CONTRACTS AND BILLING **Course Code : 316307**

Programme Name/s	**: Civil Engineering/ Civil & Rural Engineering/ Construction Technology/ Civil & Environmental Engineering/**
Programme Code	**: CE/ CR/ CS/ LE**
Semester	**: Sixth**
Course Title	**: CONTRACTS AND BILLING**
Course Code	**: 316307**

I. RATIONALE

For infrastructure development various construction projects are required to be undertaken. These projects are to be executed by entering into a legal contract. Therefore, a diploma student is expected to have adequate knowledge of different types of contract and relevant accounting procedures. This course is essential for ensuring that students are equipped with the skills of executing the contract through its provisions.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Evaluating Tender for construction projects

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Implement the Public Works Department procedure for initiating the works.
- CO2 - Draft the contract document for given civil engineering works.
- CO3 - Prepare the tender documents for the given civil engineering work.
- CO4 - Use the prescribed formats to pay the bill of the executed work
- CO5 - Prepare the detailed specification for various items of construction work.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme												
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical							
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
316307	CONTRACTS AND BILLING	CAB	DSC	4	-	2	2	8	4	3	30	70	100	40	25	10	-	-	25	10	150

Total IKS Hrs for Sem. : 1 Hrs
Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination
Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Daw the flowchart representing organization structure of PWD. TLO 1.2 1b. Explain the roles and responsibilities of engineering personnel in the PWD. TLO 1.3 1c. Explain the PWD procedure followed for the construction of the given work. TLO 1.4 1d. Justify the relevant method of contracting for the given type of work adopted in PWD.	**Unit - I Fundamentals of Execution of PWD works.** 1.1 Organization structure of Public Works Department (PWD). 1.2 Roles and responsibilities of engineering personnel, Financial powers if any. 1.3 PWD Procedure of initiating the work . 1.4 Methods used in PWD for carrying out works-contract method, departmental method -rate list method, piece work method, day's work method, employing labours on daily wages basis.	Lecture Using Chalk-Board Presentations Video Demonstrations

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
2	TLO 2.1 Explain the requirements of valid contract in the given situation. TLO 2.2 Justify the necessity of provision/s made regarding breach of contract in given contract TLO 2.3 Classify the construction Contracts based on the given criteria. TLO 2.4 Explain the significance of FIDIC contract along with its provisions. TLO 2.5 Illustrate the Registration process of contractor in the given class in Public Works Department (PWD). TLO 2.6 Justify the importance of Built operate transfer (BOT) contract in the given situation.	**Unit - II Contracts: Types and Clauses** 2.1 Definition of contract, Objects of contract, requirements of valid contract, 2.2 Indian Contract Act 1872 – objectives of the act, Clauses related to contract formation, contract performance, breach of contract, importance of workman's compensation act on construction projects only 2.3 Types of engineering contract with advantages, disadvantages and their suitability- Lump sum contract, item rate contract, percentage rate contract, labour contract, demolition contract, target contract, negotiated contract, All in contract, Engineering Procurement Construction Contract (EPC),(IKS*-Informal Agreements and Oral Contracts) 2.4 FIDIC Contract – Introduction, different books used with colour code, Conditions and Provisions of red book for contractor and Employer 2.5 Classification of contractor on basis of financial limits, Requirement of documents for registration of contractor in Public Works Department (PWD). 2.6 Built Operate Transfer (BOT) Contract: Objectives, scope, advantages, Disadvantages, Provisions, conditions, etc with relevant examples.	Lecture Using Chalk-Board Presentations Video Demonstrations

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
3	TLO 3.1 Justify the need of the tender document for the given situation. TLO 3.2 Explain the given relevant terms related to tendering procedure. TLO 3.3 Draft the Notice Inviting Tender (NIT) for the given type of work. TLO 3.4 Reproduce the prescribed relevant format/s used in tender document. TLO 3.5 Use the relevant condition of contract in the given situation. TLO 3.6 Explain the process of Two envelope system for submitting tender document. TLO 3.7 Justify the necessity of implementing E- Tendering system for the given type of work. TLO 3.8 Explain the significance of the arbitration clause/s used in the given contract in resolving the disputes raised during execution of work.	**Unit - III Tender and Arbitration** 3.1 Tender - Definition, necessity, Types -local, Global, open, Limited and negotiated tender 3.2 Terms used in tender documents: - Earnest Money Deposit (EMD), Security deposit (SD), Additional Performance Security Deposit, Validity period, right to reject one or all tenders, corrigendum to tender notice and its necessity. 3.3 Notice Inviting Tender (NIT) -Points to be included while drafting tender notice. 3.4 Tender documents – Index, tender notice, general instructions, special instructions, schedule A, Schedule B, schedule C. 3.5 Conditions of tender documents – contract conditions-time limit, time extension, penalty, defective material and workmanship, termination of contract, suspension of work, subletting of contract, extra items, price variation clause(escalation), defect liability Period, liquidated and un-liquidated Damages 3.6 Procedure of submitting filled tender Document (Two envelope system) by offline method, procedure of opening tender, comparative statement, scrutiny of tenders, award of contract, acceptance letter and work order 3.7 E -Tendering System – Online procedure of Submission of Tender in PWD, Online procedure of opening of Tender in PWD 3.8 Arbitration- Meaning, Qualification of an arbitrator, appointment, Causes and Settlement of disputes, Powers and duties of Arbitrator, Award of result. Important features of Arbitration and Conciliation Act - 1996	Lecture Using Chalk-Board Presentations Video Demonstrations Flipped Classroom
4	TLO 4.1 Record the measurements of relevant work/s in the measurement book for payment. TLO 4.2 Explain the relevant terms associated with advances and payment of the given civil work. TLO 4.3 Billing procedure used for the given type of work with reference to issue of materials etc. from the department/ owner.	**Unit - IV Measurements and Accounts** 4.1 Various account forms and their uses – Measurement Books, E- Measurement book(E-MB), Completed Measurements, Nominal Muster Roll(NMR)- Issue and write of muster roll, Imprest Cash, Indent, Invoice, Bills, Vouchers, Hand receipt, Cash Book, Temporary Advance 4.2 Mode of Payment to the contractor and its necessity - Interim Payment, Advance Payment, Secured Advance, Petty advance,Mobilization advance, First And Final bill, Final bill, Running account bill, retention money, Reduce rate payment.(IKS*- Remuneration system : Builders and artisans were often paid in grain, land, royal patronage, or other goods rather than cash) 4.3 PWD Stores procedure	Lecture Using Chalk-Board Presentations Video Demonstrations

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
5	TLO 5.1 Justify the importance of specification for construction work TLO 5.2 Classify the specifications based on the given criteria TLO 5.3 Explain the provisions made in specifications for given condition. TLO 5.4 Draft a detailed specification for a given items of engineering structure. TLO 5.5 Explain legal aspects related to specification of items of construction work	**Unit - V Specifications** 5.1 Specification- Definition Necessity and importance, points to be observed in framing specifications of an item. 5.2 Types of specification - Brief and Detailed, Standard and Manufacturers Specification 5.3 Provisions made in detailed specifications - Conditions relating to documents, general obligations of contractors, relating to Labor, execution of the work, measurements and payments, the default and non-completion of work, the settlement of disputes. 5.4 Preparing Detailed Specifications of items such as Excavation, PCC, Brick work, Internal and external plastering work, RCC work of Building construction, Canal lining, reinforcement, waterproofing of Irrigation Structures, WBM road, Bituminous road of transportation structures and Cast iron water pipes of Public health structures 5.5 Legal aspects of Specification.	Lecture Using Chalk-Board Presentations Video Demonstrations

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Organize of various activities required for initiating the works	1	*Develop the format for sequential activities involved in initiation of the given type of work	2	CO1
LLO 2.1 Evaluate the elements of given contract	2	*Prepare a detailed report on evaluation of elements of given contract of the project.	2	CO2
LLO 3.1 Identify the BOT projects to write a review on it.	3	Write a critical review on any one BOT project in your locality with your suggestions / recommendations.	2	CO2
LLO 4.1 Examine any five tender notices from the known source to offer your comments.	4	*Collect tender notice and write report.	2	CO3
LLO 5.1 Draft minimum two NIT for the given type of construction work.	5	*Prepare a NIT from the given data for the Construction of given structure.	2	CO3
LLO 6.1 Draft minimum two NIT for a work through E-tendering.	6	Prepare a NIT from the given data for the Construction of given structure through E tendering	2	CO3
LLO 7.1 Analyze of given tender documents.	7	*Interpret the given elements of tender document with justification.	2	CO3
LLO 8.1 Identify the documents required for E-tendering.	8	Prepare list of documents that are required to submit the tender through E tendering.	2	CO3

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 9.1 Identifying the documents required for preparing tender document for the given civil engineering structure in a group of five students on the basis of provided/collected detailed estimate with respect	9	*Prepare Tender document for the construction of a structure prepared in Estimating and Costing.	2	CO3
LLO 10.1 Prepare Tender document for the given civil engineering structure in a group of five students on the basis of detailed estimate provided/collected by teacher/student. Generally prepared Brief tender n	10	*Prepare Tender document for the construction of a structure prepared in Estimating and Costing.	2	CO3
LLO 11.1 Prepare Tender document for the given civil engineering structure in a group of five students on the basis of detailed estimate provided/collected by teacher/student. Generally prepared Brief tender n	11	*Prepare Tender document for the construction of a structure prepared in Estimating and Costing.	2	CO3
LLO 12.1 Interpret contract litigation resolution through arbitration.	12	Interpret the given case study on, ‘Contract litigation resolution through arbitration’ and write your suggestions.	2	CO3
LLO 13.1 Record the measurements in the prescribed format of measurement book for minimum five items of works with abstract, completion certificate and prepare final bill for payment with relevant form of bill	13	*Prepare final bill of works.	2	CO4
LLO 14.1 Draft Detailed specification for following items related to building constrution – a) P.C.C. bed concrete for foundation b) U.C.R.masonry in foundation and plinth c) Burnt brick masonry in CM in sup	14	*Compose Specification for given items related to building construction.	2	CO5
LLO 15.1 Prepare minimum one case study on unbalanced tender and ring formation.	15	Draft case study of unbalanced tender and ring formation.	2	CO5

Note : Out of above suggestive LLOs -

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Assignment

- Prepare power point presentation on Procedure of “E-Tendering”.
- Collect various account forms used in any one of following organization and write report on it. MHADA/PWD/CIDCO etc.
- Arrange Expert session on tendering processes commonly used by Private/Non Government contractors for the construction work.
- Give seminar on relevant topic.
- Preparing report on procedure of registration as a contractor in different organizations.

- Prepare power point presentation on given topic.
- Prepare detailed specification for any two item for following structure – Transportation Structure/Public Health structures/Irrigation structures.

Micro project

- Prepare a report on provisions made in arbitration conciliation act 1996.
- Visit to ongoing project and study various aspects related to accounting process (MB, RA bill, various advances).
- Visit to ongoing project and study various aspects related to contracts and tender document.
- Prepare a report on significance and applicability of GST in construction contracts.
- Write salient features of contract clauses included in Indian Contract Act 1872.
- Prepare a report on software used in tender related activities.
- Draft detailed specification for minimum one items for following structures – Transportation Structures, Irrigation Structures and Public Health Structures.
- Compare the tender documents of similar work of three different organizations.

Note :

- Above is just a suggestive list of microprojects and assignments; faculty must prepare their own bank of microprojects, assignments, and activities in a similar way.
- The faculty must allocate judicial mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.
- If a microproject is assigned, it is expected to be completed as a group activity.
- SLA marks shall be awarded as per the continuous assessment record.
- For courses with no SLA component the list of suggestive microprojects / assignments/ activities are optional, faculty may encourage students to perform these tasks for enhanced learning experiences.
- If the course does not have associated SLA component, above suggestive listings is applicable to Tutorials and maybe considered for FA-PR evaluations.

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	1.Computer system with Internet Connection	1,3,4,6,8,9,10,11

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Fundamentals of Execution of PWD works.	CO1	8	4	4	0	8
2	II	Contracts: Types and Clauses	CO2	14	2	8	6	16
3	III	Tender and Arbitration	CO3	20	4	4	16	24
4	IV	Measurements and Accounts	CO4	8	2	4	4	10
5	V	Specifications	CO5	10	2	4	6	12
Grand Total				**60**	**14**	**24**	**32**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Term work of 25 marks based on progressive assessment
- SLA of 25 marks based on assignments of 10 marks and microproject of 15 marks

Summative Assessment (Assessment of Learning)

- NOT APPLICABLE

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	3	1	-	-	2	1	2			
CO2	2	1	1	1	2	1	2			
CO3	2	1	2	2	2	2	2			
CO4	1	-	-	2	1	1	1			
CO5	2	-	2	1	2	2	2			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	Datta, B.N.	Estimating and Costing in Civil engineering	UBS Publishers Pvt. Ltd. New Delhi. ISBN:9788174767295
2	Raina, V. K.	Construction Management and Contract Practices	Shroff Publishers & Distributers Pvt. Ltd. New Delhi ISBN: 9788184047875,
3	Rangawala, S.C.	Estimating and Costing	Charotar Publishing House PVT. LTD., Anand (Gujrat) Reprint -2011
4	Birdie,G.S.	Estimating and Costing	Dhanpat Rai. New Delhi 2016 ISBN : 978-93-84378-13-4
5	Patil, B.S.	Civil Engineering Contracts and Estimates	Orient Longman, Mumbai, Ed.2010 ISBN: 9788173715594, 8173715599
6	Chakraborti, M.	Estimating and costing, specification and valuation in civil engineering	Monojit Chakraborti, Kolkata ISBN: 818530436.

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	www.mahapwd.com	PWD official website.
2	https://mahatenders.gov.in	PWD official website realted to tender.

CONTRACTS AND BILLING **Course Code : 316307**

Sr.No	Link / Portal	Description
3	https://eprocure.gov.in/eprocure/app	e-tendering for construction and other government procurement processes.
4	https://nhai.gov.in/#/tenders	NHAI posts construction and maintenance tenders related to national highways and expressways
5	https://nhai.gov.in/nhai/sites/default/files/mix_file/BOT-Pr ojects-FY.pdf	This portal by the Indian government provides detailed information on BOT projects, across various sectors like roads, railways, airports, and urban infrastructure.
6	https://www.irc.nic.in/Tenderarchive.aspx	The Indian Roads Congress (IRC) publishes archive tenders with start and end date
7	https://cpwd.gov.in/cpwde_tender.aspx	Details about e-Tenders
8	https://www.youtube.com/watch?v=-wxYHWCe1Ok	E Tendering Training
9	https://www.youtube.com/watch?v=G3M1ffidoao	E-Tender filling process

Note :

- Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students