
Biological treatment of the organic waste fraction: Direct land application, composting, and anaerobic digestion. MSW Rules 2016, Swachh Bharat Mission and Smart Cities Program	9
Module – 3	No. of Hours
Biochemical Processes and Composting Energy: Recovery from Municipal Solid Waste. Current Issues in Solid Waste Management and Review of MSW Management Status in First List of 20 Smart Cities in the Country	9
Module – 4	No. of Hours
Construction and Demolition (C&D) Waste Management: Overview C&D Waste – Regulation, Beneficial Reuse of C&D Waste Materials	9
Module – 5	No. of Hours
Electronic Waste (E-Waste) Management: Issues and Status in India and Globally, E-Waste Management Rules 2016 and Management Challenges.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Understand basic idea about Sustainable Development.
CO2	Get knowledge about Sustainable Cities.
CO3	Gain knowledge on Saving Biodiversity.
CO4	Understand Sustainable Development Goals.

Text Books	
1.	William A Worrell and P. Aarne Vesilind Solid Waste Engineering, 2 nd Edition (SI Edition) Cengage Learning, 2012 (ISBN-13: 978-1-4390-6217-3)
2.	George Tchobanoglous, Hilary Theisen and Samuel A Vigil, Integrated Solid Waste management, Tata McGraw Hill

Reference Text Books	
1.	Manual on Solid Waste Management, prepared by The Central Public Health and Environmental Engineering Organization (CPHEEO),
2.	MSW Management Rules 2016, Govt. of India, available online at CPCB website.
3.	Electronic Waste Management Rules 2016, Govt. of India, CPCB website

ASSESSMENT DETAILS BOTH (CIE AND SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of maximum marks (18 marks out of 50). A student shall be deemed to



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have satisfied the academic requirements and earned the credits allotted to each course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.

CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	Internal Assessment-1	50	30 (Average of Best two Assessments)	50
	Internal Assessment-2	50		
	Internal Assessment-3	50		
AAT	Two Assessments as per regulations	20	20	
SEE	Semester End Examination	100	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part-A and Part-B.
3. **Part-A** should contain minimum **Two or Four** quiz questions from each module of 02 marks/ 01 marks each. **Part-A is Compulsory** and carries 20 Marks.
4. **Part-B** contains total 10 questions.
5. Two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice.
6. Students should answer five full questions, selecting one full question from each module.
7. Question papers to be set as per the Blooms Taxonomy levels.

CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	-	-	-	-	-	-	-	-	-	-
CO2	2	-	2	-	-	-	-	-	-	-	-
CO3	2	-	2	-	-	-	-	-	-	-	-
CO4	2	2	2	-	-	-	-	-	-	-	-

Level 3 - High, Level 2 - Moderate, Level 1 - Low



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Semester - VI					
Conservation Of Natural Resources					
Category: OEC-I					
Course Code	:	B24CV643	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	3:0:0:3	SEE	:	50 Marks
Total Hours	:	45	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3 Hrs

Course Learning Objectives is	
1.	To learn types of land forms, soil conservation and sustainable land use planning.
2.	To apprehend water resources, types, distribution, planning and conservation. Water pollution and types of uses.
3.	To know the types of minerals and rocks.
4.	To know the atmospheric composition of air, pollution and effects on human beings, animals and plants. Air pollution control.
5.	To apprehend basics of biodiversity and ecosystems.

Module – 1	No. of Hours
Land: Land as a resource, types of lands, conservation of land forms, deforestation, effect of land use changes. Soil health, ecological and economic importance of soil, impact of soil degradation on agriculture and food security, need for soil conservation, sustainable land use planning.	9
Module – 2	No. of Hours
Water: Global water resources, Indian water resources, Resources system planning. Water use sectors- domestic, industrial, agriculture. Water deficit and water surplus basins in India, equitable distribution, Inter-basin water transfers, Interlinking of rivers – Himalayan component, peninsular component, issues involved. Ground water, its potential in India, conjunctive use, recharge of ground water. Contamination of ground water, sea water ingress, problems and solutions.	9
Module – 3	No. of Hours
Air: Introduction, composition, sources and classification of air pollutants, National Ambient Air quality standards (NAAQS), Air quality index, effects of air pollution on human health. Economic effects of air pollution. Control of air pollution by equipment, smoke and its control. Ozone depletion –impacts, photochemical changes.	9
Module – 4	No. of Hours
Biodiversity: Introduction, Flora and Fauna, Importance of biodiversity, Economic values- medicinal plants, drugs, fisheries biogeochemical cycling. Threat to biodiversity, natural & anthropogenic disturbance, habitat loss. Conservation of biodiversity, National parks, wild life sanctuaries, zoological gardens, gene banks, pollen culture, ecological restoration, social forestry. Ecosystem: Definition, Types: forest, grass land, marine, desert, wetlands, estuarine, lotic, lentic. Abiotic & biotic components of ecosystem.	9
Module – 5	No. of Hours
Global warming: concept, indicators, factor and effects. Global climate change-indicators, health impacts, effect on biodiversity. Introduction to global efforts in conservation of biodiversity. EIA regulations in India, status of EIA in India, list of projects needing environmental clearance under EIA notifications. Case study of hydro power/ thermal power projects	9



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Course Outcomes: At the end of the course, the students will be able to	
CO1	Apprehend various components of land as a natural resource and land use planning.
CO2	Know availability and demand for water resources as applied to India.
CO3	Analyze the components of air as resource and its pollution.
CO4	Discuss biodiversity & its role in ecosystem functioning.
CO5	Critically appreciate the environmental concerns of today.

Text Books	
1.	P.Jaya Rami Reddy, "A Textbook of Hydrology", University Science Press, New Delhi, 2011.
2.	Krishnamurthy K.V., "An advanced textbook of Biodiversity- principle & practices." Oxford and IBH publications Co.Pvt Ltd, New Delhi. 2004

Reference Text Books	
1.	Odum, E.P., "Fundamentals of Ecology", W.B sounders, Philadelphia, USA, 197
2.	Singh J.S, Singh S.P & Gupta, S.R., "Ecology, environment and resource conservation", Anamaya publications, 2006

ASSESSMENT DETAILS BOTH (CIE AND SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.

CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	Internal Assessment-1	50	30 (Average of Best two Assessments)	50
	Internal Assessment-2	50		
	Internal Assessment-3	50		
AAT	Two Assessments as per regulations	20	20	
SEE	Semester End Examination	100	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part-A and Part-B.
3. **Part-A** should contain minimum **Two or Four** quiz questions from each module of 02 marks/ 01 marks each. **Part-A is Compulsory** and carries 20 Marks.
4. **Part-B** contains total 10 questions.
5. Two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice.
6. Students should answer five full questions, selecting one full question from each module.
7. Question papers to be set as per the Blooms Taxonomy levels.



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CO-PO Mapping

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	-	2	-	-	2	-	1	-	-
CO2	-	-	-	2	-	-	2	-	1	-	-
CO3	-	-	-	2	-	-	2	-	1	-	-
CO4	-	-	-	2	-	-	2	-	1	-	-
CO5	-	-	-	2	-	-	2	-	1	-	-

Level 3 - High, Level 2 - Moderate, Level 1 - Low



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Semester -VI					
Road Safety Engineering					
Category: OEC-I					
Course Code	:	B24CV644	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	3:0:0:3	SEE	:	50 Marks
Total Hours	:	45	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3 Hrs

Course Learning Objectives is	
1.	To provide students with a comprehensive understanding of the principles, strategies, and Techniques related to ensuring safety on roadways.
2.	To equip students with the knowledge and skills necessary to analyse road safety issues
3.	To Utilize modelling and simulation techniques to predict and assess the impact of road safety measures
4.	To design effective road safety measures, and contribute to the improvement of road safety Practices.
5.	To Comprehend the legal and policy framework related to road safety engineering and contribute to policy development

Module – 1	No. of Hours
Accident Investigations And Risk Management: Collection Of Accident Data, Assessment Of Road Safety, Methods To Identify And Prioritize Hazardous Locations And Elements, Determine Possible Causes Of Crashes, Crash Reduction Capabilities And Countermeasures, Effectiveness Of Safety Design Features, Accident Reconstruction, Condition And Collision Diagram.	9
Module – 2	No. of Hours
Traffic Engineering Studies: Statistical Methods In Traffic Safety Analysis – Regression Methods, Poisson Distribution, Chi- Squared Distribution, Statistical Comparisons- Traffic Management Measures And Their Influence On Accident Prevention.	9
Module – 3	No. of Hours
Road Safety In Transport Planning And Geometric Design: Vehicle And Human Characteristics, Road Design And Safety Elements, Redesigning Junctions, Cross Section Improvements, Traffic Control, Traffic Calming Measures, Road Safety Furniture.	9
Module – 4	No. of Hours
Role Of Signs And Markings In Safety: Types Of Signs – Design Specifications – Guidelines For Installation – Role Of Signs In Safety; Types Of Road Markings – Design Specifications – Role Of Road Markings In Safety.	9
Module – 5	No. of Hours
Traffic Management Systems For Safety: Road Safety Audits And Tools For Safety Management Systems, Road Safety Audit Process, Road Safety Improvement Strategies, ITS And Safety.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Analyse road safety data, identify hazardous locations, and assess safety risks on roadways.
CO2	Evaluate the effectiveness of road safety interventions and conduct post-implementation analysis
CO3	Utilize modelling and simulation techniques to predict and assess the impact of road safety measures
CO4	Demonstrate knowledge of traffic control devices, traffic management strategies, and their role in enhancing road safety
CO5	Comprehend the legal and policy framework related to road safety engineering and contribute to policy development



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Text Books	
1.	Traffic Engineering And Transportation Planning – L.R. Kadiyali, Khanna Publishers
2.	Fundamentals Of Transportation Engineering - C.S.Papacostas, Prentice Hall India.

Reference Text Books	
1.	Handbook Of Road Safety Measures, Second Edition, Rune Elvik, AlenaHoye, TrulsVaa,Michael Sorenson
2.	Fundamentals Of Traffic Engineering, Richardo G Sigua
3.	Transportation Engineering – An Introduction, C.JotinKhisty, B. Kent Lall

ASSESSMENT DETAILS BOTH (CIE AND SEE)

The weightage of continuous Internal Evaluation (CIE) is 50% and for the Semester End Examination (SEE) is 50%. The minimum passing mark for the CIE is 40% of maximum marks (20 marks out of 50). The minimum passing mark for SEE is 35% of maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. Student has to secure a minimum 40% (40 marks out of 100) in the total of the CIE and SEE together.

CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	Internal Assessment-1	50	30 (Average of Best two Assessments)	50
	Internal Assessment-2	50		
	Internal Assessment-3	50		
AAT	Two Assessments as per regulations	20	20	
SEE	Semester End Examination	100	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

1. The question paper shall be set for 100 marks and duration of SEE is 3 hours.
2. The question paper will have two parts: Part-A and Part-B.
3. **Part-A** should contain minimum **Two or Four** quiz questions from each module of 02 marks/ 01 marks each. **Part-A is Compulsory** and carries 20 Marks.
4. **Part-B** contains total 10 questions.
5. Two questions of 16 marks (with minimum of 3 sub questions) from each module with internal choice.
6. Students should answer five full questions, selecting one full question from each module.
7. Question papers to be set as per the Blooms Taxonomy levels.

CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	-	2	-	-	-	-	-	-	2	1
CO2	2	2	-	2	-	-	-	-	2	-	-
CO3	-	-	-	-	2	-	-	-	-	-	2
CO4	1	-	-	3	-	-	-	-	-	1	-
CO5	-	-	2	-	-	-	-	-	-	-	1

Level 3 - High, Level 2 - Moderate, Level 1 - Low



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Semester- VI					
Extensive Survey Laboratory					
Category: PCCL					
Course Code	:	B24CV605L	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	0:0:2:0	SEE	:	50 Marks
Total Hours	:	30	Total	:	100 Marks
Credits	:	1	SEE Duration	:	3 Hrs

Course Learning Objectives is	
1.	To understand the practical applications of Surveying.
2.	To use Total station and other Measurement Equipments.
3.	To work in teams and learn time management, communication and presentation skills

Sl. No.	List of the experiment
1.	New tank projects: The work shall consist of; ○ Reconnaissance survey for selection of site and conceptualization of project. ○ Alignment of center line of the proposed bund, Longitude in land cross sections of the centerline. ○ Detailed survey required for project execution like Capacity surveys, Details at *Waste weir and sluice points, Canal alignment etc. as per requirement ○ Design and preparation of drawing with report.
2.	Water supply and sanitary project: The work shall consist of; ○ Reconnaissance survey for selection of site and conceptualization of project. ○ Examination of sources of water supply, Calculation of quantity of water required based on existing and projected population. ○ Preparation of village map by using total station. ○ Survey work required for lying of water supply and UGD Location of sites for water tank. ○ Selection of type of water tank to be provided. (ground level, overhead and underground) ○ Design of all elements and preparation of drawing with report.
3.	Highway Project: The work shall consist of; ○ Reconnaissance survey for selection of site and conceptualization of project. ○ Preliminary and detailed investigations to align a new road (min. 1 to 1.5 km stretch) between two obligatory points. The investigations shall consist of topographic surveying of strip of land for considering alternate routes and for final alignment. Surveying by using total station. ○ Report should justify the selected alignment with details of all geometric designs for traffic and design speed assumed. ○ Drawing shall include key plan initial alignment, final alignment, longitude in a section along final alignment, typical cross sections of road.



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4.	Restoration of an existing Tank: The work shall consist of; ○ Reconnaissance survey for selection of site and conceptualization of project. ○ Alignment of centerline of the existing bund, Longitudinal and cross sections of the center line. ○ Detailed survey required for project execution like Capacity surveys, Details at Waste weir and sluice points, Canal alignment etc. as per requirement ○ Design of all elements and preparation of drawing with report.
5.	Town/Housing/Layout Planning: The work shall consist of; ○ Reconnaissance survey for selection of site and conceptualization of project. ○ Detailed survey required for project execution like contour surveys. ○ Preparation of layout plans as per regulations. ○ Center line marking-transfer of centre lines from plant ground. ○ Design of all elements and preparation of drawing with report as per regulations.

Course Outcomes: At the end of the course, the students will be able to	
CO1	Apply Surveying knowledge and tools effectively for the projects.
CO2	Understanding Task environment, Goals, responsibilities, Task focus, working in Teams towards common goals, Organizational performance expectations, technical and behavioral competencies.
CO3	Application of individual effectiveness skills in team and organizational context, goal setting, time management, communication and presentation skills.
CO4	Professional etiquettes at workplace, meeting and general.
CO5	Establishing trust based relationships in teams & organizational environment.

ASSESSMENT DETAILS BOTH (CIE AND SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.



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CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Laboratory	Lab Conduction & Record	Evaluating each expt. for 10 marks	20	50
	Laboratory Test -1	50	15	
	Laboratory Test -2	50	15	
SEE	Semester End Examination	100	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

- SEE marks for the practical course are 50 Marks. Practical examinations are to be conducted between the schedules mentioned in the academic calendar of the Institution.
- All laboratory experiments are to be included for practical examination.
- Evaluation of test write-up, conduction procedure, result and viva will be conducted jointly by examiners.
- Rubrics suggested for SEE, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks.
- Change of experiment is allowed only once and 15% of Marks allotted to the Conduction procedure part are to be made zero. The minimum duration of SEE is 03 hours..

CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	2	-	-	-	-	-	2	2	2	-
CO2	2	2	1	-	-	2	-	2	2	2	-
CO3	2	1	-	-	2	2	-	2	2	2	-
CO4	2	1	2	2	-	-	1	2	2	2	-
CO5	1	2	2	-	-	-	1	-	2	-	-

Level3 –High, Level2–Moderate, Level1 -Low



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Semester-VI					
Civil 3D					
Category: AEC-VI					
Course Code	:	B24CV681	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	0:0:2:0	SEE	:	50 Marks
Total Hours	:	30	Total	:	100 Marks
Credits	:	1	SEE Duration	:	3 Hrs

Course Learning Objective is	
1.	To Work with survey elements such as points, surfaces, etc.
2.	To Design the infrastructure elements such as corridors and pipe networks
3.	To This class focuses on the core concepts of various infrastructure tools available in the AutoCAD Civil 3D

Sl. No.	List of the experiment
1.	Setting Introduction to User Interface and Project Setting: Configuring units, zones, and importing survey data (ASCII points) to create a survey database
2.	Point Group Creation and Description Keys: Filtering survey points based on raw descriptions (e.g., trees, poles) and applying automatic symbology.
3.	Surface Modeling and Contouring: Generating Existing Ground (EG) surfaces from points and customizing contour styles.
4.	Surface Analysis and Editing: Performing slope analysis, elevation banding, and editing surface TIN lines (breaklines).
5.	Alignment Design (Horizontal Alignment): Creating and editing site-specific horizontal alignments, including circular and spiral curves.
6.	Profile Generation (Vertical Alignment): Creating surface profiles and designing finished ground profiles using PVI's.
7.	Assembly and Subassembly Creation: Designing typical cross-sections (lanes, curbs, shoulders, sidewalks) for road design.
8.	Corridor Modeling: Creating a 3D model of a road by integrating the horizontal alignment, vertical profile, and assemblies.
9.	Sample Lines and Section Views: Generating cross-sections along the corridor at specific intervals for cut-and-fill analysis.
10.	Quantity Takeoff (Earthwork Calculation): Computing cut-and-fill volumes and generating earthwork reports.
11.	Pipe Network Design (Storm/Sanitary Sewer): Designing a gravity pipe network, adding pipes/structures, and performing interference checks
12.	Grading and Parcel Creation: Designing feature lines for grading (building pads/ponds) and creating subdivision plots with area tables.



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Course Outcomes: At the end of the course, the students will be able to	
CO1	Work with survey elements such as points, surfaces, etc.
CO2	Design the infrastructure elements such as corridors and pipe networks
CO3	This class focuses on the core concepts of various infrastructure tools available in the AutoCAD Civil 3D

ASSESSMENT DETAILS BOTH (CIE AND SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Laboratory	Lab Conduction & Record	Evaluating each expt. for 10 marks	20	50
	Laboratory Test -1	50	15	
	Laboratory Test -2	50	15	
SEE	Semester End Examination	100	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

1. SEE marks for the practical course are 50 Marks. Practical examinations are to be conducted between the schedules mentioned in the academic calendar of the Institution.
2. All laboratory experiments are to be included for practical examination.
3. Evaluation of test write-up, conduction procedure, result and viva will be conducted jointly by examiners.
4. Rubrics suggested for SEE, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks.
5. Change of experiment is allowed only once and 15% of Marks allotted to the Conduction procedure part are to be made zero. The minimum duration of SEE is 03 hours.



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CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	-	-	2	-	-	-	-	-	-	3
CO2	-	-	-	-	-	-	1	-	-	-	-
CO3	-	2	-	-	-	-	-	-	-	-	2

Level3 –High, Level2–Moderate, Level1 –Low



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Semester-VI					
Advanced 3DS MAX					
Category: AEC-VI					
Course Code	:	B24CV682	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	0:0:2:0	SEE	:	50 Marks
Total Hours	:	30	Total	:	100 Marks
Credits	:	1	SEE Duration	:	3 Hrs

Course Learning Objective is	
1.	To develop proficiency in Autodesk 3ds Max tools and techniques.
2.	To master 3D modeling for products, environments, architecture, and characters.
3.	To create realistic textures, lighting setups, and materials for high-quality outputs

Sl. No.	List of the experiment
1.	Procedural Modeling: Creating parametric walls, doors, windows, and stairs.
2.	Residential Modeling: Developing a 3D model of a single-storied residential building from a 2D floor plan.
3.	Exterior Site Modeling: Creating terrain (topography), roads, and landscaping elements.
4.	Material Application: Applying basic textures (concrete, asphalt, glass) using the Material Editor.
5.	UVW Mapping: Adjusting texture coordinates to fit materials on complex shapes.
6.	Lighting Techniques: Setting up Day lighting System (Sunlight/Daylight) for exterior scenes.
7.	Artificial Lighting: Using IES lights and Spotlights for interior/night scenes.
8.	Rendering with V-Ray: Setting up V-Ray Physical Camera
9.	Rendering a photorealistic exterior shot.
10.	Camera Animation: Creating a walkthrough (fly-through) animation of a building or bridge.
11.	Traffic Simulation: Animating vehicles moving along a road network using Civil View.
12.	Environmental Effects: Adding atmospheric effects like fog, rain, or snow to a scene.

Course Outcomes: At the end of the course, the students will be able to	
CO1	Develop proficiency in Autodesk 3ds Max tools and techniques.
CO2	Master 3D modeling for products, environments, architecture, and characters.
CO3	Create realistic textures, lighting setups, and materials for high-quality outputs

ASSESSMENT DETAILS BOTH (CIE AND SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.



CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Laboratory	Lab Conduction & Record	Evaluating each expt. for 10 marks	20	50
	Laboratory Test -1	50	15	
	Laboratory Test -2	50	15	
SEE	Semester End Examination	100	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

1. SEE marks for the practical course are 50 Marks. Practical examinations are to be conducted between the schedules mentioned in the academic calendar of the Institution.
2. All laboratory experiments are to be included for practical examination.
3. Evaluation of test write-up, conduction procedure, result and viva will be conducted jointly by examiners.
4. Rubrics suggested for SEE, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks.
5. Change of experiment is allowed only once and 15% of Marks allotted to the Conduction procedure part are to be made zero. The minimum duration of SEE is 03 hours.

CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	-	-	2	-	-	-	-	-	-	3
CO2	-	-	-	-	-	-	1	-	-	-	-
CO3	-	2	-	-	-	-	-	-	-	-	2

Level3 –High, Level2–Moderate, Level1 -Low



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Semester-VI					
GIS for civil engineers					
Category: AEC-VI					
Course Code	:	B24CV683	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	0:0:2:0	SEE	:	50 Marks
Total Hours	:	30	Total	:	100 Marks
Credits	:	1	SEE Duration	:	3 Hrs

Course Learning Objective is	
1.	To Develop hands-on skills using industry-standard GIS software (e.g., ArcGIS Pro, QGIS) and its extensions (Spatial Analyst, Network Analyst).
2.	To Apply GIS concepts to solve complex spatial decision-making problems and interpret analysis results
3.	To Create effective maps and visual representations of spatial data for communication

Sl. No.	List of the experiment
1.	Familiarization with GIS Software and Data Input: Introduction to the interface (ArcGIS/QGIS), data formats, and coordinate systems.
2.	Topology Editing: Creating and editing topologic relationships (node, line, polygon) to ensure data accuracy.
3.	Creation of Thematic Maps: Generating maps for specific themes like land use, soil type, or land cover.
4.	Data Conversion - Vector to Raster and Vice Versa: Converting between vector and raster formats for different analyses.
5.	Digital Elevation Model (DEM) Generation: Creating a Digital Elevation Model (DEM) from contours or point data.
6.	Calculation of Volumes and Surfaces: Calculating volumes for hills, tanks, and cut-and-fill analysis.
7.	Vector Analysis - Buffering and Overlay: Performing proximity analysis (buffer) and overlay operations (intersect/union).
8.	Raster Analysis and Map Algebra: Conducting raster-based analysis, such as slope/aspect analysis.
9.	Application 1: Transportation Network Analysis: Mapping road networks, calculating shortest paths, and service area analysis.
10.	Application 2: Watershed Delineation and Analysis: Utilizing DEMs for delineating watersheds and hydrological modeling.
11.	Application 3: Site Suitability Analysis: Identifying optimal locations for infrastructure projects (e.g., landfills, schools) using multi-criteria evaluation.
12.	Map Composition and Layout Preparation: Designing final map outputs with scales, legends, and north arrows.



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Course Outcomes: At the end of the course, the students will be able to	
CO1	Develop hands-on skills using industry-standard GIS software (e.g., ArcGIS Pro, QGIS) and its extensions (Spatial Analyst, Network Analyst).
CO2	Apply GIS concepts to solve complex spatial decision-making problems and interpret analysis results
CO3	Create effective maps and visual representations of spatial data for communication

ASSESSMENT DETAILS BOTH (CIE AND SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Laboratory	Lab Conduction & Record	Evaluating each expt. for 10 marks	20	50
	Laboratory Test -1	50	15	
	Laboratory Test -2	50	15	
SEE	Semester End Examination	100	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

1. SEE marks for the practical course are 50 Marks. Practical examinations are to be conducted between the schedules mentioned in the academic calendar of the Institution.
2. All laboratory experiments are to be included for practical examination.
3. Evaluation of test write-up, conduction procedure, result and viva will be conducted jointly by examiners.
4. Rubrics suggested for SEE, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks.
5. Change of experiment is allowed only once and 15% of Marks allotted to the Conduction procedure part are to be made zero. The minimum duration of SEE is 03 hours.



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CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	-	-	2	-	-	-	-	-	-	3
CO2	-	-	-	-	-	-	1	-	-	-	-
CO3	-	2	-	-	-	-	-	-	-	-	2

Level3 –High, Level2–Moderate, Level1 -Low



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Semester-VI					
Revit Structures					
Category: AEC-VI					
Course Code	:	B24CV684	CIE	:	50 Marks
Teaching Hours L:T:P:S	:	0:0:2:0	SEE	:	50 Marks
Total Hours	:	30	Total	:	100 Marks
Credits	:	1	SEE Duration	:	3 Hrs

Course Learning Objectives is	
1.	To equip students with the ability to create, modify, and analyze 3D parametric models, including structural columns, beams, walls, and foundations.
2.	To teach the creation of analytical models, the application of structural loads, and the development of detailed reinforcement for concrete elements.
3.	To train users on generating accurate construction documents and managing work-sharing for multi-user collaboration.

Sl. No.	List of the experiment
1.	Interface and Project Setup: Introduction to the Revit Interface, Project Browser, and Properties Palette. Setting up structural templates, project units, and navigation tools.
2.	Setting Up Levels and Grids: Creating and configuring vertical levels (foundation, floor levels). Establishing structural grids for column placement.
3.	Modeling Structural Columns: Placing vertical and slanted structural columns. Modifying column types, materials, and sizes
4.	Modeling Foundations: Adding isolated footings (spread footings) beneath columns. Creating wall footings and foundation slabs.
5.	Structural Framing: Beams: Placing beams and structural framing members. Adjusting beam alignment, elevation, and 3D joining.
6.	Structural Framing: Beam Systems and Trusses: Creating beam systems for floors and roofs. Modeling trusses and bracings.
7.	Modeling Structural Walls: Creating load-bearing and shear walls. Adding openings and editing wall profiles.
8.	Modeling Structural Slabs and Decks: Modeling structural floors and suspended slabs. Creating shaft openings and slab edges.
9.	Concrete Reinforcement (Rebar): Adding rebar to concrete beams, columns, and foundations. Modifying rebar cover settings and shapes.
10.	Analytical Modeling and Loads: Viewing and adjusting the analytical model for structural analysis. Placing structural loads (point, line, area).
11.	Annotation, Documentation, and Scheduling: Adding dimensions, tags, and structural annotations to views.



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	Creating material takeoff schedules, rebar schedules, and column schedules.
12.	Sheet Setup, Detailing, and Printing: Creating and organizing sheets (title blocks). Placing views on sheets, adding 2D detail components, and printing/exporting to PDF.

Course Outcomes: At the end of the course, the students will be able to	
CO1	Construct a complete, accurate 3D structural model of a building, including structural framing and foundations.
CO2	Perform basic structural analysis, apply loads, and produce detailed 2D reinforcement layouts for concrete components.
CO3	Generate comprehensive, annotated construction documents and schedules from the 3D model.

ASSESSMENT DETAILS BOTH (CIE AND SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

CONTINUOUS INTERNAL EVALUATION (CIE)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Laboratory	Lab Conduction & Record	Evaluating each expt. for 10 marks	20	50
	Laboratory Test -1	50	15	
	Laboratory Test -2	50	15	
SEE	Semester End Examination	100	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

1. SEE marks for the practical course are 50 Marks. Practical examinations are to be conducted between the schedules mentioned in the academic calendar of the Institution.
2. All laboratory experiments are to be included for practical examination.
3. Evaluation of test write-up, conduction procedure, result and viva will be conducted jointly by examiners.
4. Rubrics suggested for SEE, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks.



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5. Change of experiment is allowed only once and 15% of Marks allotted to the Conduction procedure part are to be made zero. The minimum duration of SEE is 03 hours.

CO-PO Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	-	-	2	-	-	-	-	-	-	3
CO2	-	-	-	-	-	-	1	-	-	-	
CO3	-	2	-	-	-	-	-	-	-	-	2

Level3 –High, Level2–Moderate, Level1 -Low



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#14, Ramohalli Cross, Kumbalagodu, Mysore Road, Bengaluru-560074



Common Courses

V & VI Semester

UG – B.E (2024 Scheme)

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Semester-V					
Biology for Engineers					
Category: BSC					
(Common to All)					
Course Code	:	B24BEK507	CIE	:	50 Marks
Teaching Hours L : T : P : S	:	2:0:0:2	SEE	:	50 Marks
Total Hours	:	30	Total	:	100 Marks
Credits	:	2	SEE Duration	:	2 Hrs

Course Learning Objective is	
1.	To familiarize the students with the basic biological concepts and their engineering applications.
2.	To enable the students with an understanding of biodesign principles to create novel devices and structures.
3.	To provide the students an appreciation of how biological systems can be re-designed as substitute products for natural systems.
4.	To motivate the students to develop interdisciplinary vision of biological engineering.

Module- 1	No. of Hours
Introduction to Biology: The cell: the basic unit of life, Structure and functions of a cell. The Plant Cell and animal cell, Prokaryotic and Eukaryotic cell, Stem cells and their application. Biomolecules: Properties and functions of Carbohydrates, Nucleic acids, proteins, lipids. Importance of special biomolecules; Enzymes (Classification (with one example each), Properties and functions), vitamins and hormones.	6
Module- 2	No. of Hours
Application of Biomolecules: Carbohydrates in cellulose-based water filters production, PHA and PLA in bio plastics production, Nucleic acids in vaccines and diagnosis, Proteins in food production.	6
Module- 3	No. of Hours
Adaptation of Anatomical Principles for Bioengineering Design: Brain as a CPU system. Robotic arms for prosthetics. Engineering solutions for Parkinson's disease. Eye as a Camera system, bionic eye. Heart as a pump system, pace makers, defibrillators. Lungs as purification system, Heart-lung machine. Kidney as a filtration system, dialysis systems.	6
Module- 4	No. of Hours
Nature-Bioinspired Materials and Mechanisms: Echolocation, Photosynthesis. Bird flying, Lotus leaf effect, Shark skin, Kingfisher beak. Human Blood substitutes - hemoglobin-based oxygen carriers (HBOCs) and perfluorocarbons (PFCs).	6
Module- 5	No. of Hours
Trends in Bioengineering: DNA origami and Biocomputing, Bioprinting techniques and materials. Bioimaging and Artificial Intelligence for disease diagnosis. Bioconcrete. Biomining.	6

Course Outcomes: At the end of the course, the students will be able to	
CO1	Elucidate the basic biological concepts via relevant industrial applications and case studies.
CO2	Evaluate the principles of design and development, for exploring novel bioengineering projects.
CO3	Corroborate the concepts of biomimetics for specific requirements.
CO4	Think critically towards exploring innovative biobased solutions for socially relevant problems.

Text Books	
1.	Biology for Engineers, Rajendra Singh C and Rathnakar Rao N, Rajendra Singh C and Rathnakar Rao N Publishing, Bengaluru, 2023.
2.	Human Physiology, Stuart Fox, Krista Rompolski, McGraw-Hill eBook. 16 th Edition, 2022

Web links and Video Lectures (E-Resources)	
•	https://nptel.ac.in/courses/121106008
•	https://freevideolectures.com/course/4877/nptel-biology-engineers-other-non-biologists
	https://ocw.mit.edu/courses/20-020-introduction-to-biological-engineering-design-spring-2009



- <https://ocw.mit.edu/courses/20-010j-introduction-to-bioengineering-be-010j-spring-2006>
- <https://www.coursera.org/courses?query=biology>

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

1.	Group Discussion of Case studies.
2.	Model Making and seminar/poster presentations.
3.	Design of novel device/equipment like Cellulose-based water filters, Filtration system.

ASSESSMENT DETAILS (BOTH CIE AND SEE)

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	Internal Assessment1	50	30 (Average of Best two Assessments)	50
	Internal Assessment2	50		
	Internal Assessment3	50		
AAT	Any Two Assessments as per Regulations	20	20	
SEE	Semester End Examination	50	50	50
Total Marks				100

SEMESTER END EXAMINATION (SEE):

1. The Question paper shall be set for 50 marks and duration of SEE is 2 Hours.
2. Two questions of 10 marks (with minimum two sub questions) from each module with internal choice.
3. Students should answer five full questions, selecting one full question from each module.
4. Mention COs, POs, Bloom's Taxonomy levels in the question paper.

CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO8	PO11
CO1	1	-	-	-	-	1	1	-	1	1	1
CO2	1	-	-	-	-	1	-	1	-	1	1
CO3	1	-	-	-	-	1	-	1	-	1	1
CO4	1	-	-	-	-	1	2	-	2	1	1
CO5	1	-	-	-	-	1	2	2	1	2	1

Level 3 - High, Level 2 - Moderate, Level 1 - Low



Semester-V					
Environmental Science and E-Waste Management					
Category: NCMC (Common to All)					
Course Code	:	B24ESK510	CIE	:	100 Marks
Teaching Hours L : T : P : S	:	2:0:0:0	SEE	:	-
Total Hours/Semester	:	30	Total	:	100 Marks
Credits	:	PP	SEE Duration	:	-

Course Learning Objective is	
1.	To identify the major challenges of environment issues.
2.	To develop skills, critical thinking and demonstrate socio-economic skills for Environmental protection.
3.	To analyze the impact of issues w. r. t. waste management.

Module- 1	No. of Hours
Ecosystem and Sustainability: Ecosystems: Structure of Ecosystem, Types: Forest, Desert, Wetlands, Riverine, Oceanic ecosystems. Sustainability: 17SDG targets and possible actions.	6
Module- 2	No. of Hours
Natural Resources and Energy: Natural Resources: Water resources-Availability & Quality aspects, Water borne diseases & water induced diseases, Fluoride problem in drinking water. Energy: Different types of energy, Conventional sources & Non-Conventional sources of energy, solar energy. Wind energy, Hydrogen as an alternative energy.	6
Module- 3	No. of Hours
Environmental Pollution: Water Pollution, Noise pollution, Air pollution (Sources, Impacts, Preventive measures and public Health Aspects). Global Environmental Concerns (Concept, policies and case-studies): Ground water depletion/recharging, Climate Change; Acid Rain; Ozone Depletion; Radon and Fluoride problem in drinking water; Resettlement and rehabilitation of people, Environmental Toxicology.	6
Module- 4	No. of Hours
Waste management: Solid Waste Management, types and sources, functional elements of SWM, Biomedical Waste Management-Sources, Characteristics. Environmental Legislation: Solid Waste Management Rules, 2016, Biomedical Waste Management Rules, 2016.	6
Module- 5	No. of Hours
E-Waste Management: E-waste; composition and generation. Global context in e-waste; E-Waste pollutants, E-waste hazardous properties, Effects of pollutant (E-waste) on human health and surrounding environment, domestic e-waste disposal, Basic principles of E waste management, Component of E Waste management. E-waste (Management and Handling) Rules, 2011; and E-waste (Management) Rules, 2022-Salient Features and its implications.	6

Course Outcomes: At the end of the course, the students will be able to	
CO1	Comprehend the principles of ecology and environmental issues pertaining to air, land and water on a global scale.
CO2	Acquire observation skills for solving problems related to the environment.
CO3	Conduct survey to describe the realities of waste management system.

Text Books	
1.	S M Prakash, "Environmental Studies" 3 rd Edition, Elite Publishing House, Mangalore, 2018.
2.	Hester R.E., and Harrison R.M, Electronic Waste Management. Science, 2009.

Reference Text Books	
1.	Benny Joseph (2005), "Environmental Studies" , Tata McGraw – Hill Publishing Company Limited.
2.	Johri R., E-waste: implications, regulations, and management in India and current global best practices, TERI Press, New Delhi.

**Web links and Video Lectures (e-Resources):**

1.	https://www.youtube.com/playlist?list=PLXTQoJ3yDR1Tp9O8R7RZGmm_GdheHqM2w
3.	https://sdgs.un.org/goals
4.	https://kspcb.karnataka.gov.in/waste-management/biomedical-waste
5.	E Waste (Management) Rules, 2022: https://kspcb.karnataka.gov.in/sites/default/files/inlinefiles/E%20Waste%20%28Management%29%20Rules%2C%202022.pdf

ASSESSMENT DETAILS (CIE only)

The weightage of Continuous Internal Evaluation (CIE) is 100%. The minimum passing mark for the CIE is 40% of the maximum marks (40 marks out of 100).

CONTINUOUS INTERNAL EVALUATION (MCQs)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	Internal Assessment-1	50	50 (Average of Best two Assessments)	100
	Internal Assessment-2	50		
	Internal Assessment-3	50		
AAT	Two Assessments as per Regulations	50	50	
Total Marks				100

CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	0	0	0	0	3	2	0	0	0	0
CO2	0	0	0	0	0	1	1	0	0	0	1
CO3	0	0	0	0	0	2	2	0	0	0	2

Level 3 - High, Level 2 - Moderate, Level 1 - Low



Semester-V			
Research Methodology & IPR (RMIPR)			
Category: AEC			
Course Code	: B24RMK606	CIE	: 50 Marks
Teaching Hours L:T: P: S	: 1: 0: 0: 3	SEE	: 50 Marks
Total Hours/Semester	: 15	Total	: 100 Marks
Credits	: 1	SEE Duration	: 1 Hours

Course Learning Objective is	
1.	To understand the fundamentals of research, types of research methodologies, and ethical practices involved in engineering research.
2.	To develop the ability to conduct effective literature review, technical reading, and identify research gaps for problem formulation.
3.	To design research methodologies, apply appropriate sampling techniques, and perform data collection and hypothesis testing.
4.	To analyze, interpret, and present research findings through structured technical reports and research papers using standard tools and formats.
5.	To understand Intellectual Property Rights (IPR), patenting processes, and their role in innovation, society, and sustainable development.

Module – 1	No. of Hours
Introduction to Research & Research Methodology: Meaning, Objectives of Engg. Research & Characteristics of good research, Research Methods v/s Research Methodology, Types of engineering research, Descriptive v/s Analytical, Applied v/s Fundamental, Quantitative v/s Qualitative, Conceptual v/s Empirical, Research, Criteria of good research, Developing a research plan, Ethics & plagiarism in Engineering Research with Research Practice for different types of Research Misconducts, Case Study and Practice Sessions	3
Module – 2	No. of Hours
Literature Review and Technical Reading: What is literature review or survey, New & Existing Knowledge, Bibliographic Databases, Search Engines, Google & Google Scholar, Effective Search, Conceptualizing Research Reviews, Gaps in research, Critical and Creative Reading, Taking Notes While Reading, Defining research problems, Datasheets, Importance of literature review in defining a problem, Primary and secondary sources of info - Review articles, treatise, monographs, papers from conferences & journals, case-studies, reports, patents, web and net searching ; Identifying gap areas from literature review, Citations, Acknowledgments, Case Studies and Practice sessions.	3
Module – 3	No. of Hours
Research Design and Methods: Research design, Basic Principles, Need for research design, Features of good design, Development of Models, Developing a research plan, Exploration, Description, Diagnosis, Simulation and Experimentations, Determining experimental and sample designs, Sampling design, Steps in sampling design, Characteristics of a good sample design, Types of sample designs, Measurement and scaling techniques, Methods of data collection, Collection of primary & secondary data, Data collection instruments, Hypothesis - Basic Concepts, Testing of hypotheses, flow diagram for hypotheses testing, Case Study and Practice Sessions.	3
Module – 4	No. of Hours
Technical Report & Paper Writing: Interpretation and report writing, Techniques of interpretations, Structure and components of scientific reports, Different steps in the report preparation – Layout, organization, structure and language of the report, Illustrations and tables with result analysis (simulation or experimentation), Types of reports, technical reports, project reports (mini & major) and research thesis, Research tools for writing, Conclusions, Future works, Flow of a research article, Research paper writing for conference & journals, text-books, Case Study and Practice Sessions.	3
Module – 5	No. of Hours
IPRs & Copyrights: Intellectual Property, what are patents & copyrights in IP? Role of IP in the Economic and Cultural Development of the Society, IP Governance, Invention and Creativity, Importance and Protection of Intellectual Property Rights (IPRs), A brief summary of - Patents, Monographs, Copyrights ©, Registered Firms ®, Trademarks ™, Industrial Designs (Design Patent,	3



Utility Patent, Granted Patent, Commercialized Patent) – Indian & Foreign Patents, Steps in Patenting — Application and Procedures with Searches, Case Study and Practice Sessions.	
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Course Outcomes: At the end of the course, the students will be able to	
CO1	Explain research fundamentals, methodologies, and ethical practices in engineering research.
CO2	Perform literature review, identify research gaps, and formulate research problems.
CO3	Design research experiments, collect data, and apply hypothesis testing methods.
CO4	Analyze results and prepare technical reports and research papers.
CO5	Apply IPR concepts including patents, copyrights, and trademarks in research and innovation.

Research Papers & Technical References (Web-links & Video Resources)

- IEEE Xplore – <https://ieeexplore.ieee.org>
- Scopus – <https://www.scopus.com>
- Science Direct – <https://www.sciencedirect.com>
- Google Scholar – <https://scholar.google.com>
- Research Gate – <https://www.researchgate.net>

ASSESSMENT DETAILS (BOTH CIE AND SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

CONTINUOUS INTERNAL EVALUATION (MCQs)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	Internal Assessment-1	50	30 (Average of Best two Assessments)	50
	Internal Assessment-2	50		
	Internal Assessment-3	50		
AAT	Two Assessments as per regulations	20	20	
SEE	Semester End Examination	50		50
Total Marks				100

SEMESTER END EXAMINATION (SEE)

SEE paper shall be set for 50 questions, each of the 01 marks. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour. The student has to secure a minimum of 35% of the maximum marks meant for SEE.

CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	-	1	-	-	2	-	-	-	2
CO2	3	3	-	2	1	-	1	1	1	-	2
CO3	2	3	3	3	2	-	1	2	-	-	2
CO4	2	2	3	3	3	-	1	2	3	1	2
CO5	1	1	-	-	1	3	3	1	2	2	2

L = Low (1), M = Medium (2), H = High (3) - Blank = No significant mapping correlation levels

Semester - VI					
Capstone Project Work: Phase - I					
Category: SDC					
Course Code	:	B24PRJ607	CIE	:	100 Marks
Teaching Hours L:T:P:S	:	0:0:4:0	SEE	:	-
Total Hours	:	60	Total	:	100 Marks
Credits	:	2	SEE Duration	:	-

Capstone Project: Phase -I and Phase - II

The Capstone project is a comprehensive, year-long project carried out in two phases during 6th and 7th semesters of the undergraduate program. It integrates knowledge and skills acquired from multiple courses and disciplines to address a complex, real-world problem.

This project provides students with an opportunity to apply scientific principles, engineering methodologies, and technological tools to conceive, design, implement and evaluate an engineering solution.

It serves as a culminating academic experience to demonstrate program outcomes, including problem-solving ability, teamwork, communication skills, and practical application of engineering principles. Students can take up project individually or in a group not exceeding 4 students. The group may have students from the same discipline and drawn from different disciplines.

Types of Capstone Projects: Capstone projects undertaken for one year may fall into one or more of the following categories:

- a) Research-Oriented Projects :
 - Focus on investigating new concepts, theories, or technologies.
 - Aim to generate new knowledge or contribute to academic research.
- b) Experimental/Analytical Projects
 - Based on laboratory or field experiments to validate a hypothesis or study a phenomenon.

Simulation/ Modelling Projects

 - Including detailed data collection, analysis, and interpretation.
 - Use computational tools to model, simulate, and predict system behavior.
 - Reduce the need for physical prototyping in the initial stages.
- c) Industrial/Industry-Sponsored Projects
 - Carried out in collaboration with an industry partner.
 - Address real-world engineering problems faced by the organization.
- d) Interdisciplinary/Multidisciplinary Projects
 - Combine knowledge and techniques from multiple engineering domains or other fields such as management, medicine, or environmental sciences.
- e) Entrepreneurial/Innovation Projects
 - Focus on product or service innovation with potential for commercialization.

- Phase I Evaluation: Capstone Project Phase-I shall have only Continuous Internal Evaluation (CIE).
- In case disciplinary capstone project, the CIE shall be conducted by the Departmental Project Review Committee, which consists of a Senior Professor, the Project Guide, and one additional faculty member appointed by the principal for projects within the parent discipline.
- For Interdisciplinary Projects, the Project Review Committee will consist of one Senior Professor, the department and interdepartmental Project Guides and one faculty member from a department related to the interdisciplinary project. The committee members are appointed by the principal of the college.
- Phase I evaluation shall be based on rubrics designed to measure graduate attributes defined by NBA. Successful completion of Phase-I allows the student to proceed to Phase-II.
- Phase II Evaluation: CIE of Phase shall be evaluated as indicated with phase -I evaluation. The SEE shall be conducted by two examiners. The assessment shall be based on rubrics designed to measure graduate attributes.

Review #	Agenda	Assessment	Review Assessment Weightage
Review1	Project Synopsis / Proposal Evaluation	Rubric R1	15
Review2	Mid-Term Project Evaluation	Rubric R2	30
Review3	End Semester Project Evaluation	Rubric R3	30
Review4	Project Report Evaluation	Rubric R4	15
Review5	Evaluation by Guide	Rubric R5	10
Continuous Internal Evaluation (CIE)			100
Total Marks			100

Rubric #R1: Project Synopsis / Proposal Evaluation**Maximum Marks: 15**

		Excellent (5 Marks)	Good (4 Marks)	Average (3 Marks)	Acceptable (2 Marks)	Unacceptable (1 Marks)
a	Identification of Problem Domain and Detailed Analysis	Detailed and extensive explanation of the purpose and need of the project	Good explanation of the purpose and need of the project	Average explanation of the purpose and need of the project	Moderate explanation of the purpose and need of the project	Minimal explanation of the purpose and need of the project
b	Study of the Existing Systems and Feasibility of Project Proposal	Detailed and extensive explanation of the specifications and the limitations of the existing systems	Collects a great deal of information and good study of the existing systems	Moderate study of the existing systems; collects some basic information	Explanation of the specifications and the limitations of the existing systems not very satisfactory; limited information	Minimal explanation of the specifications and the limitations of the existing systems; incomplete information
c	Objectives and Methodology of the Proposed Work	All objectives of the proposed work are well defined; Steps to be followed to solve the defined problem are clearly specified	Good justification to the objectives; Methodology to be followed is specified but detailing is not done	Incomplete justification to the objectives proposed; Steps are mentioned but unclear; without justification to objectives	Only Some objectives of the proposed work are well defined; Steps to be followed to solve the defined problem are not specified properly	Objectives of the proposed work are either not identified or not well defined; Incomplete and improper specification

Rubric #R2: Mid-term Project Evaluation**Maximum Marks: 30**

Level of Achievement						
		Excellent(10)	Good (8)	Average(6)	Acceptable(4)	Unacceptable (2)
a	Design Methodology	- Division of problem in to modules and good selection of computing framework. - Appropriate design methodology and properly justification.	- Division of problem into modules and good selection of computing frame work. - Design methodology not properly justified.	- Division of problem into modules but in appropriate selection of computing framework. - Design methodology not defined properly.	- Partial division of problem into modules and inappropriate selection of computing framework. - Design methodology not defined properly.	- Modular approach not adopted. - Design methodology not defined.
b	Planning of Project Work and Team Structure	- Time frame properly specified and being followed. - Appropriate distribution of project work.	- Time frame properly specified and being followed. - Distribution of project work inappropriate.	- Time frame properly specified, but not being followed. - Distribution of project work un-even.	- Time frame properly specified, but not being followed. - Un-even distribution of Project work and no synchronization.	- Time frame not properly specified. - In-appropriate distribution of project work.

c	Demonstration and Presentation	- Objectives achieved as per time frame. - Contents of presentations are appropriate and well arranged. - Proper eye contact with audience and clear voice with good spoken language.	- Objectives achieved as per time frame - Contents of presentations are appropriate but not well arranged - Satisfactory demonstration, clear voice with good spoken language but eye contact not proper	- Objectives achieved as per time frame. - Contents of presentations are appropriate but not well arranged. - Presentation not satisfactory and average demonstration	- Objectives not achieved as per time frame. - Contents of presentations are not appropriate. - Eye contact with few people and unclear voice.	- No objectives achieved. - Contents of Presentations are not appropriate and not well delivered. - Poor delivery of presentation.
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Rubric #R3: End Semester Internal Project Evaluation

Maximum Marks: 30

		Excellent(10)	Good (8)	Average(6)	Acceptable(4)	Unacceptable (2)
a	Incorporation of Suggestions	Changes are made as per modifications suggested during midterm evaluation and new innovations added	Changes are made as per modifications suggested during mid-term evaluation and good justification	All major changes are made as per modifications suggested during midterm evaluation	Few changes are made as per modifications suggested during midterm evaluation	Suggestions during mid-term evaluation are not incorporated
b	Project Demonstration	- All defined objectives are achieved. - Each module working well and properly demonstrated. - All modules of project are well integrated and system working is accurate.	- All defined objectives are achieved. - Each module working well and properly demonstrated. - Integration of all modules not done and system working is not very satisfactory.	- All defined objectives are achieved. - Modules are working well in isolation and properly demonstrated. - Modules of project are not properly integrated.	- Some of the defined objectives are achieved. - Modules are working well in isolation and properly demonstrated - Modules of project are not properly integrated.	- Defined objectives are not achieved. - Modules are not in proper working form that further leads to failure of integrated system.
c	Presentation	- Contents of presentations are appropriate and well delivered. - Proper eye contact with audience and clear voice with good spoken language	- Contents of presentations are appropriate and well delivered. - Clear voice with good spoken language but less eye contact with audience	- Contents of presentations are appropriate but not well delivered - Eye contact with few people and unclear voice	- Contents of presentations are not appropriate. - Eye contact with few people and unclear voice	- Contents of presentations are not appropriate and not well delivered . - Poor delivery of presentation

Rubric #R4: Project Report Evaluation**Maximum Marks: 15**

Level of Achievement						
		Excellent(5)	Good (4)	Average(3)	Acceptable(2)	Unacceptable (1)
a	Project Report	- Project report is according to the specified format. - References and citations are appropriate and well mentioned.	- Project report is according to the specified format. - References and citations are appropriate but not mentioned well.	- Project report is according to the specified format but some mistakes. - In-sufficient references and citations.	- Project report is not fully according to the specified format. - In-sufficient references and citations	- Project report not prepared according to the specified format. - References and citations are not appropriate
b	Description of Concepts and Technical Details	- Complete explanation of the key concepts. - Strong description of the technical requirements of the project.	- Complete explanation of the key concepts. - In-sufficient description of the technical requirements of the project.	- Complete explanation of the key concepts but little relevance to literature. - In-sufficient description of the technical requirements of the project.	- All key concepts are not explained and very little relevant to literature. - In-sufficient description of the technical requirements of the Project.	- Inappropriate explanation of the key concepts. - Poor description of the technical requirements of the project.
c	Conclusion and Discussion	- Results are presented in very appropriate manner - Project work is well summarized and concluded. - Future extensions in the project are well specified.	- Results are presented in good manner. - Project work summary and conclusion not very appropriate. - Future extensions in the project are specified.	- Results presented are not much Satisfactory. - Project work summary and conclusion not very appropriate. - Future extensions in the project are specified.	- Results presented are not much satisfactory. - Project work summary and conclusion not very appropriate. - Future extensions in the project are not specified.	- Results are not presented properly. - Project work is not summarized and concluded. - Future extensions in the project are not specified.

Rubric #R5: Evaluation by Guide**Maximum Marks: 10**

Level of Achievement				
		Excellent (5)	Satisfactory(3)	Unsatisfactory(2)
a	Self-Motivation, Determination and Regularity	- Approaches the project with self-motivation and follows it through to completion. - Reports to the guide regularly and consistent in work.	- Completes the project but sometimes lacks self-motivation. - Reports to the guide but lacks consistency	- Lacks self-motivation and determination. - Irregular in attendance and in consistent in work.
b	Working with in a Team & Technical Knowledge and Awareness related to the Project	- Collaborates and communicates in a group situation and integrates the views of others. - Extensive knowledge related to the project.	- Exchanges some views but requires guidance to collaborate with others. - Fair knowledge related to the project	- Makes little or no attempt to collaborate in a group situation. - Lack sufficient knowledge.



Semester-VI					
Indian Knowledge Systems					
Category: HSMC					
(Common to All)					
Course Code	:	B24IKK610	CIE	:	100 Marks
Teaching Hours L:T:P:S	:	2:0:0:0	SEE	:	-
Total Hours/Semester	:	30	Total	:	100 Marks
Credits	:	PP	SEE Duration	:	-

Course Learning Objective is	
1.	To Understand the knowledge on basics of research and its types.
2.	To Learn the concept of Literature Review, Technical Reading, Attributions and Citations.
3.	To learn Ethics in Engineering Research.
4.	To Discuss the concepts of Intellectual Property Rights in engineering.

Module- 1	No. of Hours
Introduction: Meaning of Research, Objectives of Engineering Research, and Motivation in Engineering Research, Types of Engineering Research, Finding and Solving a Worthwhile Problem. Ethics in Engineering Research, Ethics in Engineering Research Practice, Types of Research Misconduct, Ethical Issues Related to Authorship.	6
Module- 2	No. of Hours
Literature Review and Technical Reading: New and Existing Knowledge, Analysis and Synthesis of Prior Art Bibliographic Databases, Web of Science, Google and Google Scholar, Effective Search: The Way Forward Introduction to Technical Reading Conceptualizing Research, Critical and Creative Reading, Taking Notes While Reading, Reading Mathematics and Algorithms, Reading a Datasheet. Attributions and Citations: Giving Credit Wherever Due, Citations: Functions and Attributes, Impact of Title and Keywords on Citations, Knowledge Flow through Citation, Citing Datasets, Styles for Citations, Acknowledgments and Attributions, What Should Be Acknowledged, Acknowledgments in, Books Dissertations, Dedication or Acknowledgments.	6
Module- 3	No. of Hours
Introduction To Intellectual Property: Role of IP in the Economic and Cultural Development of the Society, IP Governance, IP as a Global Indicator of Innovation, Origin of IP History of IP in India. Major Amendments in IP Laws and Acts in India. Patents: Conditions for Obtaining a Patent Protection, To Patent or Not to Patent an Invention. Rights Associated with Patents. Enforcement of Patent Rights. Inventions Eligible for Patenting. Non-Patentable Matters. Patent Infringements. Avoid Public Disclosure of an Invention before Patenting. Process of Patenting. Process of Patenting: Prior Art Search. Choice of Application to be Filed. Patent Application Forms. Jurisdiction of Filing Patent Application. Publication. Pre-grant Opposition. Examination. Grant of a Patent. Validity of Patent Protection. Post-grant Opposition. Commercialization of a Patent. Need for a Patent Attorney/Agent. Can a Worldwide Patent be Obtained? Do I Need First to File a Patent in India? Patent Related Forms. Fee Structure. Types of Patent Applications. Commonly Used Terms in Patenting. National Bodies Dealing with Patent Affairs. Utility Models.	6
Module- 4	No. of Hours
Copyrights and Related Rights: Classes of Copyrights. Criteria for Copyright. Ownership of Copyright. Copyrights of the Author. Copyright Infringements. Copyright Infringement is a Criminal Offence. Copyright Infringement is a Cognizable Offence. Fair Use Doctrine. Copyrights and Internet. Non-Copyright Work. Copyright Registration. Judicial Powers of the Registrar of Copyrights. Fee Structure. Copyright Symbol. Validity of Copyright. Copyright Profile of India. Copyright and the word 'Publish'. Transfer of Copyrights to a Publisher. Copyrights and the Word 'Adaptation'. Copyrights and the Word 'Indian Work'. Joint Authorship. Copyright Society. Copyright Board. Copyright Enforcement Advisory Council (CEAC). International Copyright Agreements, Conventions and Treaties. Interesting Copyrights Cases. Trademarks: Eligibility Criteria. Who Can Apply for a Strademark? Acts and Laws.	6



Designation of Trademark Symbols. Classification of Trademarks. Registration of a Trademark is Not Compulsory. Validity of Trademark. Types of Trademark Registered in India. Trademark Registry. Process for Trademarks Registration. Prior Art Search. Famous Case Law: Coca-Cola Company v/s. Bisleri International Pvt. Ltd.	
Module– 5	No. of Hours
Industrial Designs: Eligibility Criteria. Acts and Laws to Govern Industrial Designs. Design Rights. Enforcement of Design Rights. Non-Protectable Industrial Designs India. Protection Term. Procedure for Registration of Industrial Designs. Prior Art Search. Application for Registration. Duration of the Registration of a Design. Importance of Design Registration. Cancellation of the Registered Design. Application Forms. Classification of Industrial Designs. Designs Registration Trend in India. International Treaties. Famous Case Law: Apple Inc. vs. Samsung Electronics Co. Geographical Indications: Acts, Laws and Rules Pertaining to GI. Ownership of GI. Rights Granted to the Holders. Registered GI in India. Identification of Registered GI. Classes of GI. Non-Registerable GI. Protection of GI. Collective or Certification Marks. Enforcement of GI Rights. Procedure for GI Registration Documents Required for GI Registration. GI Ecosystem in India. Case Studies on Patents. Case study of Curcuma (Turmeric) Patent, Case study of Neem Patent, Case study of Basmati patent. IP Organizations In India. Schemes and Programmes	6

Course Outcomes: At the end of the course, the students will be able to	
CO1	To know the meaning of engineering research.
CO2	To know the procedure of the literature Review and Technical Reading.
CO3	To understand the fundamentals of the patent laws and drafting procedure.
CO4	Understanding the copyright laws and subject matters of copyrights and designs.
CO5	Understanding the basic principles of design rights.

Text Books	
1.	Dr. Santosh M Nejekar, Dr. Harish Bendigeri “Research Methodology and Intellectual Property Rights”, ISBN 978-93-5987-928-4, Edition: 2023-24.
Reference Text Books	
1.	David V. Thiel “Research Methods for Engineers” Cambridge University Press, 978-1-107-03488-4
2.	Intellectual Property Rights by N.K.Acharya Asia Law House 6 th Edition. ISBN: 978-93-81849-30-9

ASSESSMENT DETAILS (CIE only)

The weightage of Continuous Internal Evaluation (CIE) is 100%. The minimum passing mark for the CIE is 40% of the maximum marks (40 marks out of 50).

CONTINUOUS INTERNAL EVALUATION (MCQs)

CIE	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	Internal Assessment-1	50	30 (Average of Best two Assessments)	50
	Internal Assessment-2	50		
	Internal Assessment-3	50		
AAT	Two Assessments as per regulations	20	20	
SEE	Semester End Examination	50	50	50
Total Marks				100



CO-PO Mapping

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	0	0	0	0	3	2	0	0	0	0
CO2	0	0	0	0	0	1	1	0	0	0	1
CO3	0	0	0	0	0	2	2	0	0	0	2

Level 3 - High, Level 2 - Moderate, Level 1 - Low



SEMESTER-V & VI					
NATIONAL SERVICE SCHEME (NSS)					
Category: NCMC					
Course Code	:	B24NCK591/691	CIE	:	100 Marks
Teaching Hours L : T : P	:	1:0:0	SEE	:	---
Total Hours	:	50	Total	:	100 Marks
Credits	:	--	SEE Duration	:	--

Course Objectives	
1.	Understand the community in which they work
2.	Identify the needs and problems of the community and involve the min problem-solving
3.	Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems
4.	Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes
5.	Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony

CONTENT	No. of Hours
- Organic farming, Indian Agriculture (Past, Present and Future) Connectivity for marketing. - Waste management–Public, Private and Govt. organization. - Setting of the information imparting club for women leading to contribution in social and economic issues. - Water conservation techniques–Role of different take holders–Implementation. - Preparing an actionable business proposal for enhancing the village income and approach for implementation. - Helping local schools to achieve good results and enhance their enrolment in Higher/ technical/ vocational education. - Developing Sustainable Water management system for rural areas and implementation approaches. - Contribution to any national level initiative of Government of India.Digital India, Skill India, Swachh Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme, Skill development programs etc. - Spreading public awareness under rural outreach programs.(minimum 5 programs). - Social connect and responsibilities. - Plantation and adoption of plants. Know your plants. - Organize National integration and social harmony events/ workshops / seminars. (Minimum 02 programs). - Govt. school Rejuvenation and helping them to achieve good infrastructure. NOTE: Students have to take up any one activity on the above said topics and have to prepare content for awareness and technical contents for implementation of the projects and have to present strategies for implementation of the same. Compulsorily students have to attend one camp. CIE will be evaluated based on their presentation, approach and implementation strategies.	50



Course Outcomes: After completing the course, the students will be able to	
CO1	Understand the importance of his/her responsibilities towards society.
CO2	Analyze the environmental and societal problems/issues and will be able to design solutions for the same.
CO3	Evaluate the existing system and to propose practical solutions for the same for sustainable development.
CO4	Implement government or self-driven projects effectively in the field.

CO-PO Mapping

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12
CO1	3	2	-	-	3	-	-	-	-	-	-
CO2	3	2	-	-	3	-	-	-	-	-	-
CO3	3	2	-	-	3	-	-	-	-	-	-
CO4	3	2	-	-	3	-	-	-	-	-	-

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped



SEMESTER-V & VI					
NATIONAL CADET CORPS (NCC)					
Category: NCMC					
Course Code	:	B24NCK592/692	CIE	:	100 Marks
Teaching Hours L : T : P	:	1:0:0	SEE	:	--
Total Hours	:	50	Total	:	100 Marks
Credits	:	--	SEE Duration	:	--

Course Objectives	
1.	To develop character, camaraderie, discipline, secular outlook, the spirit of adventure, sportsman spirit, and ideals of selfless service amongst cadets by working in teams, honing qualities such as self-discipline, self-confidence, self-reliance, and dignity of labour in the cadets.
2.	To create a pool of organized, trained, and motivated youth with leadership qualities from all walks of life, who will serve the Nation regardless of which career they choose
3.	To provide a conducive environment to motivate young Indians to choose the Armed Forces as a career

Content	No. of Hours
Unit 1. Personality Development: Group Discussions - Change your Mindset, Public Speaking. Unit 2. Leadership Development: Case Studies– APJ Abdul Kalam, Deepa Malik, Maharana Pratap, N Narayan Murthy etc. Unit 3. Disaster management: Disaster Management Capsule, Organization, Types of Disasters, Essential Services, Assistance, Civil Defense Organization. Unit 4. Adventure: Adventure Activities Unit 5. Border & Coastal Areas: History, Geography & Topography of Border/ Coastal Areas. Unit 6. Drill: Arm Drill, Rifle ke saath Savdhan, Vishram aur Aram se, Rifle ke saath Parade Para aur Saj, Rifle ke saath Visarjan, Line Tod, Bhumi Shastra aur Uthao Shastra, Bagal Shastra aur Baju Shastra. Unit 7. Weapon Training: Short Range firing. Unit 8. Map Reading: Setting of Map, Findings North and Own Position Unit 9. Field Craft & Battle Craft: Observation, Camouflage, Concealment. Unit 10. Obstacle Training: Obstacle training - Introduction, Safety-measures, Benefits. Obstacle Course- Straight balance, Clear Jump, Gate Vault, Zig- Zag Balance, High Wall	50



SEMESTER-V & VI					
PHYSICAL EDUCATION(PE)					
Category: NCMC					
Course Code	:	B24NCK593/693	CIE	:	100 Marks
Teaching Hours L : T : P	:	1:0:0	SEE	:	--
Total Hours	:	--	Total	:	100 Marks
Credits	:	--	SEE Duration	:	--

Semester	Course
III	Fitness Components Kabaddi / KhoKho
IV	Athletics Volleyball Throw ball
V	Athletics Football / Hockey
V	Athletics Cricket / Base ball
VI	Athletics Netball / Basketball
VI	Individual Games Handball / Badminton

Notes:

- One Hour of Lecture is equal to 1 Credit
- One Hour of Tutorial is equal to 1 Credit (Except Languages)
- Two Hours of Practical is equal to 1 Credit
- SEE: Semester End Examination
- CIE: Continuous Internal Examination
- L+T+P: Lecture + Tutorial + Practical



Guideline for Athletic and Sports

Semester & Course Code	Course Title	Content	No. of Hours
3 rd Semester B24NCK393	Fitness Components	Meaning and Importance, Fit India Movement, Definition of fitness, Components of fitness, Benefits of fitness, Types of fitness and Fitness tips. Practical Components: Speed, Strength, Endurance, Flexibility, and Agility KABADDI A. Fundamental skills ➤ Skills in Raiding: Touching with hands, Use of leg-toe touch, squat leg thrust, side kick, mule kick, arrow fly kick, crossing of baulk line. Crossing of Bonus line. ➤ Skills of holding the raider: Various formations, catching from particular position, different catches, catching formation and techniques. ➤ Additional skills in raiding: Escaping from various holds, techniques of escaping from chain formation, offense and defense. ➤ Game practice with application of Rules and Regulations. B. Rules and their interpretations and duties of the officials.	Total-32 hours 2 hours / week
	Speed Strength Endurance Agility Flexibility		
	Kho kho	A. Fundamental skills ➤ Skills in Chasing: Sit on the box (Parallel & Bullet toe method), Get up from the box (Proximal & Distal foot method), Give Kho (Simple, Early, Late & Judgment), Pole Turn, Pole Dive, Tapping, Hammering, Rectification of foul. ➤ Skills in running: Chain Play, Ring play and Chain & Ring mixed play. ➤ Game practice with application of Rules and Regulations. B. Rules and their interpretations and duties of the officials.	
	Kabaddi	A. Fundamental skills 1. Skills in Raiding: Touching with hands, Use of leg-toe touch, squat leg thrust, side kick, mule kick, arrow fly kick, crossing of baulk line. Crossing of Bonus line. 2. Skills of holding the raider: Various formations, catching from particular position, different catches, catching formation and techniques. 3. Additional skills in raiding: Escaping from various holds, techniques of escaping from chain formation, offense and defense. 4. Game practice with application of Rules and Regulations. B. Rules and their interpretations and duties of the officials	



4th Semester B24NCK493	Athletics Track-Sprints Jumps-Long Jump Throws-Shot Put	Track Events ➤ Starting Techniques: Standing start and Crouch start (its variations) use of Starting Block. ➤ Acceleration with proper running techniques. ➤ Finishing technique: Run Through, Forward Lunging and Shoulder Shrug. Long Jump: Approach Run, Take-off, Flight in the air (Hang Style / Hitch Kick) and Landing Shot put: Holding the Shot, Placement, Initial Stance, Glide, Delivery Stance and Recovery (Perry O'Brien Technique)	Total-32 hours 2 hours / week
	Volleyball	A. Fundamental skills Service: Under arm service, Side arm service, Tennis service, Floating service. Pass: Under arm pass, Over head pass. Spiking and Blocking. Game practice with application of Rules and Regulations B. Rules and their interpretation and duties of officials.	
	Throw ball	A. Fundamental skills Overhand service, Side arm service, two hand catching, one hand overhead return, side arm return. B. Rules and their interpretations and duties of officials	

5th Semester B24NCK593	Athletics Track-110&400 Meters Hurdles Jumps-High Jump Throws-Discus Throw	110 Meters and 400 Meters: Hurdling Technique: Lead leg Technique, Trail leg Technique, Side Hurdling, Over the Hurdles Crouch start (its variations) use of Starting Block. Approach to First Hurdles, In Between Hurdles, Last Hurdles to Finishing. High jump: Approach Run, Take-off, Bar Clearance (Straddle) and Landing. Discus Throw: Holding the Discus, Initial Stance Primary Swing, Turn, Release and Recovery (Rotation in the circle).	
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5th Semester B24NCK593	Football	A. Fundamental Skills ➤ Kicking: Kicking the ball with inside of the foot, Kicking the ball with Full Instep of the foot, Kicking the ball with Inner Instep of the foot, Kicking the ball with Outer Instep of the foot and Lofted Kick. ➤ Trapping: Trapping-the Rolling ball, and the Bouncing ball with sole of the foot. ➤ Dribbling: Dribbling the ball with Instep of the foot, Dribbling the ball with Inner and Outer Instep of the foot. ➤ Heading: In standing, running and jumping condition. ➤ Throw-in: Standing throw-in and Running throw-in. ➤ Feinting: With the lower limb and upper part of the body. ➤ Tackling: Simple Tackling, Slide Tackling. ➤ Goal Keeping: Collection of Ball, Ballclearance-kicking, throwing and deflecting. ➤ Game practice with application of Rules and Regulations. B. Rules and their interpretation and duties of officials.	Total-32 hours 2 hours / week
	Hockey	A. Fundamental Skills ➤ Passing: Short pass, Long pass, push pass, hit ➤ Trapping. ➤ Dribbling and Dozing. ➤ Penalty stroke practice. ➤ Penalty corner practice. ➤ Tackling: Simple Tackling, Slide Tackling. ➤ Goal Keeping, Ball clearance-kicking, and deflecting. ➤ Game practice with application of Rules and Regulations. B. Rules and their interpretation and duties of officials.	
	<u>Athletics</u> Track-Relays Jumps-Triple Jump Throws-Javelin Throw	Relay Race: Starting, Baton Holding / Carrying, Baton Exchange in between zone, and Finishing. Triple Jump: Approach Run, Take-off, Flight in the Hop, Step, Jump and Landing. Javelin Throw: Grip, Carry, and Recovery (3/5 Impulse stride). Release.	Total-32 hours 2 hours / week
	CRICKET	A. Fundamental Skills ➤ Batting-Forward Defense Stroke, Backward Defense Stroke, Off Drive, On Drive, Straight Drive, Cover Drive, Square Cut. ➤ Bowling-Out-swing, In-swing, Off Break, Leg Break and Googly. ➤ Fielding: Catching - The High Catch, The Skim Catch, The Close Catch and throwing at the stumps from different angles. Long Barrier and Throw, Short Throw, Long Throw, Throwing on the Turn. ➤ Wicket Keeping B. Rules and their interpretation and duties of officials.	



	BASEBALL	A. Fundamental Skills Player Stances—walking, extending walking, L stance, cat stance. Grip – standard grip, choke grip. Batting – swing and bunt. Pitching. Baseball: Slider, fast pitch, curve ball, drop ball, rise ball, change up, knuckle ball, screw ball. B. Rules and their interpretation and duties of officials.	
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6th Semester B24NCK693	Athletics Combined Events- Heptathlon & Decathlon Jumps- Pole Vault Throws- Hammer Throw	Combined Events: Heptathlon all the 7 events Decathlon: All 10 Events Pole Vault: Approach Run, Planting the Pole, Take-off, Bar Clearance and Landing. Hammer Throw: Holding the Hammer, Initial Stance Primary Swing, Turn, Release and Recovery (Rotation in the circle).	Total-32 hours 2 hours / week
	Basketball	A. Fundamental Skills ➤ Passing: Two hands Chest Pass, Two hands Bounce Pass, One hand Base ball Pass, Side arm Pass, Overhead Pass, Hook Pass. ➤ Receiving: Two hand receiving, one hand receiving, Receiving in stationary position, receiving while jumping and Receiving while Running. ➤ Dribbling: How to start dribble, drop dribble, High Dribble, Low Dribble, Reverse Dribble, Rolling Dribble. ➤ Shooting: Lay-up shot and its variations, one hand set shot, two hands jump shot, Hook shot, Free Throw. ➤ Rebounding: Defensive rebound and Offensive rebound. ➤ Individual Defence: Guarding the player with the ball and without the ball, pivoting. ➤ Game practice with application of Rules and Regulations. B. Rules and their interpretation and duties of officials.	
	Netball	A. Fundamental skills ➤ Catching: one handed, two handed, with feet grounded and in flight. ➤ Throwing (Different passes and their uses): One hand passes (shoulder, high shoulder, underarm, bounce, lob), two hand passes (Push, overhead and bounce). ➤ Footwork: Landing on one foot, landing on two feet, Pivot, Running pass. ➤ Shooting: One hand, forward step shot, and back ward step shot.	



		➤ Techniques of free dodge and sprint, sudden sprint, sprint and stop, sprinting with change at speed. ➤ Defending: Marking the player, marking the ball, blocking, inside the circle, outside the circle. Defending the circle edge against the passing. ➤ Intercepting: Pass and shot. ➤ Game practice with application of Rules and Regulations. B. Rules and their interpretation and duties of officials.	
Individual games Shuttle Badminton		A. Fundamental skills ➤ Basic Knowledge: Various parts of the Racket and Grip. ➤ Service: Short service, Long service, Long-high service. ➤ Shots: Over head shot, Defensive clear shot, Attacking clear shot, Drop shot, Net shot, Smash. ➤ Game practice with application of Rules and Regulations. B. Rules and their interpretation and duties of officials.	Total-32 hours 2 hours / week
Table Tennis		A. Fundamental skills ➤ Basic Knowledge: Various parts of the Racket and Grip (Shake Hand & Pen Hold Grip). ➤ Stance: Alternate & Parallel. ➤ Push and Service: Backhand & Forehand. ➤ Chop: Backhand & Forehand. ➤ Receive: Push and Chop with both Backhand & Forehand. ➤ Game practice with application of Rules and Regulations. B. Rules and their interpretation and duties of officials.	
Hand ball		A. Fundamental skills ➤ Catching, Throwing and Ball control, ➤ Goal Throws: Jump shot, Center shot, Dive shot, Reverse shot. ➤ Dribbling: High and low. ➤ Attack and counter attack, simple counter attack, counter attack from two wings and center. ➤ Blocking, Goal Keeping and Defensive skills. ➤ Game practice with application of Rules and Regulations. B. Rules and their interpretation and duties of officials.	
Ball Badminton		A. Fundamental skills ➤ Basic Knowledge: Various parts of the Racket and Grip. ➤ Service: Short service, Long service, Long-high service. ➤ Shots: Over head shot, Defensive clear shot, Attacking clear shot, Drop shot, Net shot, Smash. ➤ Game practice with application of Rules and Regulations. B. Rules and their interpretation and duties of officials.	



REFERENCES

1. Saha, A. K. Sarir Siksher Ritiniti, Rana Publishing House, Kalyani.
2. Bandopadhyay, K. Sarir Siksha Parichay, Classic Publishers, Kolkata.
3. Petipus, et al. Athlete's Guide to Career Planning, Human Kinetics.
4. Dharma, P. N. Fundamentals of Track and Field, Khel Sahitya Kendra, New Delhi.
5. Jain, R. Play and Learn Cricket, Khel Sahitya Kendra, New Delhi.
6. Vivek Thani, Coaching Cricket, Khel Sahitya Kendra, New Delhi.
7. Saha, A. K. Sarir Siksher Ritiniti, Rana Publishing House, Kalyani.
8. Bandopadhyay, K. Sarir Siksha Parichay, Classic Publishers, Kolkata
9. Naveen Jain, Play and Learn Basketball, Khel Sahitya Kendra, New Delhi.
10. Dubey, H. C. Basketball, Discovery Publishing House, New Delhi.
11. Rachana Jain, Teach Yourself Basketball, Sports Publication.
12. Jack Nagle, Power Pattern Of fences for winning basketball, Parker Publishing Co., New York. 13 Renu Jain, Play and Learn Basketball, Khel Sahitya Kendra, New Delhi.
13. Sally Kus, Coaching Volleyball Successfully, Human Kinetics.
14. Saha, A. K. Sarir Siksher Ritiniti, Rana Publishing House, Kalyani.
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SEMESTER-V & VI					
YOGA					
Category: NCMC					
Course Code	:	B24NCK594/694	CIE	:	100 Marks
Teaching Hours L : T : P	:	1:0:0	SEE	:	--
Total Hours	:	--	Total	:	100 Marks
Credits	:	--	SEE Duration	:	--

Semester	Course
III Semester	1) Introduction of Yoga, Aim and Objectives of yoga, Prayer 2) Brief introduction of yogic practices for common man 3) Rules and regulations 4) Misconceptions of yoga 5) Suryanamaskara 6) Different types of Asanas - Sitting - Standing - Prone line - Supine line
IV Semester	1) Patanjali's Ashtanga Yoga 2) Suryanamaskara 3) Different types of Asanas - Sitting - Standing - Prone line - Supine line 4) Kapalbhathi 5) Pranayama
V Semester	1) Patanjali's Ashtanga Yoga 2) Surya namaskara 3) Different types of Asanas - Sitting - Standing - Proneline - Supineline 4) Kapalbhathi 5) Pranayama



	1) Patanjali's Ashtanga Yoga 2) Suryanamaskara 3) Different types of Asanas a. Sitting b. Standing c. Prone line d. Supine line 4) Kapalbhathi 5) Pranayama
VI Semester	1) Patanjali's Ashtanga Yoga 2) Suryanamaskara 3) Different types of Asanas a. Sitting b. Standing c. Prone line d. Supine line 4) Kapalbhathi 5) Pranayama
	1) Patanjali's Ashtanga Yoga 2) Suryanamaskara 3) Different types of Asanas a. Sitting b. Standing c. Prone line d. Supine line 4) Kapalbhathi 5) Pranayama 6) Shat Kriyas

Notes:

- One Hour of Lecture is equal to 1 Credit
- One Hour of Tutorial is equal to 1 Credit (Except Languages)
- Two Hours of Practical is equal to 1 Credit
- SEE: Semester End Examination
- CIE: Continuous Internal Examination
- L+T+P: Lecture + Tutorial + Practical



Guidelines for Yoga Syllabus

Semester & Course Code	Course Title	Content	No. of Hours
3rd Semester B24NCK394	Introduction of Yoga, Aim and Objectives of yoga, Prayer	Yoga, its origin, history and development. Yoga, its meaning, definitions. Different schools of yoga, importance of prayer	Total-32 hours 2 hours / week
	Brief introduction of yogic practices for common man	Yogic practices for common man to promote positive health	
	Rules and regulations	Rules to be followed during yogic practices by practitioner	
	Misconceptions of yoga	Yoga its misconceptions, Difference between yogic and non yogic practices.	
	Suryanamaskara	Suryanamaskar prayer and its meaning, Need, importance and benefits of Suryanamaskar 12 count, 2 rounds	
	Different types of Asanas Sitting ➤ Padmasana ➤ Vajrasana Standing ➤ Vrikshana ➤ Trikonasana Prone line ➤ Bhujangasana ➤ Shalabhasana Supine line ➤ Utthitadvipadasana ➤ Ardhalasana	Asana, Need, importance of Asana. Different types of asana. Asana its meaning by name, technique, precautionary measures and benefits of each asana.	



4th Semester B24NCK494	Patanjali's Ashtanga Yoga ➤ Yama ➤ Niyama	Patanjali's Ashtanga Yoga its need and importance. <u>Yama:</u> Ahimsa, satya, asteya, brahmacarya, aparigraha. <u>Niyama:</u> shoucha, santosh, tapa, svaadhyaya, Eshvara pranidhan	Total-32 hours 2 hours / week
	Suryanamaskara	Suryanamaskar 12 count, 4 rounds	
	Different types of Asanas Sitting ➤ Sukhasana ➤ Paschimottanasana Standing ➤ Ardhakati Chakrasana ➤ Parshva Chakrasana Prone line ➤ Dhanurasana Supine line ➤ Halasana ➤ Karna Peedasana	Asana, Need, importance of Asana. Different types of asana. Asana its meaning by name, technique, precautionary measures and benefits of each asana.	
	Kapalabhati	Meaning, importance and benefits of Kapalabhati. 40 strokes/min, 3 rounds	
	Pranayama ➤ Suryanuloma–Viloma ➤ Chandranuloma-Viloma ➤ Suryabhedana ➤ ChandraBhedana ➤ Nadishodhana	Meaning, Need, importance of Pranayama. Different types. Meaning by name, technique, precautionary measures and benefits of each Pranayama	



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5th Semester B24NCK594	Ashtanga Yoga ➤ Asana ➤ Pranayama	Patanjali's Ashtanga Yoga its need and importance.	Total-32 hours 2 hours / week
	Suryanamaskara	Suryanamaskar 12 count, 6 rounds	
	Different types of Asanas Sitting ➤ Ardha Ushtrasana ➤ Vakrasana Standing ➤ Urdhva Hastothanasana ➤ Hastapadasana Prone line ➤ Padangushtha Dhanurasana Supine line ➤ Sarvangasana ➤ Chakraasana	Asana, Need, importance of Asana. Different types. Asana its meaning by name, technique, precautionary measures and benefits of each asana.	
	Kapalabhati	Revision of practice 50 strokes/min, 3 rounds	
	Pranayama ➤ Surya Bhedana ➤ Ujjayi	Meaning, Need, importance of Pranayama. Different types. Meaning by name, technique, Precautionary measures and benefits of each Pranayama.	
	Ashtanga Yoga ➤ Pratyahara ➤ Dharana	Patanjali's Ashtanga Yoga its need and importance.	
	Suryanamaskara	Revision of practice 12 count, 8 rounds	
	Different types of Asanas Sitting ➤ Aakarna Dhanurasana ➤ Yogamudra in Padmasana Standing ➤ Parivritta Trikonasana ➤ Utkatasana Prone line ➤ Poorna Bhujangasana/	Asana, Need, importance of Asana. Different types, Asana by name, technique, precautionary measures and benefits of each asana.	Total-32 hours 2 hours / week



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	Rajakapotasana Supine line ➤ Navasana/Noukasana ➤ Pavanamuktasana	
	Kapalabhati	Revision of practice 60 strokes/min, 3 rounds
	Pranayama ➤ Sheetali ➤ Sheektari	Meaning, Need, importance of Pranayama. Different types. Meaning by name, technique, precautionary measures and benefits of each Pranayama

6th Semester B24NCK694	Ashtanga Yoga ➤ Dhyana (Meditation) ➤ Samadhi	Patanjali's Ashtanga Yoga its need and importance.	Total-32 hours 2 hours / week
	Suryanamaskara	Revision of practice 12count, 10rounds.	
	Different types of Asanas Sitting ➤ Vibhakta Paschimottanasana ➤ Yogamudra inVajrasana Standing ➤ Parshvakonasana ➤ Ekapadbaddhapadmottanasana Prone line balancing ➤ Mayurasana Supine line ➤ Sarvangasana ➤ Setubandhasana ➤ Shavasanaa (Relaxation poisture)	Asana, Need, Importance of Asana. Different types, Asana by name, technique, precautionary measures and benefits of each asana.	
	Kapalabhati	Revision of practice 80 strokes/min, 3 rounds	



	Pranayama ➤ Bhastrika ➤ Bhramari	Meaning, Need, importance of Pranayama. Different types. Meaning by name, technique, Precautionary measures and benefits of each Pranayama.	
	Suryanamaskara Different types of Asanas Sitting ➤ Bakasana ➤ Hanumanasana ➤ Ekapada Rajakapotasana Standing ➤ Vatayanasana ➤ Garudasana ➤ Natarajasana Balancing ➤ Sheershasana Supine line ➤ 1.Setubandha Sarvangasana ➤ Shavasanaa (Relaxation poisture)	Revision of practice 12count, 12 rounds. Asana, Need, importance of Asana. Different types, Asana by name, technique, precautionary measures and benefits of each asana.	Total-32 hours 2 hours / week
	Kapalabhati	Revision of practice 100 strokes/min, 3 rounds.	
	Pranayama ➤ Nadishodhana ➤ Ujjai ➤ Bhramari	Revision of practices	
	ShatKriyas ➤ Jalaneti & sutraneti ➤ Nouli (only for men) ➤ Sheetkarma Kapalabhati	Meaning, Need, importance of Shatkriya. Different types. Meaning by name, technique, precautionary measures and benefits of each Kriya	

Book for Reference:

- Swami Kuvulyananda: Asma (Kavalyadhama, Lonavala)
- Tiwari, O P: Asana Why and How



- Ajitkumar: Yoga Pravesha (Kannada)
- Swami Satyananda Saraswati: Asana Pranayama, Mudra, Bandha (Bihar School of yoga, Munger)
- Swami Satyananda Saraswati: Surya Namaskar (Bihar School of yoga, Munger)
- Nagendra H R: The art and science of Pranayama
- Tiruka: Shatkriyegalu (Kannada)
- Iyengar B K S: Yoga Pradipika (Kannada)
- Iyengar B K S: Light on Yoga (English)



SEMESTER-V & VI					
MUSIC					
Category: NCMC					
Course Code	:	B24NCK595/695	CIE	:	100 Marks
Teaching Hours L : T : P	:	1:0:0	SEE	:	--
Total Hours	:	--	Total	:	100 Marks
Credits	:	--	SEE Duration	:	--

Course Objectives	
1.	Identify the major traditions of Indian music, both through notations and aurally.
2.	Analyze the compositions with respect to musical and lyrical content
3.	Demonstrate an ability to use music technology appropriately in a variety of setting.

Module – 1	No. of Hours
Preamble: Contents of the curriculum intend to promote music as language to develop an analytical, Creative, and intuitive Understanding. For this the student must experience music through study and direct participation in improvisation and composition. Origin of the Indian Music: Evolution of the Indian music system, Understanding of Shruthi, Nada, Swara, Laya, Raga Tala, Mela.	3
Module – 2	No. of Hours
Compositions: Introduction to the types of composition in Carnatic Music- Geethe, Jath i, Swara, Swarajathi, Varna, Krithi, and Thillana, Notation System.	3
Module – 3	No. of Hours
Composers: Biography and contributions of Purandaradasa, Thyagaraja, Mysoro Vasudevacharya.	3
Module – 4	No. of Hours
Music Instruments: Classification and construction of string instruments, wind instrumrnts, percussion instruments, Idiophones (Ghana Vaadya), Examples of each class of Instrum ents	3
Module – 5	No. of Hours
Abhyasa Gana: Singing the swara exercises (Sarale Varase Only), Botation writing for Sarale Varase and Suladi Saptha Tala (Only in Mayamalavagowla Raga), Singing 4 Geethe in M alahari, and one jathi Swara, One Krithi in a Mela raga	14

Course Outcomes: At the end of the course, the students will be able to	
CO1	Discuss the Indian system of music and relate it to other genres (Cognitive DOrmain)
CO2	Experience the emotions of composer and develop empathy (Affective Domain)
CO3	Respond to queries on various patterns in a composition (Psycho Motor Domain)

Text Books	
1.	Vidushi Vasantha Madhavi, "Theory of Music", Prism Publication, 2007.
2.	T Sachidevi and T Sharadha (Thirumalai Sisters), Karnataka Sangeetha Dharpana- Vol. 1 (English), Shreenivaas Prakaashana, 2018.

Reference Text Books	
1.	Lakshminarayana Subramaniam, Viji Subramanaim, "Classical Music of India: A Practical Guige", Tranqueber 2018.
2.	R. Rangaramanuja Ayyangar, "History of South Indian (Carnatic) Music", Vipanci Charitable Trust; Third edition, 2019.
3.	Ethel Rosenthal, "The Story of Indian Music and Its Istruments: A Study of the Present and a Record of the Past", Pilgrims Publishing, 2007.
4.	Carnatic Music, National Institute of Open Schooling, 2019.