

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI.



Scheme of Teaching and Examinations and Syllabus
M.Tech., COMPUTER AIDED STRUCTURAL ENGINEERING (CAS)
(Effective from Academic year 2022-24)

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI											
Scheme of Teaching and Examinations – 2022 - 24											
M.Tech., COMPUTER AIDED STRUCTURAL ENGINEERING (CAS)											
Choice Based Credit System (CBCS) and Outcome Based Education(OBE)											
I SEMESTER											
Sl. No	Course	Course Code	Course Title	Teaching Hours per Week			Examination			Credits	
				Theory	Practical	Skill Development Activities	Duration in hours	CIE Marks	SEE Marks		Total Marks
				L	P	SDA					
1	BSC	22CAS11	Structural Optimization - Theory & Computations	03	--	--	03	50	50	100	3
2	PCC	22CAS12	Computational Structural mechanics - Classical and FE approach	02	--	02	03	50	50	100	3
3	IPCC	22CAS13	Advanced Design of RC Structural Elements	03	02	--	03	50	50	100	4
4	PCC	22CAS14	Structural Dynamics-Theory and Computations	04	--	--	03	50	50	100	4
5	PCC	22CAS15	Mechanics of Deformable Bodies	03	--	--	03	50	50	100	3
6	MCC	22RMI16	Research Methodology and IPR	03	--	--	03	50	50	100	3
7	PCCL	22CASL17	Structural Laboratory –I	01	02	00	03	50	50	100	2
8	AUD/AEC	22AUD18/ 22AEC18	Any SWAYAM/ NPTEL structural engineering related ONLINE courses (conducting during current semester), whose lecture hours are not less than 8 weeks.	Classes and evaluation procedures are as per the policy of the online course providers.							PP
TOTAL				19	04	02	21	350	350	700	22
<p>Note: BSC-Basic Science Courses, PCC: Professional core. IPCC-Integrated Professional Core Courses, MCC- Mandatory Credit Course, AUD/AEC –Audit Course / Ability Enhancement Course(A pass in AUD/AEC is mandatory for the award of the degree), PCCL-Professional Core Course lab, L-Lecture, P-Practical, T/SDA-Tutorial / Skill Development Activities(Hours are for Interaction between faculty and students)</p>											
<p>Integrated Professional Core Course (IPCC): Integrated Professional Core Course (IPCC): Refers to Professional Theory Core Course Integrated with practical of the same course. The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper.</p> <p>Audit Courses /Ability Enhancement Courses Suggested by BOS (ONLINE courses): Audit Courses: These are prerequisite courses suggested by the concerned Board of Studies. Ability Enhancement Courses will be suggested by the BoS if prerequisite courses are not required for the programs. Ability Enhancement Courses:</p> <ul style="list-style-type: none"> • These courses are prescribed to help students to enhance their skills in in fields connected to the field of specialisation as well allied fields that leads to employable skills. Involving in learning such courses are impetus to lifelong learning. • The courses under this category are online courses published in advance and approved by the concerned Board of Studies. • Registration to Audit /Ability Enhancement Course shall be done in consultation with the mentor and is compulsory during the concerned semester. • In case a candidate fails to appear for the proctored examination or fails to pass the selected online course, he/she can register and appear for the same course if offered during the next session or register for a new course offered during that session, in consultation with the mentor. • The Audit Ability Enhancement Course carries no credit and is not counted for vertical progression. However, a pass in such a course is mandatory for the award of the degree. <p>Skill development activities: Under Skill development activities in a concerning course, the students should</p> <ol style="list-style-type: none"> 1. Interact with industry (small, medium, and large). 2. Involve in research/testing/projects to understand their problems and help creative and innovative methods to solve the 											

problem.

3. Involve in case studies and field visits/ fieldwork.
4. Accustom to the use of standards/codes etc., to narrow the gap between academia and industry.
5. Handle advanced instruments to enhance technical talent.
6. Gain confidence in modelling of systems and algorithms for transient and steady-state operations, thermal study, etc.
7. Work on different software/s (tools) to simulate, analyze and authenticate the output to interpret and conclude.

All activities should enhance student's abilities to employment and/or self-employment opportunities, management skills, Statistical analysis, fiscal expertise, etc.

Students and the course instructor/s to involve either individually or in groups to interact together to enhance the learning and application skills of the study they have undertaken. The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.

Internship: All the students have to undergo mandatory internship of 6 weeks during the vacation of I and II semesters and /or II and III semesters. A University examination shall be conducted during III semester and the prescribed internship credit shall be counted for the same semester. Internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take-up/complete the internship shall be declared as fail in internship course and have to complete the same during the subsequent University examination after satisfying the internship requirements.

Note: (i) Four credit courses are designed for 50 hours Teaching – Learning process.
 (ii) Three credit courses are designed for 40 hours Teaching – Learning process.
 (iii) Two credit courses are designed for 25 hours Teaching – Learning process.

PCC - 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 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.
- Continuous Internal Evaluation:
- Three Unit Tests each of 20 Marks
- Two assignments each of 20 Marks or one Skill Development Activity of 40 marks
- to attain the COs and POs
- The sum of three tests, two assignments/skill Development Activities, will be scaled down to 50 marks
- CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

PCC - Semester End Examination:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have a sub-question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

IPCC - 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 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

CIE for the theory component of IPCC

- Two Tests each of 20 Marks
- Two assignments each of 10 Marks/One Skill Development Activity of 20 marks
- Total Marks of two tests and two assignments/one Skill Development Activity added will be CIE for 60 marks, marks scored will be proportionally scaled down to 30 marks.

CIE for the practical component of IPCC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall

be awarded on the same day. The 15 marks are for conducting the experiment and preparation of the laboratory record, the other 05 marks shall be for the test conducted at the end of the semester.

- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test at the end /after completion of all the experiments shall be conducted for 50 marks and scaled down to 05 marks.
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for 20 marks.

SEE for IPCC

- Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (duration 03 hours)
- The question paper will be set for 100 marks and marks scored will be scaled down proportionately to 50 marks.
- The question paper will have ten questions. Each question is set for 20 marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
- The students have to answer 5 full questions, selecting one full question from each module.
- The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper shall include questions from the practical component.
- The minimum marks to be secured in CIE to appear for SEE shall be the 15 (50% of maximum marks -30) in the theory component and 10 (50% of maximum marks -20) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 04/05 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than the 20 marks.
- SEE will be conducted for 100 marks and students shall secure 40% of the maximum marks to qualify in the SEE. Marks secured will be scaled down to 50. (Student has to secure an aggregate of 50% of maximum marks of the course(CIE+SEE))

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Choice Based Credit System (CBCS) and Outcome Based Education(OBE)											
II SEMESTER											
Sl. No	Course	Course Code	Course Title	Teaching Hours /Week			Examination				Credits
				Theory	Practical/ Seminar	Skill Development Activities	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	P	SDA					
1	PCC	22CAS21	Finite Element Analysis of Structural Systems – Concepts and Procedures	02	--	02	03	50	50	100	3
2	IPCC	22CAS22	Analysis of Plates and shells –Classical and FE Approach	03	02		03	50	50	100	4
3	PEC	22CAS23X	Professional elective 1	03	--	--	03	50	50	100	3
4	PEC	22CAS24X	Professional elective 2	03	--	--	03	50	50	100	3
5	MPS	22CAS25	Mini Project with Seminar	00	04	02	--	100	--	100	3
6	PCCL	22CASL26	Software Computational Laboratory –II	01	02	00	03	50	50	100	2
7	AUD/AEC	22AUD27/ 22AEC27	Any SWAYAM/ NPTEL structural engineering related ONLINE courses (conducting during current semester), whose lecture hours are not less than 8 weeks.	Classes and evaluation procedures are as per the policy of the online course providers.							PP
TOTAL				12	08	04	15	350	250	600	18
Note: BSC-Basic Science Courses, PCC: Professional core. IPCC-Integrated Professional Core Courses, MCC- MandatoryCredit Course, AUD/AEC –Audit Course / Ability Enhancement Course(A pass in AUD/AEC is mandatory for the award of the degree), PCCL-Professional Core Course lab, L-Lecture, P-Practical, T/SDA-Tutorial / Skill Development Activities(Hours are for Interaction between faculty and students).											
Professional Elective 1				Professional Elective 2							
Course Code under 20CAS24X	Course title			Course Code under 20CAS25X	Course title						
22CAS231	Python and its application in civil engineering			22CAS241	Seismic resistant design of structural systems						
22CAS232	Design of Tall structures			22CAS242	Applications of IoT in Civil Engineering						
22CAS233	Advanced Design of Pre-stressed Concrete Structures			22CAS243	Advances in Artificial Intelligence						
22CAS234	Composite and Smart Materials			22CAS244	Numerical Methods and programming						
Note: 1 Mini Project with Seminar: This may be hands-on practice, survey report, data collection and analysis, coding, mobile											

app development, field visit and report preparation, modelling of system, simulation, analysing and authenticating, case studies, etc.

The CIE marks shall be awarded by a committee comprising of HoD as Chairman, Guide/co-guide, if any, and a senior faculty of the department. Students can present the seminar based on the completed mini-project. Participation in the seminar by all postgraduate students of the program shall be mandatory.

The CIE marks awarded for Mini-Project work and Seminar shall be based on the evaluation of Mini Project work and Report, Presentation skill and performance in Question and Answer session in the ratio 50:25:25. Mini-Project with Seminar shall be considered as a head of passing and shall be considered for vertical progression as well as for the award of degree. Those, who do not take-up/complete the Mini Project and Seminar shall be declared as fail in that course and have to complete the same during the subsequent semester. There is no SEE for this course.

2. Internship: All the students shall have to undergo a mandatory internship of 06 weeks during the vacation of II and III semesters. A University examination shall be conducted during III semester and the prescribed internship credit shall be counted in the same semester. The internship shall be considered as a head of passing and shall be considered for vertical progression as well as for the award of degree. Those, who do not take-up/complete the internship shall be declared as fail in the internship course and have to complete the same during the subsequent University examination after satisfying the internship requirements.

III SEMESTER											
Sl. No	Course	Course Code	Course Title	Teaching Hours /Week			Examination				Credits
				Theory	Practical/ Mini-Project/ Internship	Skill Development activities	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	P	SDA					
1	PCC	22CAS31	Design of Bridges	03	--	02	03	50	50	100	4
2	PEC	22CAS32X	Professional elective 3	03	--	--	03	50	50	100	3
3	OEC	22CAS33X	Open elective Courses-1	03	--	--	03	50	50	100	3
4	PROJ	22CAS34	Project Work phase -1	00	06	00	--	100	--	100	3
5	SP	22CAS35	Societal Project	00	06	00	--	100	--	100	3
6	INT	22CASI36	Internship	(06 weeks Internship Completed during the intervening vacation of II and III semesters.)			03	50	50	100	6
TOTAL				09	12	02	12	400	200	600	22
Note: PCC: Professional core courses, PEC: Professional Elective Courses, IPCC-Integrated Professional Core Courses. MPS-Mini Project With Seminar; AUD/AEC; Audit Courses / Ability Enhancement Courses (Mandatory), PCCL-Professional Core Course lab, L-Lecture, P-Practical, T/SDA-Tutorial / Skill Development Activities(Hours are for interaction between faculty and students)											
Professional elective 3						Open Elective - 1					
Course Code under			Course title			Course Code under			Course title		
22CAS321			Reliability analysis and design of structural elements			22CAS331			Concrete Technology		
22CAS322			Structural Health Monitoring			22CAS332			Basic Construction Materials		
22CAS323			Structural stability analysis - Classical and FE approach			22CAS333			Strength of Materials		
22CAS324			Design of offshore Structures			22CAS334			Repair & Rehabilitation of Structures		
Note:											
<p>1. Project Work Phase-1:The project work shall be carried out individually. However, in case a disciplinary or interdisciplinary project requires more participants, then a group consisting of not more than three shall be permitted. Students in consultation with the guide/co-guide (if any) in disciplinary project or guides/co-guides (if any) of all departments in case of multidisciplinary projects, shall pursue a literature survey and complete the preliminary requirements of the selected Project work. Each student shall prepare a relevant introductory project document, and present a seminar. CIE marks shall be awarded by a committee comprising of HoD as Chairman, all Guide/s and co-guide/s (if any) and a senior faculty of the concerned departments. The CIE marks awarded for project work phase -1, shall be based on the evaluation of Project Report, Project Presentation skill, and performance in the Question and Answer session in the ratio of 50:25:25.</p> <p>2. Societal Project: Students in consultation with the internal guide as well as with external guide (much preferable) shall involve in applying technology to workout/proposing viable solutions for societal problems. CIE marks shall be awarded by a committee comprising of HoD as Chairman, Guide/co-guide if any, and a senior faculty of the department. The CIE marks awarded shall be based on the evaluation of Project Report, Project Presentation skill, and performance in the Question and Answer session in the ratio of 50:25:25.</p> <p>Those, who have not pursued /completed the Societal Project, shall be declared as fail in the course and have to complete the same during subsequent semester/s after satisfying the Societal Project requirements. There is no SEE (University examination) for this</p>											

course.

3. Internship: Those, who have not pursued /completed the internship, shall be declared as fail in the internship course and have to complete the same during subsequent University examinations after satisfying the internship requirements. Internship SEE (University examination) shall be as per the University norms.

CIE marks shall be awarded by a committee comprising of HoD as Chairman, Guide/co-guide if any, and a senior faculty of the department. The CIE marks awarded for project work phase -1, shall be based on the evaluation of Project Report, Project Presentation skill, and performance in the Question and Answer session in the ratio of 50:25:25.

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IV SEMESTER

Sl. No	Course	Course Code	Course Title	Teaching Hours /Week		Examination				Credits
				Theory	Practical/ Field work	Duration in hours	CIE Marks	SEE Marks Viva voce	Total Marks	
				L	P					
1	Project	22CAS41	Project work phase -2	--	08	03	100	100	200	18
TOTAL				--	08	03	100	100	200	18

Note:**1. Project Work Phase-2:**

Students in consultation with the guide/co-guide (if any) in disciplinary project or guides/co-guides (if any) of all departments in case of multidisciplinary projects, shall continue to work of Project Work phase -1 to complete the Project work. Each student / batch of students shall prepare project document, and present a seminar.

CIE marks shall be awarded by a committee comprising of HoD as Chairman, all Guide/s and co-guide/s (if any) and a senior faculty of the concerned departments. The CIE marks awarded for project work phase -2, shall be based on the evaluation of Project Report, Project Presentation skill, and performance in the Question and Answer session in the ratio of 50:25:25.

SEE shall be at the end of IV semester. Project work evaluation and Viva-Voce examination (SEE), after satisfying the plagiarism check, shall be as per the University norms.

Total Credits 22+18+22+18 =**80**

