SRI KRISHNA INSTITUTE OF TECHNOLOGY, BANGALORE-90



LABORATORY PLAN

Academic Year 2019-20

B E – Civil Engineering
7
15CVL77
Computer Aided Detailing of Structures
02 / 2-0-0
40
MOHAN K T

Academic Evaluation and Monitoring Cell

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INSTRUCTIONS TO TEACHERS

- Classroom / Lab activity shall be started after taking attendance.
- Attendance shall only be signed in the classroom by students.
- Three hours attendance should be given to each Lab.
- Use only Blue or Black Pen to fill the attendance.
- Attendance shall be updated on-line & status discussed in DUGC.
- No attendance should be added to late comers.
- Modification of any attendance, over writings, etc is strictly prohibited.
- Updated register is to be brought to every academic review meeting as per the COE.

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Note: Remove "Table of Content" before including in CP Book Each Laboratory Plan shall be printed and made into a book with cover page Blooms Level in all sections match with A.2, only if you plan to teach / learn at higher levels

A. LABORATORY INFORMATION

1. Laboratory Overview

Degree:	B. E	Program	CIVIL
Year / Semester :	4 / 7th	Academic Year:	2019-20
Course Title:	Computer Aided Detailing of Structures	Course Code:	15CVL77
Credit / L-T-P:	02/ 2-0-0	SEE Duration:	180 Minutes
Total Contact Hours:	40 Hrs	SEE Marks:	80 Marks
CIA Marks:	20	Assignment	
Course Plan Author:	MOHAN K T	Sign	Dt:
Checked By:	SHIVAPRASAD D G	Sign	Dt:

2. Laboratory Content

Exp	Title of the Experiments	Lab Hours	Concept	Blooms Level
1	Detailing of RC simply supported beam, cantilever beam and continuous beam	03	Detailing	L6
2	Detailing of RC one way slab, two way and one-way continuous slab.	03	Detailing	L6
3	Detailing of RC Doglegged Staircase.	03	Detailing	L6
4	Detailing of RC Cantilever Retaining wall.	03	Detailing	L6
5	Detailing of RC Counter Fort Retaining wall.	03	Detailing	L6
6	Detailing of RC circular water tank and rectangular water tank.	03	Detailing	L6
7	Detailing of beam to beam beam to column by bolted and welded connections.	03	Detailing	L6
8	Detailing of Steel built-up columns with lacing's and battens.	03	Detailing	L6
9	Detailing of Steel column bases and gusseted bases with bolted and welded connections.	03	Detailing	L6
10	Detailing of Steel roof truss – welded and bolted.	03	Detailing	L6
11	Detailing of Steel beams with bolted and welded.	03	Detailing	L6
12	Detailing of Steel gantry girder.	03	Detailing	L6

3. Laboratory Material

Books & other material as recommended by university (A, B) and additional resources used by Laboratory teacher (C).

Expt.	Details	Expt. in book	Availability
Α	Text books (Title, Authors, Edition, Publisher, Year.)	-	-
1-11	N Krishna Raju , "Structural Design and Drawing of Reinforced Concrete and Steel", University Press.	1-11	In Lib / In Dept
	Krishna Murthy, "Structural Design and Drawing – Concrete Structures" , CBS Publishers, New Delhi.	1-11	In Lib/ In dept
В	Reference books (Title, Authors, Edition, Publisher, Year.)	-	-
1, 2	SP 34: Handbook on concrete reinforcement and detailing, Bureau of Indian Standards.	-	In Lib
1, 2	IS 13920:2016, Ductile design and detailing of reinforced concrete structures subjected to seismic forces – code of practice, Bureau of Indian Standard.		In Lib
3, 4, 5			
С	Concept Videos or Simulation for Understanding	-	-
C1			
C2			
1			

D	Software Tools for Design	-	-
E	Recent Developments for Research	-	-
		_	-
F	Others (Web, Video, Simulation, Notes etc.)	-	-
1			

4. Laboratory Prerequisites:

Refer to GL01. If prerequisites are not taught earlier, GAP in curriculum needs to be addressed. Include in Remarks and implement in B.5.

Students must have learnt the following Courses / Topics with described Content . . .

-	-	Base Course:		-	-
SNo	Course	Course Name	Topic / Description	Sem	Remarks
	Code				
1	15CV51	Design of RC	Analysis and Design concepts of RCC	5	
		Structural Elements	structural elements		
2	15CV62	Design of Stee	Analysis and Design concepts of steel	6	
		Structures	structural members.		
3	15CV54	Computer aideo	AUTO CAD Basic Commands.	5	
		BPD			

5. Content for Placement, Profession, HE and GATE

The content is not included in this course, but required to meet industry & profession requirements and help students for Placement, GATE, Higher Education, Entrepreneurship, etc. Identifying Area / Content requires experts consultation in the area.

Topics included are like, a. Advanced Topics, b. Recent Developments, c. Certificate Courses, d. Course

Projects, e. New Software Tools, f. GATE Topics, g. NPTEL Videos, h. Swayam videos etc.

Expt.	Topic / Description	Area	Remarks	Blooms
				Level
1	Compression, Tension, Torsion /	Higher	Gap	Understa
	Knowledge of Materials.	Education.	A seminar on Electron Tubes &	nd L2
			amplifiers	
3				
3				
5				
_				

B. Laboratory Instructions

1. General Instructions

SNo	Instructions	Remarks
1	Observation book and Lab record are compulsory.	
2	Students should report to the concerned lab as per the time table.	
	After completion of the drawing, certification of the concerned staff in-	
	charge in the observation book is necessary.	
	Student should bring a notebook of 100 pages and should note the	
	important shortcut of auto cad tools.	
5	The record of observations along with the detailed drawing in the	
	Immediate last session should be submitted and certified by staff member	
	in-charge.	
6	Should attempt all drawing/ assignments given in the list session wise.	

7	It is responsibility to create a separate directory to store all the files, so that	
	nobody else can read or copy.	
8	Completed lab assignments should be submitted in the form of a Lab	
	Record in which you have to write the procedure along with drawings and	
	results for various RCC and Steel structural members.	

2. Laboratory Specific Instructions

SNo	Specific Instructions	Remarks
1	Start computer	
2	Open the text editor	
3	Select new file.	
4	Write the program	
5	Save the program with .c extension.	
6	Compile the program F9	
7	Execute the program F10	

C. OBE PARAMETERS

1. Laboratory Outcomes

#	COs	Teach.	Concept	Instr Method	Assessment	Blooms'
		Hours			Method	Level
1	Preparing detailed working drawing of simply supported, cantilever and continuous beams.	03	Detailing	Demonstrate	_	
2	Preparing detailed working drawing of one way, two way and one way continuous slabs	03	Detailing	Demonstrate	Assignment	
3	Preparing detailed working drawing of doglegged staircase.	03	Detailing	Demonstrate	Assignment and Slip Test	L6
4	Preparing detailed working drawing of cantilever retaining wall	03	Detailing	Demonstrate		L6
5	Preparing detailed working drawing of counter fort retaining wall	03	Detailing	Demonstrate		L6
6	Preparing detailed working drawing of circular and rectangular water tank.	03	Detailing	Demonstrate		
7	Creating connections for beam to beam beam to column by bolted and welded connections	04	Detailing	Demonstrate	Assignment	L6
8	Creating lacing and battens for built up columns.	04	Detailing	Demonstrate	Assignment and Slip Test	L6
9	Creating gusseted bases and column bases for bolted and welded connections.	03	Detailing	Demonstrate	Assignment	L6
10	Creating roof truss for both bolted and welded connections.	03	Detailing	Demonstrate	_	
11	Creating beams for bolted and welded connections	03	Detailing	Demonstrate		
12	Preparing detailed working drawing of gantry girder for steel structural members.		Detailing	Demonstrate	Assignment	L6
_	Total	40	-	-	-	-

Note: Identify a max of 2 Concepts per unit. Write 1 CO per concept.

2. Laboratory Applications

SNo	Application Area	CO	Level
1	Design of simply supported, cantilever and continuous beams.	CO1	L6
2	Design of one way, two way and one way continuous slabs.	CO2	L6
3	Design of doglegged staircase.	CO3	L6
4	Design of cantilever retaining wall.	CO4	L6
5	Design of counter fort retaining wall.	CO5	L6
6	Design of circular and rectangular water tank.	CO6	L6
7	Creating connections for beam to beam beam to column by bolted and welded	CO7	L6
	connections.		
8	Creating lacing and battens for built up columns.	CO8	L6
9	Creating gusseted bases and column bases for bolted and welded connections.	CO9	L6
10	Design of roof truss for both bolted and welded type.	CO10	L6
11	Creating beams with bolted and welded.	CO11	L6
12	Design of gantry girder for steel structural members.	CO12	L6

Note: Write 1 or 2 applications per CO.

3. Mapping And Justification

CO – PO Mapping with mapping Level along with justification for each CO-PO pair. To attain competency required (as defined in POs) in a specified area and the knowledge & ability required to accomplish it.

Маррі	ng	Mapping Level	Justification
СО	РО	-	-
CO1	PO1		Applying the knowledge of engineering science fundamental concepts to detailing of cantilever and simply supported beam.
CO1	PO2	L6	Civil engineering concepts to identify the type of reinforcement to be provided in the given problem.
CO1	PO11	L6	knowledge of drafting and apply the concepts to make a plans and projects.
CO2	PO1		Applying the knowledge of engineering science fundamental concepts to detailing of one way and two way slabs.
CO2	PO2	L6	Civil engineering concepts to identify the type of reinforcement to be provided in the given problem.
CO2	PO11	L6	knowledge of drafting and apply the concepts to make a plans and projects.
CO3	PO1		Applying the knowledge of engineering science fundamental concepts to detailing of Dog legged staircase
CO3	PO2	L6	Civil engineering concepts to identify the type of reinforcement to be provided in the given problem.
CO3	PO11	L6	knowledge of drafting and apply the concepts to make a plans and projects.
CO ₄	PO1		Applying the knowledge of engineering science fundamental concepts to detailing of Cantilever retaining wall.
CO ₄	PO2	L6	Civil engineering concepts to identify the type of reinforcement to be provided in the given problem.
CO ₄	PO11	L6	knowledge of drafting and apply the concepts to make a plans and projects.
CO ₅	PO1	L6	Applying the knowledge of engineering science fundamental concepts to detailing of counter fort retaining wall.
CO ₅	PO2	L6	Civil engineering concepts to identify the type of reinforcement to be provided in the given problem.
CO ₅	PO11	L6	knowledge of drafting and apply the concepts to make a plans and projects.
CO6	PO1	L6	Applying the knowledge of engineering science fundamental concepts to detailing of circular and rectangular water tank.
CO6	PO2	L6	Civil engineering concepts to identify the type of reinforcement to be

			provided in the given problem.
CO6	PO11	L6	knowledge of drafting and apply the concepts to make a plans and projects.
CO7	PO1	L6	Applying the knowledge of engineering science fundamental concepts to detailing of column by bolted and welded connections.
CO7	PO2	L6	Civil engineering concepts to identify the type of reinforcement to be provided in the given problem.
CO7	PO11	L6	knowledge of drafting and apply the concepts to make a plans and projects.
CO8	PO1	L6	Applying the knowledge of engineering science fundamental concepts to detailing of lacing and battens for built up columns.
CO8	PO2	L6	Civil engineering concepts to identify the type of reinforcement to be provided in the given problem.
CO8	PO11	L6	knowledge of drafting and apply the concepts to make a plans and projects.
CO9	PO1	L6	Applying the knowledge of engineering science fundamental concepts to detailing of gusseted bases for built up column.
CO9	PO2	L6	Civil engineering concepts to identify the type of reinforcement to be provided in the given problem.
CO9	PO11	L6	knowledge of drafting and apply the concepts to make a plans and projects.
CO10	PO1	L6	Applying the knowledge of engineering science fundamental concepts to detailing of roof truss for bolted and welded connections.
CO10	PO2	L6	Civil engineering concepts to identify the type of reinforcement to be provided in the given problem.
CO10	PO11	L6	Demonstrate knowledge of drafting and apply the concepts to make a plan and developing for the projects.
CO11	PO1	L6	Applying the knowledge of engineering science fundamental concepts to detailing for beams bolted and welded connections.
CO11	PO2	L6	Civil engineering concepts to identify the type of reinforcement to be provided in the given problem.
CO11	PO11	L6	knowledge of drafting and apply the concepts to make a plans and projects.
CO12	PO1	L6	Applying the knowledge of engineering science fundamental concepts to detailing of gantry girder for steel structural members.
CO12	PO2	L6	Civil engineering concepts to identify the type of reinforcement to be provided in the given problem.
CO12	PO11	L6	knowledge of drafting and apply the concepts to make a plans and projects.

4. Articulation Matrix

CO – PO Mapping with mapping level for each CO-PO pair, with course average attainment.

_	Course Outcomes		Program Outcomes											
#	COs	PO ₁	РО	РО	РО	РО	РО	РО	РО	РО	PO ₁	PO1	PO1	Level
			2	3	4	5	6	7	8	9	0	1	2	
15CVL777.1	Preparing detailed working	2	3	-	-	-	-	-	-	-	-	3	-	L6
	drawing of simply supported	,												
	cantilever and continuous beams.													
15CVL777.2	Preparing detailed working	2	3	-	-	-	-	-	-	-	-	3	-	L6
	drawing of one way, two way and	k												
	one way continuous slabs													
15CVL777.3	Preparing detailed working	2	3	-	-	-	-	-	-	-	-	3	-	L6
	drawing of doglegged staircase.													
15CVL777.4	Preparing detailed working	2	3	-	-	_	-	-	-	-	-	3	-	L6
	drawing of cantilever retaining wal	ĺ												
15CVL777.5	Preparing detailed working	2	3	-	-	-	-	-	-	-	-	3	-	L6
	drawing of counter fort retaining													
	wall													

	Preparing detailed working drawing of circular and rectangular water tank.		3	-	-	-	-	-	-	-	-	3	-	L6
	Creating connections for beam to beam beam to column by bolted and welded connections		3	-	-	-	-	-	-	-	-	3	-	L6
	Creating lacing and battens for built up columns.	2	3	-	-	-	-	-	1	-	-	3	ı	L6
	Creating gusseted bases and column bases for bolted and welded connections.		3	-	-	-	-	-	-	-	-	3	-	L6
	Creating roof truss for both bolted and welded connections.	2	3	-	-	-	-	-	-	-	-	3	-	L6
	Creating beams for bolted and welded connections	2	3	-	-	-	-	-	-	-	-	3	-	L6
	Preparing detailed working drawing of gantry girder for steel structural members.		3	-	-	-	-	-	-	-	-	3	-	L6
CS501PC.	Average	2	3	-	-	-	-	-	-	-	-	3	-	

5. Curricular Gap and Experiments

Topics & contents not covered (from A.4), but essential for the course to address POs and PSOs.

Expt	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping
1					
2					
3					
4					
5					

Note: Write Gap topics from A.4 and add others also.

6. Experiments Beyond Syllabus

Topics & contents required (from A.5) not addressed, but help students for Placement, GATE, Higher Education, Entrepreneurship, etc.

Expt	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

D. COURSE ASSESSMENT

1. Laboratory Coverage

Assessment of learning outcomes for Internal and end semester evaluation. Distinct assignment for each

student. 1 Assignment per chapter per student. 1 seminar per test per student.

	tudent. 1 Assignment per chapter per student. 1 seminar per test per student. Unit Title Teachi No. of question in Exam										
Unit	Title	Teachi								CO	Levels
		ng	CIA-1	CIA-2	CIA-3	Asg-1	Asg-2	Asg-3	SEE		
		Hours									
1	Preparing detailed working	03	1	-	-	-	_	-	1	CO1	L6
	drawing of simply supported,										
	cantilever and continuous beams.										
2	Preparing detailed working	03	1	-	-	-	-	-	1	CO2	L6
	drawing of one way, two way and										
	one way continuous slabs										
3	Preparing detailed working	03	1	_	_	_	_	_	1	CO3	L6
	drawing of doglegged staircase.	- 3	_						_		
4	Preparing detailed working	03	1	_	_	_	_	_	1	CO4	L6
-	drawing of cantilever retaining wall		_						_	004	
5	Preparing detailed working		1	_	_	_	_	_	1	CO5	L6
)	drawing of counter fort retaining	_	_							005	LO
	wall										
6		00								CO6	L6
0	1 0	_	1	_	_	_	_	_	1	C06	LO
	drawing of circular and rectangular										
<u> </u>	water tank.										1.0
7	Creating connections for beam to		1	_	-	-	-	_	1	CO7	L6
	beam beam to column by bolted										
<u></u>	and welded connections										
8	Creating lacing and battens for	03	-	1	-	-	-	-	1	CO8	L6
	built up columns.										
9	Creating gusseted bases and	_	-	1	-	-	-	-	1	CO9	L6
	column bases for bolted and										
	welded connections.										
10	Creating roof truss for both bolted	03	_	1	-	-	-	-	1	CO10	L6
	and welded connections.										
11	Creating beams for bolted and	03	-	1	-	-	-	_	1	CO11	L6
	welded connections	_									
12	Preparing detailed working	03	_	1	-	_	-	_	1	CO12	L6
	drawing of gantry girder for steel	_								_	
	structural members.										
13	Total	40	7	5	-	-	-	-	20	-	-
$\overline{}$	1 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7				l	1					L

2. Continuous Internal Assessment (CIA)

Assessment of learning outcomes for Internal exams. Blooms Level in last column shall match with A.2.

Evaluation	Weightage in Marks	CO	Levels
CIA Exam – 1	15	CO1, CO2, CO3, CO4	L5, L6
CIA Exam – 2	-	CO5, CO6, CO7,	L5, L6
CIA Exam – 3	-	CO8,	L5, L6
		CO9,CO10,CO11,CO12	
Assignment - 1	05	CO1, CO2, CO3, CO4	L5, L6
Assignment - 2	-	CO5, CO6, CO7, CO8,	L5, L6
Assignment - 3	-	CO9,CO10,CO11,CO12	L5, L6
Seminar - 1	-		-
Seminar - 2	-		-
Seminar - 3	-		-
Other Activities - define -		CO1 to Co12	L5, L6
Slip test			

Final CIA Marks	20	-	-

SNo	Description	Marks
1	Observation and Weekly Laboratory Activities	05 Marks
2	Record Writing	05 Marks for each Expt
3	Internal Exam Assessment	15 Marks
4	Internal Assessment	20 Marks
5	SEE	80 Marks
-	Total	100 Marks

E. EXPERIMENTS

Experiment 01: Detailing of RC Beams

-	Experiment No.:	1	Marks		Date Planned		Date Conducted	
1	Title	Deta	ailing of sim	oly supporte	d, cantilever	and continuo	ous beams.	
2		Prepare detailed working drawing of simply supported, cantilever and continuous beams.						
3	Aim	Deta	ailing of rein	forced concr	ete beams			
	Material / Equipment Required							
5	Principle, Concept			e of design o				
6	Procedure, Program, Activity, Algorithm, Pseudo Code							
	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph							
	Observation Table, Look-up Table, Output	I						
	Sample Calculations							
	Graphs, Outputs							
	Results & Analysis							
	Application Areas		Design	of beams				
13	Remarks							
14	Faculty Signature							

with Date	

Experiment 02: Detailing of RC Slabs

-	Experiment No.:	1	Marks		Date Planned		Date Conducted	
1	Title	Detai	ling of one w	ay, two way	and one-way	continuous	slabs	
2		slabs	Prepare detailed working drawing of one way, two way and one-way continuous slabs.					
				rced concret	e slabs			
4	Equipment Required		Lab Manual					
5	Principle, Concept	Basic	_	of design of				
6	Procedure, Program, Activity, Algorithm, Pseudo Code	 The limits are set before starting the drawing. The lower left corner is set as default (0.0000, 0.0000). The upper right corner is changed as per our requirements. By using units command, we set the types as decimal, precision as 0.0000 and units to scale as millimeters. Ortho is switched off as the drawing requires use of inclined line also along with horizontal and vertical lines. By using the line command, the outline of the required drawing is drawn. By using the trim command, the extra lines are trimmed. Lines are extended using extend command wherever necessary. Donut option is used to represent the c/s of reinforcements. Offset command is used to get lines at regular distance. Hatching is done using hatch command. Dimensions are provided and text command is also used for labeling the drawing. 						
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph							
8	Observation Table, Look-up Table, Output							
	Sample Calculations							
	Graphs, Outputs							
	Results & Analysis							
	Application Areas		Design of	slabs				
	Remarks							
14	Faculty Signature with Date							

Experiment 03: Detailing of RC Staircase

-	Experiment No.:	1	Marks		Date	Date		
					Planned	Conducted		
1	Title	Detai	etailing of doglegged staircase					
2	Course Outcomes	Prepa	Prepare detailed working drawing of staircase					
3	Aim	Detai	Detailing of staircase					
4	Material /	Lab N	ab Manual					
	Equipment							
	Required							

5	Theory, Formula, Principle, Concept	Basic knowledge of design of staircase
6	Procedure, Program, Activity, Algorithm, Pseudo Code	 The limits are set before starting the drawing. The lower left corner is set as default (0.0000, 0.0000). The upper right corner is changed as per our requirements. By using units command, we set the types as decimal, precision as 0.0000 and units to scale as millimeters. Ortho is switched off as the drawing requires use of inclined line also along with horizontal and vertical lines. By using the line command, the outline of the required drawing is drawn. By using the trim command, the extra lines are trimmed. Lines are extended using extend command wherever necessary. Donut option is used to represent the c/s of reinforcements. Offset command is used to get lines at regular distance. Hatching is done using hatch command. Dimensions are provided and text command is also used for labeling the drawing.
	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph	
	Observation Table, Look-up Table, Output	
9	Sample Calculations	
	Graphs, Outputs	
	Results & Analysis	
	Application Areas	Design of staircase
	Remarks	
14	Faculty Signature with Date	

Experiment 04: Detailing of RC Cantilever retaining wall

-	Experiment No.:	1	Marks	Date Planned	Date Conducted			
1	Title	Detai	ling of cantil	ever retaining wall				
2	Course Outcomes	Prepa	Prepare detailed working drawing of cantilever retaining wall					
3	Aim	Detai	ling of cantil	ever retaining wall				
	Material / Equipment Required	Lab N	1anual					
_	Theory, Formula, Principle, Concept	Basic	Basic knowledge of design of retaining wall					
	Procedure, Program, Activity, Algorithm, Pseudo Code		as default requireme By using 0.0000 ar Ortho is s along with By using t By using t Lines are	t (0.0000, 0.0000). The upper rents. units command, we set the and units to scale as millimeters switched off as the drawing renthorizontal and vertical lines.	requires use of inclined line also of the required drawing is drawn. Ines are trimmed. The required trawing is drawn. The required trawing is drawn. The requires use of inclined line also			

		 Offset command is used to get lines at regular distance. Hatching is done using hatch command. Dimensions are provided and text command is also used for labeling the drawing.
7	Block, Circuit,	
	Model Diagram,	
	Reaction Equation,	
	Expected Graph	
8	Observation Table,	
	Look-up Table,	
	Output	
9	Sample	
	Calculations	
10	Graphs, Outputs	
11	Results & Analysis	
12	Application Areas	Design of retaining wall
13	Remarks	
14	Faculty Signature with Date	

Experiment 05: Detailing of RC Counter fort retaining wall

-	Experiment No.:	1	Marks		Date		Date		
	T'11	D . I . 'I	l' C		Planned		Conducted		
1			Detailing of counter fort retaining wall Prepare detailed working drawing of counter fort retaining wall						
2						er fort retaini	ng wall		
3				er fort retainin	ig wall				
4	Material / Equipment Required	Lab M	1anual						
5	Theory, Formula, Principle, Concept	Basic	knowledge	of design of re	etaining wall	L			
6	Procedure, Program, Activity, Algorithm, Pseudo Code		as default requireme By using 0.0000 ar Ortho is s along with By using t Lines are Donut op Offset cor Hatching	are set before to (0.0000, 0.00 ents.) units command units to scan switched off an horizontal are the line commextended using the trim commextended using the trim sused to mand is used to mand is used to a sare provided the trim to the trim to the trim to mand is used to the trim t	and, we set le as millime is the drawind vertical linerand, the outnand, the extend correpresent the doto get lines hatch comme	the types a eters. ng requires nes. eline of the re cra lines are to mmand when ne c/s of reir s at regular on	ner is change as decimal, use of inclin equired drawi trimmed. erever necess nforcements. distance.	ed as per our precision as ed line alsong is drawn.	
	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph								
	Observation Table, Look-up Table, Output								
9	Sample Calculations								

10	Graphs, Outputs	
	Results & Analysis	
12	Application Areas	Design of cantilever retaining wall
13	Remarks	
14	Faculty Signature	
	with Date	

Experiment o6 : Detailing of RC Water tank

-	Experiment No.:	1	Marks		Date Planned		Date Conducted	
1	Title	Detai	Detailing of rectangular and circular water tank					
2	Course Outcomes	Prepa	Prepare detailed working drawing of rectangular and circular water tank					
3	Aim	Detai	ling of rectar	ngular and cir	cular water t	ank		
4	Equipment Required		1anual					
	Principle, Concept	Basic		of design of \				
6	Procedure, Program, Activity, Algorithm, Pseudo Code		as default requireme By using 0.0000 an Ortho is s along with By using t By using t Lines are Donut opt Offset con Hatching i	are set before (0.0000, 0.00 ents.) units commend units to scatte the comment of	and, we set ale as milliments the drawind vertical liminand, the outlined extend coorepresent the doto get line hatch commend.	the types a eters. ng requires nes. tline of the re tra lines are to mmand whe ne c/s of reir s at regular on	ner is change as decimal, use of inclin equired draw crimmed. erever neces nforcements. distance.	ed as per our precision as ed line also ing is drawn.
	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph							
	Observation Table, Look-up Table, Output							
	Sample Calculations							
	Graphs, Outputs							
	Results & Analysis							
	Application Areas		Design of	water tank				
	Remarks							
14	Faculty Signature with Date							

Experiment 07: Detailing of steel structural members

-	Experiment No.:	1	Marks		Date		Date	
					Planned		Conducted	
1	Title	Detai	Detailing of beam to beam beam to column by bolted and welded connections					
2	Course Outcomes	Prepa	repare detailed working drawing of bolted and welded connections of beam to					
		beam	n, beam to co	olumn sectio	ns.			

3	Aim	Detailing of beam to beam beam to column by bolted and welded connections
4		Lab Manual
	Equipment	
	Required	
5	Theory, Formula, Principle, Concept	Basic knowledge of design of bolted and welded connections of beams
6	Procedure, Program, Activity, Algorithm, Pseudo Code	 The limits are set before starting the drawing. The lower left corner is set as default (0.0000, 0.0000). The upper right corner is changed as per our requirements. By using units command, we set the types as decimal, precision as 0.0000 and units to scale as millimeters. Ortho is switched off as the drawing requires use of inclined line also along with horizontal and vertical lines. By using the line command, the outline of the required drawing is drawn. By using the trim command, the extra lines are trimmed. Lines are extended using extend command wherever necessary. Donut option is used to represent the c/s of reinforcements. Offset command is used to get lines at regular distance. Hatching is done using hatch command. Dimensions are provided and text command is also used for labeling the drawing.
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph	
8	Observation Table, Look-up Table, Output	
9	Sample Calculations	
10	Graphs, Outputs	
-	Results & Analysis	
	Application Areas	Design of bolted and welded connections of beams and columns.
_	Remarks	
14	Faculty Signature with Date	

Experiment 08: Detailing of steel lacings and battens

-	Experiment No.:	1	Marks		Date Planned		Date Conducted	
1	Title	Detai	ling of lacing	and battens	for built up	columns.		
2	Course Outcomes	Prepa	are detailed \	working draw	ing of lacing	and battens	for built up o	columns
3	Aim	Detai	ling of lacing	gand battens	for built up	columns.		
	Material / Equipment Required	Lab N	Lab Manual					
5	Theory, Formula, Principle, Concept	Basic	knowledge	of design of I	lacing and ba	attens of stee	el built up col	umns.
	Procedure, Program, Activity, Algorithm, Pseudo Code		as default requireme By using 0.0000 an Ortho is s along with By using t	are set before (0.0000, 0.00) ents. units commend units to so switched off an horizontal and he line commend the trim commend (0.000).	and, we set ale as millime as the drawi nd vertical lin nand, the ou	the types a eters. ng requires nes. tline of the re	ner is change as decimal, use of inclin equired drawi	ed as per our precision as ed line also

		 Lines are extended using extend command wherever necessary. Donut option is used to represent the c/s of reinforcements. Offset command is used to get lines at regular distance. Hatching is done using hatch command. Dimensions are provided and text command is also used for labeling the drawing.
,	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph	
8	Observation Table, Look-up Table, Output	
9	Sample Calculations	
	Graphs, Outputs	
_	Results & Analysis	
	Application Areas	Design of lacing and battens for built up sections.
	Remarks	
14	Faculty Signature with Date	

Experiment 09: Detailing of steel gusseted bases and column bases

-	Experiment No.:	1	Marks		Date Planned		Date Conducted		
1	Title		ling of gus ections	sseted bases	and colui	mn bases	for welded	and I	bolted
2	Course Outcomes			working drad connection		usseted bas	e and colur	nn ba	se for
3	Aim		ling of gus ections	sseted bases	and colui	mn bases	for welded	and I	bolted
·	Equipment Required		1anual						
_	Theory, Formula, Principle, Concept	Basic	knowledge	of design of g	gusseted pla	ite			
	Procedure, Program, Activity, Algorithm, Pseudo Code		as default requireme By using 0.0000 an Ortho is s along with By using t By using t Lines are Donut opt Offset cor Hatching	are set before (0.0000, 0.00 ents.) units command units to scale witched off and horizontal and he line commextended using the commextended using the sare provided the comment of the com	and, we set ale as milliments the drawind vertical liminand, the our mand, the expresent the drawing extend control to get line hatch commends.	per right core the types eters. In grequires hes. It in e of the restra lines are sommand who he c/s of reins at regular mand.	ner is change as decimal, use of inclir equired draw trimmed. erever neces nforcements. distance.	ed as precisioned line ing is constant.	er our ion as e also drawn.
	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph								

8	Observation Table,	
	Look-up Table,	
	Output	
9	Sample	
	Calculations	
10	Graphs, Outputs	
11	Results & Analysis	
12	Application Areas	Design of gusseted plate
13	Remarks	
14	Faculty Signature	
	with Date	

Experiment 10 : Detailing of steel roof truss

-	Experiment No.:	1	Marks		Date anned		Date Conducted		
1	Title	Detai	ling of roof t	russ for welded a		connection			
2			repare detailed working drawing of roof truss.						
3			etailing of roof truss for welded and bolted connections.						
4	Material / Equipment Required	Lab N	/anual						
	Principle, Concept	Basic		of design of roof					
6	Procedure, Program, Activity, Algorithm, Pseudo Code		as default requireme By using 0.0000 ar Ortho is s along with By using t By using t Lines are Donut op Offset cor Hatching	s are set before sit (0.0000, 0.0000) ents. units command and units to scale asswitched off as the horizontal and withe line commanextended using estion is used to represent a sare provided as are provided as the trim commanextended using estion is used to represent a sare provided as a sare provided as the trim command is used to represent a sare provided as the trim command is used to rep). The upport of the drawing vertical line of the extraction of th	er right content the types a ters. g requires as. ne of the real times are to the mand when the term at regular and.	ner is change as decimal, use of inclin equired draw trimmed. erever neces nforcements. distance.	ed as per our precision as led line also ling is drawn.	
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph								
8	Observation Table, Look-up Table, Output								
	Sample Calculations								
	Graphs, Outputs								
11	Results & Analysis								
12	Application Areas		Design of	roof truss in stee	l structura	l members	3		
13	Remarks								
14	Faculty Signature with Date								

Experiment 11: Detailing of steel beams with bolted and welded

-	Experiment No.:	1	Marks		Date Planned		Date Conducted		
1	Title	 Detail	ling of beam	s with bolted			Conducted		
2				working draw			d and welded		
			etailing of beams with bolted and welded						
4			ab Manual						
	Principle, Concept	Basic		of design of b					
6	Procedure, Program, Activity, Algorithm, Pseudo Code	•	as default requirements By using 0.0000 and Ortho is sealong with By using the By using the Lines are sealong Donut opt Offset control	s are set before starting the drawing. The lower left corner is set lt (0.0000, 0.0000). The upper right corner is changed as per our lents. y units command, we set the types as decimal, precision as ind units to scale as millimeters. switched off as the drawing requires use of inclined line also the horizontal and vertical lines. the line command, the outline of the required drawing is drawn, the trim command, the extra lines are trimmed. extended using extend command wherever necessary, on the present the c/s of reinforcements. The provided to get lines at regular distance. It is done using hatch command. The lower left corner is set literated as per our lents. The provided and text command is also used for labeling the literated as per our left.					
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph								
8	Observation Table, Look-up Table, Output								
	Sample Calculations								
	Graphs, Outputs								
	Results & Analysis								
	Application Areas		Design of	beams with b	oolted and w	elded			
	Remarks								
14	Faculty Signature with Date								

Experiment 12: Detailing of steel gantry girder

-	Experiment No.:	1	Marks		Date Planned	Date Conducted
1	Title	Detail	ing of gantr	y girder		
2	Course Outcomes	Prepa	re detailed v	working draw	ing of gantry (girder
3	Aim	Detail	ing of gantr	y girder		
	Material / Equipment Required	Lab M	1anual			
5	Theory, Formula Principle, Concept	Basic	knowledge	of design of g	gantry girder	
	Procedure, Program, Activity, Algorithm, Pseudo			t (0.0000, 0.00		drawing. The lower left corner is set er right corner is changed as per our

	Code	 By using units command, we set the types as decimal, precision as 0.0000 and units to scale as millimeters. Ortho is switched off as the drawing requires use of inclined line also along with horizontal and vertical lines. By using the line command, the outline of the required drawing is drawn. By using the trim command, the extra lines are trimmed. Lines are extended using extend command wherever necessary. Donut option is used to represent the c/s of reinforcements. Offset command is used to get lines at regular distance. Hatching is done using hatch command. Dimensions are provided and text command is also used for labeling the drawing.
7	Block, Circuit, Model Diagram, Reaction Equation, Expected Graph	
8	Observation Table, Look-up Table, Output	
9	Sample Calculations	
	Graphs, Outputs	
11	Results & Analysis	
	Application Areas	Design of gantry girder
	Remarks	
14	Faculty Signature with Date	

F. Content to Experiment Outcomes

1. TLPA Parameters

Table 1: TLPA - Example Course

		-			T		1
Expt-	Course Content or Syllabus						Assessment
#	(Split module content into 2 parts which		Learning	l .	Action	on	Methods to
	have similar concepts)	g Hours	Levels	ms'			
			for	Level	Learning	for	Learning
			Content			Learning	
Α	В	С	D	Ε	F	G	Н
1	Preparing detailed working drawing of	6	L6	L6	Detaild	PPT/	Assignment
	simply supported, cantilever and				drafting.	Lecture	
	continuous beams.						
2	Preparing detailed working drawing of one	6	L6	L6	Detaild	PPT/	Assignment
	way, two way and one way continuous slabs				drafting.	Lecture	
3	Preparing detailed working drawing of	3	L6	L6	Detaild	PPT/	Assignment
	doglegged staircase.				drafting.	Lecture	
4	Preparing detailed working drawing of	3	L6	L6	Detaild	PPT/	Assignment
	cantilever retaining wall				drafting.	Lecture	
5	Preparing detailed working drawing of	3	L6	L6	Detaild	PPT/	Assignment
	counter fort retaining wall				drafting.	Lecture	
6	Preparing detailed working drawing of	3	L6	L6	Detaild	PPT/	Assignment
	circular and rectangular water tank.				drafting.	Lecture	
7	Creating connections for beam to beam	3	L6	L6	Detaild	PPT/	Assignment
	beam to column by bolted and welded				drafting.	Lecture	
	connections				_		
8	Creating lacing and battens for built up	3	L6	L6	Detaild	PPT/	Assignment
	columns.				drafting.	Lecture	
9	Creating gusseted bases and column bases	3	L6	L6	Detaild	PPT/	Assignment
	for bolted and welded connections.				drafting.	Lecture	
10	Creating roof truss for both bolted and	3	L6	L6	Detaild	PPT/	Assignment
	welded connections.				drafting.	Lecture	
11	Creating beams for bolted and welded	3	L6	L6	Detaild	PPT/	Assignment
	connections	-			drafting.	Lecture	
12	Preparing detailed working drawing of	3	L6			PPT/	Assignment
	gantry girder for steel structural members.				drafting.	Lecture	
					<u>. J.</u>		

2. Concepts and Outcomes:

Table 2: Concept to Outcome - Example Course

				·		
Exp	_		Final Concept		CO Components	Course Outcome
t-#		Concepts		Justification	(1.Action Verb,	
	from study of	from		(What all Learning	2.Knowledge,	
	the Content	Content		Happened from the	3.Condition /	Student Should be
	or Syllabus			study of Content /	Methodology,	able to
				Syllabus. A short	4.Benchmark)	
				word for learning or		
				outcome)		
Α	1	J	K	L	М	N
1	Preparing	Detailing	Detailing	Detailed drawing	Detailing/	Preparing detailed
	detailed			for beams	Autocad/	working drawing of
	working					simply supported,
	drawing of					cantilever and
	simply					continuous beams.
	supported,					
	cantilever					
	and					
	continuous					
	beams.					
2	Preparing	Detailing	Detailing	Detailed drawing	Detailing/	Preparing detailed

	detailed working drawing of one way, two way and one way			for slabs	Autocad/	working drawing of one way, two way and one way continuous slabs
3	continuous slabs Preparing detailed working drawing of doglegged	Detailing	Detailing	Detailed drawing for stair case.	Detailing/ Autocad/	Preparing detailed working drawing of doglegged staircase.
4	staircase. Preparing detailed working drawing of cantilever retaining wall	Detailing	Detailing	Detailed drawing for Retaining wall.	Detailing/ Autocad/	Preparing detailed working drawing of cantilever retaining wall
5	Preparing detailed working drawing of counter fort retaining wall		Detailing	Detailed drawing for retaining wall.	Detailing/ Autocad/	Preparing detailed working drawing of counter fort retaining wall
6		Detailing	Detailing	Detailed drawing for water tank.	Detailing/ Autocad/	Preparing detailed working drawing of circular and rectangular water tank.
7	Creating connections for beam to beam to column by bolted and welded connections		Detailing	Detailed drawing for steel connections.	Detailing/ Autocad/	Creating connections for beam to beam beam to column by bolted and welded connections
8			Detailing	Detailed drawing for steel connections.	Detailing/ Autocad/	Creating lacing and battens for built up columns.
9	Creating gusseted bases and column bases for bolted and welded connections.	Detailing	Detailing	Detailed drawing for steel connections.	Detailing/ Autocad/	Creating gusseted bases and column bases for bolted and welded connections.
10	Creating roof truss for both bolted and welded connections.		Detailing	Detailed drawing for steel connections.	Detailing/ Autocad/	Creating roof truss for both bolted and welded connections.
11	Creating	Detailing	Detailing	Detailed drawing	Detailing/	Creating beams for

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beam bolted welde conne	d and		for steel connections.	Autocad/	bolted and welded connections
12 Prepa detail working drawing gantry for struct members	ed ng ng of / girder steel ural	Detailing	Detailed drawing for steel connections.	Detailing/ Autocad/	Preparing detailed working drawing of gantry girder for steel structural members.