	Course Title: **IRRIGATION AND BRIDGE DRAWING**		
	Credits (L:T:P) 0**:2:4**	Total Contact Hours: **78**	Course Code: 15CE55D
	Type of Course: **Drawing, Case study**	**Credit : 03**	Core/ Elective: **Core**
CIE- 25 Marks			SEE- 100 Marks

Pre-requisite: Concepts of Basic Civil Engineering Drawing, Water Resources Engineering and Transportation engineering.

Course objectives

1. To know and draw the various components of earthen dam and canals including plan and cross section.
2. To understand the requirement of tank sluice, tank weirs and draw the various views.
3. To understand and draw the various views of culverts and bridges.
4. To prepare a case study on an existing bridge or irrigation structure.

COURSE OUTCOMES

On successful completion of the course, the student should be able to;

COURSE OUTCOMES		CL	Linked PO	Teaching Hrs
CO1	Distinguish type of earthen dam, canal sections and draw the various views from the given data.	R/U/A	1,2,3,5,8,9,10	9
CO2	Distinguish and select suitable type of tank sluice and weir and draw the various views from the given data.	R/U/A/An	1,2,3,5,8,9,10	33
CO3	Develop/Draw culverts, bridges and their suitability to the site conditions and prepare the drawings for the given data.	R/U/A/An/C	1,2,3,5,8,9,10	27
CO4	Conduct a case study on an existing bridge or irrigation structure and prepare a mini report.	R/U/A/An/C/E	1 to 10	9

Legend: R: Remember, U: Understand, A: Apply, An: Analyse, S: Synthesise, E:Evaluate

Programme Outcome Attainment Matrix

Course	Programme Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
	Basic knowledge	Discipline knowledge	Experiments and Practice	Engineering Tools	Engineer and society	Environment & Sustainability	Ethics	Individual and Team work	Communication	Lifelong learning
IRRIGATION AND BRIDGE DRAWING	**3**	**3**	**3**	**2**	**1**	**1**	**1**	**2**	**3**	**2**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3

If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1

If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

DETAILED COURSE CONTENT

UNITS	COURSE CONTENT	HOURS ALLOCATED
UNIT 1	1(a).EARTHEN DAMS (i) Types of earthen bunds, details of earthen bund such as side slope, revetment, hearting, core walls, rock toe and drainage arrangements as per standards. (ii) Draw the cross section and sectional plan showing details of drainage arrangements of the following using given data (without design). • Earthen bund with homogeneous materials • Earthen bund with hearting • Earthen bund with core wall 1(b).CANALS Components of canal. Draw the cross section of the following canals showing components for the given data (without design). • Canal in full cutting • Canal in full Embankment • Canal in partial cutting and partial embankment	09
UNIT 2	**TANK SLUICE** 1. For the given discharge determination of the size of the orifice 2. Draw the longitudinal section, half plan at top, half plan at foundation level ,half front elevation and half sectional elevation of the following for the given data (without structural design). • Head and Gibbet wall type-slab barrel with plug Arrangement. • Tower head type- slab barrel with shutter arrangement • Pipe sluice -Tower head and head -gibbet wall type with plug arrangement	18
UNIT 3	**TANKS WEIRS** 1. Components of tank weir-body wall, abutment, wing walls, return wall, bund, protection works (solid, grouted apron, stone revetment), Cut off wall and back batter. 2. Determination of the length of waste weir for a given catchment area. 3. Draw the half longitudinal section, half front elevation, half plan at top, half plan at foundation level & cross section of the following types of weir for the given data. • Waste weir with water cushion • Surplus weir with Stepped apron (Calculate bottom width of Abutments, wing wall and return wall using thumb rule)	15

UNIT 4	**CULVERTS** Components of culvert, Calculation of flood discharge at culvert using empirical formula, determination of linear water way and number of openings from the given data. Draw the half longitudinal section, half longitudinal elevation, half plan at top, half plan at foundation level & cross section for the following • Single span slab culvert with splayed wing walls • Two span slab culvert with return wing walls • Two span box culvert with splayed wing walls • Pipe culvert	15
UNIT 5	**R.C.C. T - BEAM BRIDGE (Railways & Highways)** 1. General Principles involved in the design of RCC t beam bridge (with out design) 2. Components of bridge, Calculation of flood discharge at bridge using empirical formula, determination of linear water way and number of openings from the given data. 3. Details of abutment, piers, wing walls etc to be determined using thumb rules and standard practice. 4. Draw the half longitudinal section, half longitudinal elevation, half plan at top, half plan at foundation level & cross section half through pier and half through centre span of the following types of weir for the given data. • Two span RCC T- beam highway bridge with return wing walls. • Two span RCC T-beam highway bridge with splayed wing walls. • Two span RCC T-Beam railway bridge with splayed wing walls.	12
	Case study/mini project	09
	Total	78

Course Delivery:

- The course content may be delivered using models and Videos

SUGGESTED STUDENT ACTIVITIES

Identify the spoiled earthen embankment nearby and prepare a report with drawing

1. Visit to a nearby canal, take the field data and draw the c/s of canal.
2. Identify and take the details of existing tank weir/tank sluice in the vicinity of your area and draw all the views.
3. Identify and take the details of existing culvert/highway bridge/railway bridge nearby and draw all the views.
4. For the given data prepare a model of any one of the following.
   - Tank sluice
   - Tank weir
   - Culvert
   - Railway/Highway bridge

NOTE:

1. Students should select any one of the above or other topics relevant to the subject approved by the concerned faculty, individually or in a group of 3 to 5. Students should mandatorily submit a written report and make a presentation on the topic. The task should not be repeated among students. Report will be evaluated by the faculty as per rubrics. Weightage for 5 marks Internal Assessment shall be as follows:

(Unsatisfactory- **1,** Developing **-2,** Satisfactory **-3,** Good- **4,** Exemplary- **5**)

2. Report should contain log sheet, respective drawings and photos

3. Reports should be made available to IA verification officer.

Example of model of rubrics / criteria for assessing student activity

Dimension	Students score (Group of five students)				
	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 4	STUDENT 5
Rubric Scale	Unsatisfactory **1,** Developing **2,** Satisfactory **3,** Good **4,**Exemplary5				
1.Literature	1				
2.Fulfill team's roles & duties	4				
3.Conclusion	3				
4.Convensions and log sheet	5				
Total	13				
Average=(Total /4)	3.25= 4				
Note: Concerned faculty (Course coordinator) must devise appropriate rubrics/criteria for assessing Student activity for 5 marks One activity to attain last CO (course outcome) may be given to a group of FIVE students					

Note: Dimension should be chosen related to activity and evaluated by the course faculty

Dimension	Rubric Scale				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary
1.Literature	Has not included relevant info	Has included few relevant info	Has included some relevant info	Has included many relevant info	Has included all relevant info needed
2.Fulfill team's roles & duties	Does not perform any duties assigned	Performs very little duties	Performs partial duties	Performs nearly all duties	Performs all duties of assigned team roles
3.Communication	Poor	Less Effective	Partially effective	Effective	Most Effective
4.Convensions	Frequent Error	More Error	Some Error	Occasional Error	No Error

Weightage of Marks and blue print of marks for SEE

Unit	Major Topics	Hours Allotted	Questions to be set for SEE Cognitive Levels						Marks weightage		weightage (%)	SEE Question to be set
			R	U	Ap	Ay	C	E				
1	Earthen dams and canals	9	20%	40%	40%	0%	0%	0%	15	50	34	1
			3	**6**	**6**	**0**	**0**	**0**				
2	Tank sluice	18	20%	40%	30%	10%	0%	0%	35			
			7	**14**	**10**	**4**	**0**	**0**				
3	Tank weirs	15	20%	40%	30%	10%	0%	0%	50		33	1
			10	**20**	**15**	**5**	**0**	**0**				
4	Culverts	36	20%	40%	30%	10%	0%	0%	50		33	1
5	T-beam bridges		**10**	**20**	**15**	**5**	**0**	**0**				
Total		**78**	20%	40%	31%	9%	0%	0%	150		100	3
			30	**60**	**46**	**14**	**0**	**0**				

Legend- R; Remember U: Understand Ap: Application Ay: Analysis C: Creation E: Evaluation

Questions for CIE and SEE will be designed to evaluate the various educational components such as:

Sl. No	Bloom's taxonomy	% in Weightage
1	Remembering and Understanding	**50**
2	Applying the knowledge acquired from the course	**30**
3	Analysis	**10**
4	Synthesis (Creating new knowledge)	**10**
5	Evaluation	**0**

Reference Books

1. Irrigation manual – Ellis. Tamil Nadu Govt. Publication
2. Irrigation Drawing - Sathyanarayana murthy (Subhash stores Bangalore)
3. Design of bridge - by N. Krishna murthy (Subhash stores Bangalore)
4. Bridge Engineering - Johnson D. Vector Oxford IBH Publications
5. Design and construction of highways bridge - K. S. Rekshit (New Central Book Agency Calcutta - 9
6. Irrigation Engineering and hydraulic structures - S.K. Garg (Khanna Publishers, Delhi)
7. Bridge Engineering - J.S. Allegia (Charotar book stall anand)
8. Irrigation and water power engineering - B.C.Punmia, Pande, B.B.Lal Lakshmi Publications, 7/21, Ansari Road, Daryaganj, New Delhi - 110 002.
9. Principles and practice of irrigation engineering - S.K.Sharma (S.Chand and company Pvt. Ltd. Ramnagar, New Delhi - 110 055
10. Irrigation Engineering - vol I, II and III K.R. Sharma
    A text book of irrigation engineering and Hydraulics structures R.K.Sharma(Oxford - IBH publishing Co.,)
11. Bridge engineering by ponnuswamy (Mc Graw Hill Education, Publication)
12. Civil Engineering Drawing Manual - TTTI Publications.

COURSE CONTENT AND EVALUATION CHART FOR SEE

Course assessment and evaluation chart:

	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
Direct assessment	CIE	IA	Students	Graded exercises (Average marks of all 16 drawing sheets)	20	Drawing sheets / Index sheets	1to 4
				Student Activities/ Case Study	05	Report + photos	1 to 4
	SEE	end exam		End of the course	100	Answer scripts at BTE	1 to 4
Indirect assessment	student feedback on course		Students	Middle of the course		Feedback forms	Delivery of course
	End of course survey			End of the course		Questionnaires	Effectiveness of delivery of instructions & assessment methods

***CIE** – Continuous Internal Evaluation ***SEE** – Semester End Examination

Note:

1. Rubrics to be devised appropriately by the concerned faculty to assess Case study / Student activities.

GRADED EXERCISES

UNIT NO	NAME OF THE UNIT	SHEETS	TITLE OF THE DRAWING	MINIMUM NO OF EXERCISE
1	**Earthen bunds and canals**	2	Earthen bunds	3
		1	Canals	3
2	**Tank Sluice**	4	Tank Sluice with Head and Gibbet wall type and plug arrangement	1
			Tank sluice with Tower head type and shutter arrangement	1
			Pipe sluice with Tower head and plug arrangement	1
			Pipe sluice with head and gibbet wall type and plug arrangement	1
3	**Tanks/waste weirs**	2	Waste weir with water cushion	1
			Surplus weir with Stepped apron	1
4	**Culverts**	4	Single span slab culvert with splayed wing walls	1
			Two span slab culvert with return wing walls	1
			Two span box culvert with splayed wing walls	1
			Pipe culvert with return wing walls or splayed wing wall	1
5	**R.C.C. T - Beam Bridge (Railways & Highways)**	3	(i)Two span R.C.C. T - Beam highway Bridge with return wing wall	1
			(ii) Two span RCC T-beam Highway bridge with splayed wing walls.	1
			(iii)A two span RCC T-Beam Railway bridge with splayed wing walls.	1
	TOTAL	**16**		19

Note:

(1) Student should submit all the 16 drawing sheet compulsorily.

(2) Each drawing sheet should be evaluated for 20 marks as and when exercise is completed.

(3) Index sheet with signature of Candidate, Course co- ordinator and Programme Co-ordinator should be submitted during IA Verification.

Name of the Institution
Department of Civil Engineering

IRRIGATION AND BRIDGE DRAWING Code: **15CE55D**

INDEX SHEET V SEM 2017-2018

BATCH- ___

Evaluation of Drawing Sheets and Internal Assessment Marks

Name of the Candidate :_ _____

Reg No:_____

Unit No	Topic of the Unit	Sheet no	Date	Title of the Sheet	Max Marks	Marks Obtained	Average IA Marks Unit wise
1	**Earthen bunds and canals**	1		(i)Earthen bunds	20		
		2		(ii)Earthen bunds	20		
		3		Canals	20		
2	**Tank Sluice**	4		Tank Sluice with Head and Gibbet wall type and plug arrangement	20		
		5		Tank Sluice with Tower head type and shutter arrangement	20		
		6		Pipe sluice with Tower head and plug arrangement	20		
		7		Pipe sluice with Head and Gibbet wall type and plug arrangement	20		
3	**Tanks/waste weirs**	8		Waste weir with water cushion	20		
		9		Surplus weir with Stepped apron	20		
4	**Culverts**	10		Single span slab culvert with splayed wing walls	20		
		11		Two span slab culvert with return wing walls	20		
		12		Two span box culvert with splayed wing walls	20		
		13		Pipe culvert with return wing walls or splayed wing wall	20		
5	**R.C.C. T - Beam Bridge (Railways & Highways)**	14		(i)Two span R.C.C. T - Beam highway Bridge with return wing wall	20		
		15		Two span RCC T-beam Highway bridge with splayed wing walls.	20		
		16		(iii)A two span RCC T-Beam Railway bridge with splayed wing walls.	20		

Average IA Marks = $\frac{\textit{Total Internal Marks Obtained}}{\textit{Total Internal Marks}} = \frac{(\ 320\ )}{20} =$

Course Outcome IA =

Unit	I	II	III	IV	V	Average IA Unit Wise $\frac{(U1+U2+U3+U4+U5)}{5}$
CO	CO1	CO2	CO3	CO4	CO5	
Marks						

Sig. of Student Sig. of Course co-ordinator Sig.of Programme Co-ordinator

Fifth Semester Diploma Examination
MODEL QUESTION PAPER
IRRIGATION AND BRIDGE DRAWING

Time: 4 Hours Max. Marks: 100

Note:

- Assume the missing data suitably.
- Drawing should be neat and fully dimensioned.
- Answer any one question from Q1, Q2
- Question no-3 is compulsory.

PART-A

Q1(a). Draw the cross sections of an Earthen bund with core wall to suitable scale to the following details

Bed level	100.00m
Hard soil level	98.00m
Top bund level	105.00m
MWL	104.00m
FTL	103.00m
Top width of bund	3.0m
U/S slope	1½:1(H:V)
D/S slope	2:1 (H:V)

Core Wall:
Top width 1.0m
Bottom width at bed level-2.0m
Bottom width at Hard soil level -1.5m
Revetment on u/s is of 0.45m thick with 0.15m Gravel backing
Provide Rock toe on the downstream side. - 15 Marks

Q1(b) The following are the details of a " TANK SLUICE" with tower head

Top width of bund	2m.
Front slope of bund	1.5 : 1
Rear slope of bund	2 : 1
Top Bund Level	126
Maximum Water Level	125.2
Full Tank Level	124.60
Sill Level	121.50
Top level of tower head	125.50

The tower head consists of a masonry well of internal diameter of 1.2 m with 400mm shell thickness from top to bottom

Size of sluice barrel = 600mm wide and 750 mm. deep , thickness of side walls = 450 mm.
Thickness of RCC slab over barrel = 150mm.
Size of rear cistern = 1.2 m x 1.2 m.
Thickness of cistern walls = 450 mm.
Assume any necessary data and draw to a suitable scale the following views

i) Longitudinal Section - 20 Marks
ii) Plan at Top. - 15 Marks

Q.(2) Following are the details of "Tank weir" with stepped apron

Hydraulic particulars:

Catchment area - 4km^2

Ryve's constant – 8.5

Head of water over the weir is restricted to 1.00m

Calculate the length of the weir -05marks

Constructional details:

Top width of bund	-	2.00 m
TBL	-	29.00 m
MWL	-	28.00 m
FTL	-	27.00 m
Bed level of tank	-	26.00 m
Upstream slope of bund	-	1.5:1
Downstream slope of bund	-	2:1
Top of foundation level	-	24.80 m
Bottom of foundation level	-	24.20 m
Ground level at D/S side of weir	-	25.20 m
Top of U/S return wall	-	27.90 m
Top of D/S return wall	-	26.20 m
Crest width of body wall	-	1.00 m
Bottom width of body wall	-	2.00 m
Splay of wing wall on U/S side	-	1 in 3
Splay of wing wall on D/S side	-	1 in 5

Provide 600mm thick stepped apron for a length of 3.00m at RL+26.00 and 3.5m at RL+25.20m.Suitable grouted apron is to be provided beyond solid apron

Dam stone of size 100mm x100mm x1m are to be fixed in the body wall at 1.00m C/C

Top width of abutment, Wings, Return wall – 450mm

Bottom width of these walls may be taken as 0.4H; Where H is the height of wall.

Assume any other necessary data suitably and draw to a suitable scale the following views.

(i) Cross section across the body wall. – 25 Marks

(ii) Half plan at top & half plan at bottom. -20 Marks

Q3. Following are the details for a RCC Slab Culvert proposed across a stream

(a) Hydraulic Particulars:

Catchment Area	-	4.5 Sq. Km
Ryve's constant	-	7.5
Velocity of flow through vent	-	1.75 m/sec
Average bed width of stream	-	9 m
Assume afflux	-	150 mm

(b) Constructional Details:

No. of Spans	-	2
Bank slope	-	1:1
Bed level of stream	-	100.00 m
H.F,L	-	102.00 m
G.L & Road Formation Level	-	103.00 m
Hard rock level	-	98.50 m
Road Width	-	7.50m
Thickness of RCC slab	-	0.30m
Thickness of wearing course	-	0.10m

Bearing slab on abutment & pier - 0.30m
Top and bottom width of pier - 0.9m
Top width of abutment - 1.00m
Bottom width of abutment
(Front face vertical) - 1.50m
Parapet wall - 200mm thick
RCC railings work 0.90m high, between RCC piers of 0.15mX0.15m at 2m c / c
Wing Wall: Return type, top width 0.45m, front face is vertical.
Provide protection works both u/s and d/s
Calculate linear waterway and span -10 Marks
Assuming any other data, draw to a scale of 1:50 the following views.
(i) Half longitudinal elevation and half longitudinal section -20 Marks
(ii) Half plan at top and half plan at bottom -20 Marks

MODEL QUESTION BANK

Question for 15 Marks

1. For the given details of earthen dam draw the cross-section of the earthen dam showing -top width, bottom width, u/s and d/s slopes, revetment, hearting material, casing material, grip trenches, counter berm, phreatic line, and all levels.
2. For the given details of earthen dam draw the cross-section of the earthen dam with puddle core wall also draw the plan showing the drainage arrangements.
3. For the given details draw the cross-section of canal in full embankment.
4. For the given details draw the cross-section of canal in full cutting.
5. For the given details draw the cross-section of canal in partial cutting and partial embankment.

Questions for 35 marks:

1. For the given hydraulic particulars design the diameter of orifice required in tank sluice with head and gibbet wall type, slab barrel with plug arrangement, draw the longitudinal section showing all the details.
2. For the given data, draw the longitudinal section, half plan at top and half plan at foundation level of tank sluice with head and gibbet wall type, rectangular barrel with plug arrangement showing all the details.
3. For the given data, draw the longitudinal section, half front elevation and half sectional elevation of tank sluice with head and gibbet wall type, rectangular barrel and plug arrangement showing all the details.
4. For the given data, draw the longitudinal section, half front elevation and half sectional elevation of a tank sluice with tower head type, slab barrel and shutter arrangement showing all the details.

5. For the given data, draw the longitudinal section, half plan at top and half plan at foundation level of a pipe sluice with tower head type and plug arrangement showing all the details.

6. For the given data, draw the longitudinal section, half plan at top and half plan at foundation level of a pipe sluice with head and gibbet wall type and plug arrangement showing all the details

7. For the given data, draw the longitudinal section, half front elevation and half sectional elevation of a pipe sluice with head and gibbet wall type and plug arrangement showing all the details.

8. For the given data, draw the longitudinal section, half front elevation and half sectional elevation of a pipe sluice with tower head type and plug arrangement showing all the details.

Questions for 50 Marks:

1 For the given data draw the half sectional elevation, half front elevation, half plan at foundation, half plan at top and cross section of tank weir with water cushion.

2 For the given data draw the half sectional elevation, half front elevation, half plan at foundation, half plan at top and cross section of tank weir with stepped apron

3 For the given data draw the half sectional elevation, half front elevation, half plan at foundation and half plan at top of a single span slab culvert with splayed wing wall.

4 For the given data, draw the half sectional elevation, half front elevation, half plan at foundation and half plan at top of a two span slab culvert with return wing wall

5 For the given data, draw the half sectional elevation, half front elevation, half plan at foundation and half plan at top of a two span box culvert with splayed wing wall.

6 For the given data, draw the half sectional elevation, half front elevation, half plan at foundation and half plan at top of a pipe culvert with splayed wing wall.

7 For the given data, draw the half sectional elevation, half front elevation, half plan at foundation and half plan at top of a pipe culvert.

8 For the given hydraulic parameters such as catchment area, ryve's constant, calculate the discharge in the drain, also calculate the linear waterway and span. Draw the half sectional elevation, half front elevation, half plan at foundation and half plan at top of a two span R.C.C T-beam road bridge with return wing wall for the given data

9 For the given data, Draw the half sectional elevation, half front elevation, half plan at foundation ,half plan at top, half cross section through pier and half cross section through centre span of a two span R.C.C T-beam road bridge with return wing wall

10 For the given hydraulic parameters such as catchment area, ryve's constant, calculate the discharge in the drain, also calculate the linear waterway and span. Draw the half sectional elevation, half front elevation, half plan at foundation and half plan at top of a two span R.C.C T-beam road bridge with splayed wing wall for the given data.

11 For the given data, Draw the half sectional elevation, half front elevation, half plan at foundation, half plan at top, half cross section through pier and half cross section through centre span of a two span R.C.C T-beam road bridge with splayed wing wall

12 For the given hydraulic parameters such as catchment area, ryve's constant, calculate the discharge in the drain, also calculate the linear waterway and span. Draw the half sectional elevation, half front elevation, half plan at foundation and half plan at top of a two span R.C.C T-beam railway bridge with splayed wing wall for the given data

13. For the given data, Draw the half sectional elevation, half front elevation, half plan at foundation ,half plan at top, half cross section through pier and half cross section through centre span of a two span R.C.C T-beam railway bridge with splayed wing wall.