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Maharashtra State Board Of Technical Education, Mumbai

Learning and Assessment Scheme for Post S.S.C Diploma Courses

Programme Name : Diploma In Civil Engineering / Civil & Rural Engineering / Construction Technology / Civil & Environmental Engineering

Programme Code : CE / CR / CS / LE **With Effect From Academic Year** : 2023-24

Duration Of Programme : 6 Semester **Duration** : 12 Weeks (Industry) + 10 Weeks (Institute)

Semester : Fifth **NCrF Entry Level** : 4.0 **Scheme** : K

Sr No	Course Title	Abbrevation	Course Type	Course Code	Total IKS Hrs for Sem.	Learning Scheme					Credits	Assessment Scheme												
						Actual Contact Hrs./Week			Self Learning (Activity/ Assignment / Micro Project)	Notional Learning Hrs /Week		Paper Duration (hrs.)	Theory				Based on LL & TL Practical				Based on Self Learning		Total Marks
						CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
													Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
(All Compulsory)																								
1	THEORY OF STRUCTURE	TOS	DSC	315313	-	6	-	-	3	9	3	4	30	70	100	40	-	-	-	-	25	10	125
2	WATER RESOURCE ENGINEERING	WRE	DSC	315314	1	4	-	2	-	6	2	3	30	70	100	40	50	20	25@	10	-	-	175
3	EMERGING TRENDS IN CIVIL ENGINEERING	ETC	DSC	315315	-	3	-	-	-	3	1	1.5	30	70*#	100	40	-	-	-	-	-	-	100
4	ENTREPRENEURSHIP DEVELOPMENT AND STARTUPS	ENDS	AEC	315002	-	1	-	2	-	3	1	-	-	-	-	-	50	20	25@	10	-	-	75
5	SEMINAR AND PROJECT INITIATION COURSE	SPI	AEC	315003	-	-	-	1	2	3	1	-	-	-	-	-	25	10	25@	10	25	10	75
6	INTERNSHIP(12 WEEKS)	ITR	INP	315004	-	-	-	-	-	36 - 40	10	-	-	-	-	-	100	40	100#	40	-	-	200
ELECTIVE COURSE- I (Any - One)																								
7	ENERGY CONSERVATION & GREEN BUILDING	ECG	DSE	315316	-	4	-	2	-	6	2	3	30	70	100	40	25	10	25#	10	-	-	150
	PRECAST & PRESTRESSED CONCRETE STRUCTURES	PPC	DSE	315317	-	4	-	2	-	6	2	3	30	70	100	40	25	10	25#	10	-	-	150
	ROAD TRAFFIC ENGINEERING	TEN	DSE	315318	-	4	-	2	-	6	2	3	30	70	100	40	25	10	25#	10	-	-	150
Total					**1**	**18**		**7**	**5**		**20**		**120**	**280**	**400**		**250**		**200**		**50**		**900**

Abbreviations : CL- Classroom Learning , TL- Tutorial Learning, LL-Laboratory Learning, 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.* 10 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. **Note:** Notional learning hours for **internship represents the student engagement hours.**

Course Category : Discipline Specific Course Core (DSC) , Discipline Specific Elective (DSE) , Value Education Course (VEC) , Intern./Apprenti./Project./Community (INP) , AbilityEnhancement Course

Sr No	Course Title	Abbrevation	Course Type	Course Code	Total IKS Hrs for Sem.	Learning Scheme					Credits	Assessment Scheme											
						Actual Contact Hrs./Week			Self Learning (Activity/ Assignment / Micro Project)	Notional Learning Hrs /Week		Paper Duration (hrs.)	Theory				Based on LL & TL				Based on Self Learning		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	
(AEC) , Skill Enhancement Course (SEC) , GenericElective (GE)																							

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THEORY OF STRUCTURE **Course Code : 315313**

Programme Name/s	**: Civil Engineering/ Civil & Rural Engineering/ Construction Technology/ Civil & Environmental Engineering/**
Programme Code	**: CE/ CR/ CS/ LE**
Semester	**: Fifth**
Course Title	**: THEORY OF STRUCTURE**
Course Code	**: 315313**

I. RATIONALE

Every civil engineering structure need to be design properly for ensuring its stability .Structural members often experience various types of load with different end conditions. However all such design based on some preliminarily analysis of determinate & indeterminate structural element such as Simply supported beam, cantilever beam, fixed beam, continuous beam, portal frame etc. Therefore civil engineer must have knowledge of specialized method for conducting such analysis. This course will develop the basic knowledge among the learners about various analytical technique that are required to solve civil engineering problems.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

•The theoretical principles taught in the course are directly applicable to real-world field situations. By applying these Principles, students learn how to
"Analyze the given structural components using the relevant methods."

III. COURSE LEVEL LEARNING OUTCOMES (COS)

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

- CO1 - Analyze slope and Deflection in beams under different loading conditions.
- CO2 - Analyze fixed beams under different loading conditions.
- CO3 - Apply the principles of Three Moments to analyze continuous beam under the given situations.
- CO4 - Apply the Moment Distribution Method to analyze continuous beam under different loading conditions.
- CO5 - Evaluate axial forces in the members of simple truss.

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	
315313	THEORY OF STRUCTURE	TOS	DSC	6	-	-	3	9	3	4	30	70	100	40	-	-	-	-	25	10	125

Total IKS Hrs for Sem. : 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.* 10 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 Use flexural equation to prepare general differential equation. TLO 1.2 Determine the slope and deflection for the given structural element under specific loading conditions by double integration method. TLO 1.3 Determine the slope and deflection for the given structural element under specific loading conditions by Macaulay's method.	**Unit - I Slope and Deflection** 1.1 Concept of slope and deflection, stiffness of beams, Relation among bending moment, slope, deflection and radius of curvature, (no derivation). 1.2 Double integration method to find slope and deflection of simply supported and cantilever beam subjected to concentrated load and uniformly distributed load on entire span. 1.3 Macaulay's method for slope and deflection, application to simply supported and cantilever beam subjected to concentrated and uniformly distributed load on entire span.	Lecture Using Chalk-Board Collaborative learning Video Demonstrations Site/Industry Visit Presentations
2	TLO 2.1 Explain the effect of fixity in the given beam section. TLO 2.2 Calculate fixed end moments for the fixed beam under specific loading conditions by using first principle. TLO 2.3 Find end moments and reactions for fixed beam under given loading condition by using standard formulae. TLO 2.4 Draw S.F. and B.M. diagrams for the given fixed beam using given data.	**Unit - II Fixed Beam** 2.1 Concept of fixity, effect of fixity, advantages and disadvantages of fixed beam over simply supported beam. 2.2 Principle of superposition, Fixed end moments from first principle for beam subjected to central point load, UDL over entire span, Point load other than mid span. 2.3 Standard formulae to find end moments and end reactions for different loading conditions. 2.4 Shear force and bending moment diagram of fixed beam, point of contra shear and point of contra flexure.	Lecture Using Chalk-Board Video Demonstrations Site/Industry Visit Collaborative learning Presentations
3	TLO 3.1 Draw deflected shape of continuous beam subjected to given load and end conditions by using effect of continuity TLO 3.2 Explain Clapeyron's theorem of three moments used for the analysis of given continuous beam. TLO 3.3 Analyze continuous beam under given loading conditions, using Clapeyrons	**Unit - III Continuous Beam** 3.1 Definition, effect of continuity, nature of moments induced due to continuity, concept of deflected shape, Zero span or imaginary span theory. 3.2 Clapeyron's theorem of three moments (no derivation) Supports at same level, spans having same and different moment of inertia. 3.3 Clapeyron's theorem of three moments to various types of continuous beams subjected to concentrated loads and uniformly distributed load over entire span having same and different moment of inertia,	Lecture Using Chalk-Board Video Demonstrations Site/Industry Visit Collaborative learning Presentations

THEORY OF STRUCTURE **Course Code : 315313**

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.
	theorem of three moments. TLO 3.4 Draw S.F.and B.M. diagram for the given continuous beam using given data.	supports at same level, up to three spans and two unknown support moments only. 3.4 Shear force and bending moment diagram of continuous beams, point of contra shear and point of contra flexure.	
4	TLO 4.1 Explain Moment Distribution Method (M.D.M.) used for analyzing the given indeterminate beam. TLO 4.2 Apply M.D.M. to analyse given continuous beam with same M.I. for the given condition. TLO 4.3 Apply M.D.M. to analyze given continuous beam with different M.I. for the given condition. TLO 4.4 Plot S.F. and B.M. Diagrams for continuous beam using given data. TLO 4.5 Identify the type of given portal frame with justification.	**Unit - IV Moment Distribution Method** 4.1 Introduction to moment distribution method, sign convention, Carry over factor, stiffness factor, distribution Factor, Distribution of moment. 4.2 Application of moment distribution method to continuous beams subjected to concentrated loads and uniformly distributed load over entire span having same moment of inertia, supports at same level, up to three spans and two unknown support moments only. 4.3 Application of moment distribution method to continuous beams subjected to concentrated loads and uniformly distributed load over entire span having different moment of inertia, supports at same level, up to three spans and two unknown support moments only. 4.4 Shear force and bending moment diagram of continuous beams, point of contra shear and point of contra flexure. 4.5 Introduction to portal frames – Symmetrical and unsymmetrical portal frames with the concept of Bays and stories.(No Numerical)	Lecture Using Chalk-Board Collaborative learning Video Demonstrations Presentations Site/Industry Visit
5	TLO 5.1 Classify the trusses used in constructions. TLO 5.2 Calculate the support reactions for the given simple truss using analytical method. TLO 5.3 Calculate axial forces for the given simple truss using method of joint and method of section. TLO 5.4 Understand the graphical method for analysis of simple truss.	**Unit - V Simple Trusses** 5.1 Introduction of Truss, Types of trusses (Simple, Fink, compound fink, French truss, Pratt truss, Howe truss, North light truss, King post and Queen post truss), Classification of trusses (perfect and imperfect). 5.2 Support reactions for trusses subjected to point loads at nodal points only. 5.3 Forces in members of truss using method of joints and Method of sections. 5.4 Graphical method of analysis of truss. (No numerical on graphical method of analysis of truss)	Lecture Using Chalk-Board Collaborative learning Model Demonstration Video Demonstrations Site/Industry Visit Presentations

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 Apply the knowledge related to slope and deflections to solve the problems /	1	Sample Question's….. (Course teacher will decide the number of numerical as per the time constraint)	4	CO1

THEORY OF STRUCTURE **Course Code : 315313**

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
questions in given situation.		A) Draw the neat sketch indicating maximum slope and maximum deflection of cantilever beam subjected to point load at its free end. B) State the suitable boundary conditions for given type of beam to calculate integration constants C1 and C2. C) Prepare the General differential equation for given type of beam for different loading conditions along with the required data. D) Calculate the Slope and Deflection by using Macaulay's method for a simply supported beam and cantilever beam for various loading conditions such as 1. Beam subjected to single point load. 2. Beam subjected to two point loads. 3. Beam subjected to point load and udl. Along with the required data		
LLO 2.1 Apply the knowledge related to fixed beam to solve the problems / questions in given situation.	2	Sample Question's….. (Course teacher will decide the number of numerical as per the time constraint) A) Compare the fixed beam and simply supported beam subjected to same loading conditions. B)Compare the support moments calculated by first principle and standard formula for fixed beam for various loading conditions. C) Draw net BM of fixed beam for given loading conditions along with the required data. D) Draw the SFD and calculate the pt. of contra shear of continuous beam for given support moments and loads along with the required data. E) Calculate pt. of contra flexure for given BMD and pt. of contra shear for given SFD along with the required data.	4	CO2
LLO 3.1 Apply the knowledge related to continuous beam to solve the problems / questions in given situation.	3	Sample Question's….. (Course teacher will decide the number of numerical as per the time constraint) A) Explain the effect of continuity with neat sketch? OR Draw the neat sketch of continuous beam indicating sagging and hogging bending moment when it is subjected to external loading. B) State Clapeyron's theorem of three moment for same and different Moment of Inertia. Also state the meaning of each term involved. C) Calculate the support moments of continuous beam having same moment of inertia and varying moment of inertia for given loading conditions using Clapeyron's three moment theorem. D) Draw the SFD and calculate the pt. of contra shear of continuous beam for given support moments and	4	CO3

THEORY OF STRUCTURE **Course Code : 315313**

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
		reactions along with the required data. E) Calculate the Net Bending moment , Max. bending moment and pt. of contra flexure from given BMD and required data of continuous beam.		
LLO 4.1 Apply the knowledge related to continuous beam to solve the problems / questions in given situation.	4	Sample Question's….. (Course teacher will decide the number of numerical as per the time constraint) A) State the distribution of carry over factor for a continuous beam for different support conditions. B) Calculate the stiffness factor and Distribution Factor for diagram such as number of members connecting at same point whose having different support conditions and varying MI. (Diagram should be provided by course teacher) C) Calculate the support moments of continuous beam having same or varying moment of inertia for given loading conditions using moment distribution method. D) Draw the SFD and calculate the pt. of contra shear of continuous beam for given loading conditions and support moments along with the required data . E) Calculate pt. of contra flexure and pt. of contra shear for given BMD and SFD of continuous beam along with the required data.	4	CO4
LLO 5.1 Apply the knowledge related to truss to solve the problems / questions in given situation.	5	Sample Question's….. (Course teacher will decide the number of numerical as per the time constraint) A) Draw a neat sketch of any four types of trusses. B) State the assumptions for analysis of trusses. C) Identify the perfect and imperfect truss from given trusses D) Find the redundancy for given imperfect trusses. E) Calculate the axial forces developed in simple supported truss and cantilever truss subjected to external loading along with the required data.	4	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

- (Minimum TWO activities is compulsory for all students under SLH)

1. Collect the data from YouTube/videos showing change in deflected shape due to change in number of supports in a beam.

2. Apply the moment distribution method to analyze the portal frames.
3. Apply the graphical method to analyze the truss.
4. Prepare truss using given number of members and joints to carry given load. (use web tools/ video games available on internet such as X construction)
5. Explain the procedure to calculate maximum & minimum Stress for hollow rectangular chimney.
6. Explain the procedure to calculate maximum & minimum Stress for hollow circular chimney.
7. Write the procedure to calculate Maximum & minimum stress for a trapezoidal Dam section.

Micro project

- (Minimum ONE activity is compulsory for all students under SLH)

1. Prepare the chart of maximum slope and deflection for standard cases of simply supported beam and cantilever beam.
2. Prepare chart of free bending moments for standard cases of simply supported beam and fixed end moments for standard cases of fixed beam.
3. Collect information of three continuous beams having different support conditions on actual sites and study the reinforcement provided.
4. Compare the results of manual analysis and software analysis of continuous beam by using open source software. (Such as https://platform.skyciv.com/login)
5. Compare the results of manual analysis and software analysis of Single bye single story portal frame by using open source software.
(Such as https://platform.skyciv.com/login)
6. Prepare models of any one type of truss.
7. Collect information and photographs of any three types of simple trusses.
8. Compare the results of manual analysis and software analysis of truss by using open source software.
(Such as https://platform.skyciv.com/login)

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	Open Source software used for Analysis Such as https://platform.skyciv.com/login	All

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	Slope and Deflection	CO1	12	2	4	8	14

THEORY OF STRUCTURE **Course Code : 315313**

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
2	II	Fixed Beam	CO2	8	2	4	4	10
3	III	Continuous Beam	CO3	14	2	8	6	16
4	IV	Moment Distribution Method	CO4	16	2	4	12	18
5	V	Simple Trusses	CO5	10	2	4	6	12
Grand Total				**60**	**10**	**24**	**36**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Two-unit tests of 30 marks each will be conducted and average of two-unit tests to be considered. Under SLA : Assignment, Microproject (60% Weightage to process and 40% weightage to product), Question and Answer

Summative Assessment (Assessment of Learning)

- Pen and Paper Test (Written Test)

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	3	2	1	-	-	2			
CO2	3	3	2	1	-	-	3			
CO3	3	3	2	1	-	-	3			
CO4	3	3	2	1	-	-	3			
CO5	3	3	2	1	-	-	3			

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	Ramanrutham S.	Theory of Structures	Dhanpatrai & Sons, Delhi ISBN : 978-93-84378-10-3
2	Khurmi R. S.	Theory of Structures	S. Chand and Co., New Delhi, 2006 ISBN:978-81-21905-20-6
3	Bhavikatti S. S.	Structural Analysis Vol-1	Vikas Publishing House Pvt.Ltd. New Delhi; ISBN: 978-81-25927-90-7

THEORY OF STRUCTURE **Course Code : 315313**

Sr.No	Author	Title	Publisher with ISBN Number
4	Junnarkar S. B.	Mechanics of structures, Volume-I and II	Charotar Publishing House, Anand ISBN:978-93-80358-99-4
5	Pandit G.S. and Gupta S.P.	Theory of Structures	Tata McGraw Hill, New Delhi, 2006 ISBN :978-00-74634-93-6

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://youtu.be/oa5ojjGEUSw?si=nNu8rSHo9YYquTmB	Introduction and Need of Structural Analysis Prof. Amit Shaw, Department of Civil Engineering, I.I.T. Kharagpur.
2	https://sa2-iitd.vlabs.ac.in/exp/slope-deflection-method-1-beams/simulation.html	Virtual Lab for slope-deflection-method beams/simulation, Virtual Labs by IIT Delhi
3	https://www.youtube.com/watch?v=GUOKSExdjq8	Lecture Series on deflection of beam by Prof. S.K. Bhattacharya, Department of Civil Engineering, I.I.T. Kharagpur.
4	https://www.youtube.com/watch?v=vi0tjfDSjNY	Lecture Series on deflection of beam by Prof. S.K. Bhattacharya, Department of Civil Engineering, I.I.T. Kharagpur.
5	https://bsa-iiith.vlabs.ac.in/exp/continuous-beams/index.html	Virtual Lab for Continuous beams/simulation, Virtual Labs by IIT Delhi
6	https://bsa-iiith.vlabs.ac.in/exp/portal-frames/index.html	Virtual Lab for Portal Frame/simulation, Virtual Labs by IIT Delhi
7	https://bsa-iiith.vlabs.ac.in/exp/retaining-walls/theory.html	Virtual Lab for Retaining wall or Dam/simulation, Virtual Labs by IIT Delhi
8	https://youtu.be/yyxRHt62WFo?si=4rF9ds2SedQ77NR4	Analysis of Truss: Method of Sections Prof. Amit Shaw, Department of Civil Engineering, I.I.T. Kharagpur.
9	https://youtu.be/5gExoUfZoBY?si=9bB5Z71ECZAbBbRL	Analysis of Truss: Method of Joints Prof. Amit Shaw, Department of Civil Engineering, I.I.T. Kharagpur.

Note :

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

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WATER RESOURCE ENGINEERING **Course Code : 315314**

Programme Name/s	**: Civil Engineering/ Civil & Rural Engineering/ Construction Technology/ Civil & Environmental Engineering/**
Programme Code	**: CE/ CR/ CS/ LE**
Semester	**: Fifth**
Course Title	**: WATER RESOURCE ENGINEERING**
Course Code	**: 315314**

I. RATIONALE

Water is essential resource for all the living thing on earth, making its conservation crucial. With increasing demand and unpredictable rainfall in India, efficient water management system is more important than ever. Irrigation structures like dams, diversion headworks, canals play a key role in this effort. Water Resource Engineering deals in the planning, designing, constructing, and executing these hydraulic structures which are used to used to store, distribute and conserve the water sources. The primary goal of water resources engineering is to control and regulate water for various purposes including flood control, irrigation, hydroelectric power development etc. This course will enable the students to use and apply the basic principles and practices related to irrigation engineering and utilisation of supplied water at field.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Suggest the relevant irrigation systems for the given site conditions.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

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

- CO1 - Evaluate the hydrological parameters of the given site.
- CO2 - Compute the Canal capacity for the crop water requirement of the given command area.
- CO3 - Suggest the suitable type of dam for the given site condition.
- CO4 - Execute the Minor and Micro Irrigation Schemes.
- CO5 - Propose the type of Diversion Headwork in the irrigation scheme.

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	
315314	WATER RESOURCE ENGINEERING	WRE	DSC	4	-	2	-	6	2	3	30	70	100	40	50	20	25@	10	-	-	175

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 :

MSBTE Approval Dt. 24/02/2025 **Semester - 5, K Scheme**

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.* 10 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 Classify the irrigation projects on the basis of given criteria. TLO 1.2 Explain the term “hydrological cycle”. TLO 1.3 Describe the characteristics of Rain gauge station to be installed in the given location. TLO 1.4 Estimate mean rainfall in the given area using the relevant method. TLO 1.5 Explain the factors affecting Runoff for given site condition. TLO 1.6 Determine the Maximum Flood Discharge using the relevant empirical method from the given data.	**Unit - I Introduction to Irrigation and Hydrology** 1.1 Irrigation: Definition, necessity and Classification of Irrigation projects, advantages and ill effects of excess irrigation. 1.2 Hydrology: Definition of Hydrological cycle, Rainfall, Evaporation. 1.3 Rain Gauge: Symon's rain gauge and automatic rain gauge - Tipping bucket type. 1.4 Methods of calculating mean rainfall: Arithmetic mean, Theissen polygon and Isohyetal method. 1.5 Runoff: Definition, factors affecting Runoff (No Numerical questions). 1.6 Maximum Flood Discharge measurement: Empirical methods.	Video Demonstrations Lecture Using Chalk-Board Presentations Site/Industry Visit Collaborative learning
2	TLO 2.1 Explain the terms, “Cropping seasons, Crop period, Duty, Delta, base period, Culturable Command Area, Gross Command Area, intensity of irrigation.” TLO 2.2 Establish the relationship between duty, delta and base period. TLO 2.3 Compute the crop water requirement and canal capacity from the given data. TLO 2.4 Propose the relevant method of supplying irrigation water in the cropping season. TLO 2.5 Suggest relevant measures of silt control in a given type of dam with justification. TLO 2.6 Compute the control levels for the given reservoir from the given data.	**Unit - II Crop water requirement and Reservoir Planning** 2.1 Crop Water requirement: Cropping seasons, Crop period, Duty, Delta, base period, Culturable Command Area, Gross Command Area, intensity of irrigation, factors affecting duty. 2.2 Relation between duty, delta and base period. 2.3 Numerical on water requirement and capacity of canal. IKS: Rahat water Irrigation system in India. 2.4 Methods of Irrigation: Surface, subsurface and overhead irrigation. 2.5 Silting of Reservoir: Rate of silting, factors affecting silting and control measures. 2.6 Control levels in reservoir. Numerical on	Lecture Using Chalk-Board Presentations Video Demonstrations Site/Industry Visit Collaborative learning

WATER RESOURCE ENGINEERING **Course Code : 315314**

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.
		fixing control levels of reservoir.	
3	TLO 3.1 Classify the dams based on given criteria. TLO 3.2 Draw a labeled cross-sectional sketch of Earthen dam. TLO 3.3 Propose the suitable control measure to reduce the seepage through the foundation and embankment of earthen dam. TLO 3.4 Explain with the sketch the various forces acting on the gravity dam. TLO 3.5 Propose the types of spillways for given type of dam with justification. TLO 3.6 Propose the types of energy dissipaters for the given type of dam with justification.	**Unit - III Dams and Spillways** 3.1 Dam and its classification based on use, materials and hydraulic design. 3.2 Earthen Dams: Components with function, typical cross section. 3.3 Methods of construction of earthen dam, seepage through embankment and foundation and its control, Types of failure of earthen dam and its preventive measures. 3.4 Gravity Dams: Forces acting on dam, typical cross section, drainage gallery. 3.5 Spillways: Definition, function, Types. Emergency and service spillway - ogee spillway and discharge over spillway, Spillway gates . 3.6 Energy dissipation.	Lecture Using Chalk-Board Model Demonstration Video Demonstrations Presentations Site/Industry Visit Collaborative learning Case Study
4	TLO 4.1 Explain the procedure for construction of given type of Bandhara. TLO 4.2 Propose the suitable location for construction of percolation tank. TLO 4.3 Design the typical layout of Lift Irrigation system in the given situation. TLO 4.4 Design the typical layout of Drip and Sprinkler irrigation for the given condition. TLO 4.5 Suggest the layout for the Well Irrigation scheme in the given site conditions.	**Unit - IV Minor and Micro Irrigation** 4.1 Bandhara irrigation: Introduction, Layout, components, construction. 4.2 Percolation Tanks: Selection of site, need, construction. 4.3 Lift irrigation scheme: Components and their functions, layout. 4.4 Drip and Sprinkler Irrigation: components, layout, suitability. 4.5 Well irrigation: Introduction, types, advantages and disadvantages.	Lecture Using Chalk-Board Video Demonstrations Case Study Presentations Site/Industry Visit Collaborative learning
5	TLO 5.1 Classify the weirs based on given conditions. TLO 5.2 Suggest the suitable site for barrage construction. TLO 5.3 Draw a labeled sketch of the given type of diversion headwork. TLO 5.4 Classify the canal on the basis of alignment and position in the given canal network. TLO 5.5 Suggest the relevant type of construction material used for lining of given canal. TLO 5.6 Propose the relevant type of Cross Drainage work in given site condition. TLO 5.7 Propose the relevant types of regulators used for specific purpose in canal irrigation system	**Unit - V Diversion Headwork and Canals** 5.1 Weirs: Introduction, components, classification. K.T. weir : components and construction. 5.2 Barrages : Introduction, components and their functions, location. 5.3 Diversion headwork : Layout, components and their function. 5.4 Canals: Definition, classification according to alignment and position in the canal network, cross section of canal in embankment and cutting, partial embankment and cutting. 5.5 Canal lining: Purpose, construction material used, advantages. 5.6 Cross Drainage works: Aqueduct, siphon aqueduct, super passage, level crossing. 5.7 Canal regulators: Head regulator, Cross	Lecture Using Chalk-Board Model Demonstration Video Demonstrations Case Study Presentations Site/Industry Visit Collaborative learning

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.
		regulator, escape, falls and outlets.	

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 Estimate average rainfall or Runoff from the given data	1	*Estimation of average rainfall OR Runoff using relevant method.	2	CO1
LLO 2.1 Estimate the water requirement for the cropping season for given area.	2	*Estimation of crop water requirement for the given data and cropping season.	2	CO2
LLO 3.1 Estimate Canal capacity based on the given data.	3	Computation of Canal capacity from crop water requirement .	2	CO2
LLO 4.1 Compute the control levels for the reservoir from given data	4	*Computation of control levels for the reservoir.	2	CO2
LLO 5.1 Prepare a detailed technical presentation on major dams in India.	5	*Prepare a detailed report on any two major dams in India by observing relevant videos.	2	CO3
LLO 6.1 Prepare detailed technical report for the identified water resource project.	6	Site visit to any nearby water resource project (Dam/Canal/Weir/diversion headwork/any other irrigation project) and prepare detailed technical report.	2	CO3
LLO 7.1 Prepare detailed technical presentation on any one micro or minor irrigation scheme.	7	*Prepare detailed report on any one irrigation scheme (Micro OR Minor) by site visit or observing relevant videos.	2	CO4
LLO 8.1 Prepare a detailed report on financial assistance of central/state government schemes for the Jalayukt shivar Yojana / Farm ponds / Drip Irrigation scheme.	8	Collect information and Prepare a detailed report on financial assistance of central/ state government schemes for the Jalayukt shivar Yojana / Farm ponds / Drip Irrigation scheme.	2	CO4
LLO 9.1 Draw a labeled sketch of existing Cross section of canal in filling OR cutting OR partial cutting and filling	9	*Sketch the existing Cross section of canal in filling OR in cutting OR in partial cutting and filling, nearby area by measuring actual dimensions.	2	CO5
LLO 10.1 Draw a labeled sketch of Cross Drainage works using actual measurements.	10	Sketch any one existing Cross Drainage works in nearby area by measuring the actual dimensions.	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)

Micro project

- Prepare a report of cropping pattern, for the given minor or major irrigation project in your area with reference to

growth in yield.

- Prepare a report on any one executed system of rainwater harvesting with reference to its necessity, broad design parameters, economics in your area along with your comments.
- Conduct online / internet survey for Watershed management project (s) in the Maharashtra State with a detailed report of at least five relevant technical inputs.
- Summarize the relevant information in the form of the report from internet regarding types of satellite imagery to capture the necessary details of the given water resource projects.
- Prepare a report on any one executed system of Farm ponds or Jalayukt shivar schemes or drip irrigation scheme with emphasis on its suitability, costing, utility and maintenance after undertaking the visit to it.
- Visit to the nearby rain gauge station and obtain information for the average rainfall for the particular day.
- NOTE: “These are the optional activities for extra learning of students”.

Assignment

- Compare Automatic & Nonautomatic rain gauges based on any four points.
- Prepare details report of IMD rain gauge stations in your locality.
- Visit to a drip irrigation installation in your area & write brief report.
- Prepare a short report on well irrigation based on yield & season wise crops grown.
- Prepare a model of dam by using locally available material.
- Write the initiatives taken by state government for drip irrigation & sprinkler irrigation.
- Write a short report on cooperative equal water distribution system in your area.
- Measure evaporation of water in summer season by using available vessels & equipment’s.
- NOTE: “These are the optional activities for extra learning of students”.

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	N.A	

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	Introduction to Irrigation and Hydrology	CO1	7	4	4	4	12

WATER RESOURCE ENGINEERING **Course Code : 315314**

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
2	II	Crop water requirement and Reservoir Planning	CO2	9	0	4	12	16
3	III	Dams and Spillways	CO3	11	4	8	6	18
4	IV	Minor and Micro Irrigation	CO4	5	2	4	4	10
5	V	Diversion Headwork and Canals	CO5	8	0	8	6	14
Grand Total				**40**	**10**	**28**	**32**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Two-unit tests of 30 marks each will be conducted and average of two-unit tests considered. For formative assessment of laboratory learning 50 marks. Each practical will be assessed considering appropriate % weightage to process and product and other instructions of assessment.

Summative Assessment (Assessment of Learning)

- Pen and Paper Test (Written Test), Term Work, Practical examination.

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	2	1	1	1	1	1			
CO2	3	2	2	1	2	2	1			
CO3	3	3	3	3	2	3	3			
CO4	2	2	3	2	2	2	3			
CO5	3	2	3	2	2	3	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	Punmia, B.C., Pande B, Lal	Irrigation and water power Engineering	Lakshmi Publications, New Delhi - 110 002. Edition2016 ISBN 13: 9788131807637
2	Sharma R.K. and Sharma T.K	Irrigation Engineering	S.Chand and Company Ltd.Delhi ISBN 13: 9788121921282 Ed.2002

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Sr.No	Author	Title	Publisher with ISBN Number
3	Basak N.N.	Irrigation Engineering	McGraw Hill Education India Pvt. Ltd. New Delhi.Edition1999 ISBN 13: 9780074635384
4	Dahigaonkar J.G.	Irrigation Engineering	Asian Book Pvt. Ltd., New Delhi ISBN 13: 9788184120080
5	S.K.Garg	Irrigation and Hydraulic structures	Khanna Publishers, Delhi. ISBN: 978-81-7409-047-9

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://wrd.maharashtra.gov.in/	Water resource department, government of Maharashtra, India
2	https://archive.nptel.ac.in/courses/126/105/126105010/	Introduction to Irrigation Engineering and Hydrology
3	https://www.youtube.com/watch?v=fx1uUek3Iqg	Hydrological cycle and Methods of computing Average rainfall
4	https://nptel.ac.in/courses/105105110	Surface & ground water resources
5	https://www.youtube.com/results?search_query=crop+water+requirement	Crop water requirement
6	https://archive.nptel.ac.in/courses/126/105/126105010/	Crop water requirement
7	https://www.youtube.com/watch?v=bDwow2-WzHo	Introduction to Dams
8	https://archive.nptel.ac.in/courses/105/105/105105110/	Notes on Gravity Dam
9	https://archive.nptel.ac.in/courses/105/105/105105110/	Notes on Spillways and Energy Dissipators
10	https://archive.nptel.ac.in/courses/126/105/126105019/	Micro irrigation engineering
11	https://archive.nptel.ac.in/courses/126/105/126105010/	Sprinkler irrigation and Drip Irrigation
12	https://archive.nptel.ac.in/courses/126/105/126105010/	Irrigation wells
13	https://www.youtube.com/watch?v=pEdY37n7CdE	Introduction to Canal
14	https://www.nitsri.ac.in/Department/Civil%20Engineering/CIV-604_IHS-6th_CIVIL-Chapter-5_Notes.pdf	Cross Drainage works
15	https://www.youtube.com/watch?v=Ps99Cs0RQJs	Canal design

Note :

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

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EMERGING TRENDS IN CIVIL ENGINEERING **Course Code : 315315**

Programme Name/s	**: Civil Engineering/ Civil & Rural Engineering/ Construction Technology/ Civil & Environmental Engineering/**
Programme Code	**: CE/ CR/ CS/ LE**
Semester	**: Fifth**
Course Title	**: EMERGING TRENDS IN CIVIL ENGINEERING**
Course Code	**: 315315**

I. RATIONALE

Civil Engineering is the oldest form of engineering and also the discipline of thinking and building. However, in the era of latest technological development, a civil engineer is required to keep himself updated with the latest trend and techniques in the field to stay competitive and avoid falling behind ensuring its scientific priority and significance. There are genuine, realistic applications and benefits to updating the industry's current needs. These cutting-edge building innovations fundamentally change the scenario of construction sector. It is therefore necessary to figuring out how to incorporate these advancements into their strategies and workflows in various ways. This course will help the learners to know the basic knowhow of all such emerging trends in civil engineering.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Suggest the relevant emerging techniques for the given civil engineering works.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

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

- CO1 - Suggest the relevant softwares for given construction projects.
- CO2 - Select the relevant advance materials for given civil engineering work.
- CO3 - Propose the suitable advance construction equipments for the given work situation.
- CO4 - Adopt the relevant techniques for sustainable construction.
- CO5 - Suggest the relevant advance techniques for given construction activity.

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	
315315	EMERGING TRENDS IN CIVIL ENGINEERING	ETC	DSC	3	-	-	-	3	1	1.5	30	70*#	100	40	-	-	-	-	-	-	100

Total IKS Hrs for Sem. : 0 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 :

MSBTE Approval Dt. 24/02/2025 **Semester - 5, K Scheme**

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.* 10 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 Describe merits and demerits of soft computing techniques. TLO 1.2 Suggest the suitable software/s for the given purpose in construction activity.	**Unit - I Softwares in Civil Engineering** 1.1 Merits and Demerits of soft computing technique. 1.2 Applications of Civil Engineering softwares : Build-Master, HEC-RAS, STRAP, WaterGEMS, ArcGIS, STAAD-Pro, RISA-Connection, MIDAS, Building Information Modeling (BIM), Procore, Primavera Pro, Virtual Reality Software-VR, MX Road Software, Building Planning & Management System (BPMS), Plaxis 3D, Autodesk Construction Cloud, Powerplay, Geo5.	Lecture Using Chalk-Board Video Demonstrations Presentations Demonstration
2	TLO 2.1 Suggest the advanced construction material for given type of construction. TLO 2.2 Enumerate the properties of given construction material. TLO 2.3 Use the relevant advance construction material for the given purpose in construction activity.	**Unit - II Advance Construction Materials** 2.1 Properties and applications of building materials: Pollution absorbing bricks, Cooling bricks, 3D printed bricks, Interlocking bricks, Translucent wood, Sound proofing walls, Epoxy flooring. 2.2 Properties and applications of road materials: Recycled asphalt shingles, Self healing asphalt, Precast Pre-stressed Concrete Panels (PPCP) 2.3 Properties and applications of concrete materials: Synthetic concrete, New admixtures: Masterglanium, Polycarboxylic Ether, Nano concrete, Light transmitting concrete, Foam concrete, Bendable concrete or Engineered Cementitious Composite (ECC), Concrete Fabric, Hydrophobic concrete, Green concrete, Timbercrete, Ferrock.	Lecture Using Chalk-Board Presentations Video Demonstrations Case Study
3	TLO 3.1 Suggest the relevant survey equipment for specified purpose. TLO 3.2 Propose the relevant type of construction equipment for given purpose. TLO 3.3 Suggest the relevant advance material handling equipment in given situation.	**Unit - III Advance Construction Equipments** 3.1 Survey equipments: LiDAR, Direct Reading Grade Rods, 3D Laser scanning, Robotic Markout, Google Earth. 3.2 Construction equipments: Earth moving equipment: Skid and crawler loaders, Trenchers, Scrappers, Wheeled loading shovels, Advanced plastering machine, Bridge girder launcher. 3.3 Material handling equipments: Types of cranes: Floating crane, Rough terrain crane, Bridge Over head crane, Conveyors, Hoists, Types of Forklifts: Telehandler forklift, Rough Terrain forklift, Types of paver: Tracked pavers,	Lecture Using Chalk-Board Presentations Video Demonstrations Case Study

EMERGING TRENDS IN CIVIL ENGINEERING **Course Code : 315315**

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.
		Hybrid offset paver, Side feeders, Road header, and Types of Tunnel boring machine: Horizontal boring, Vertical boring, Line boring.	
4	TLO 4.1 Explain the necessity of energy audit with relevant methods. TLO 4.2 Propose the relevant recyclable material for the given construction activity. TLO 4.3 Explain the term,	**Unit - IV Sustainability in Construction** 4.1 Energy Audit: Necessity and methods. 4.2 Properties of renewable ,recyclable material and recycling of construction debris with its applications. 4.3 Sustainable Drainage system(SuDs) : Principles, Components and Benefits of SuDs.	Lecture Using Chalk-Board Presentations Video Demonstrations Case Study
5	TLO 5.1 Use the relevant building construction techniques for the specified purpose in construction activity. TLO 5.2 Suggest the relevant road construction technique in given situation. TLO 5.3 Undertake the relevant ground improvement technique in the given situation.	**Unit - V Advance Construction Techniques** 5.1 Building construction techniques: Pre-engineered building using Mivan technology, Façade Technology, Fire protection buildings, 3D printing. 5.2 Road construction techniques: Road Printer, Smart roads, Anti-icing roads, Piezoelectric roads, Hyper loop construction, Precast arch bridge construction. 5.3 Ground improvement techniques: Advanced piling techniques : Mono piling, Micro Piles, Soil Nailing, Sand Drains, Pre-Fabricated Vertical Drains, Thermal Methods: Soil heating and Soil freezing.	Lecture Using Chalk-Board Presentations Video Demonstrations Case Study

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES : NOT APPLICABLE.

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

Micro project

- Prepare a report on Zero Energy Building and Green Building stating its case study mentioning material required advantages and disadvantages and applications etc.
- Prepare a report on advanced tools/equipments for the site safety.
- Prepare the charts showing different types of safety rules and regulations of site.
- Prepare a report on Techniques of Earthquake Resistant Structures mentioning methods, merits, practical difficulties, applications etc.
- These are optional activities, which can be preferred by students for extra learning.

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	Computer system (Any computer system with appropriate configuration)	All
2	LCD Projector with accessories	All

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	Softwares in Civil Engineering	CO1	6	6	6	2	14
2	II	Advance Construction Materials	CO2	6	6	6	2	14
3	III	Advance Construction Equipments	CO3	8	8	6	4	18
4	IV	Sustainability in Construction	CO4	4	4	4	2	10
5	V	Advance Construction Techniques	CO5	6	6	6	2	14
Grand Total				**30**	**30**	**28**	**12**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Two unit test (MCQ) of 30 marks each will be conducted and average of two-unit test to be considered.

Summative Assessment (Assessment of Learning)

- Online MCQ examination

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	1	1	1	2	1	-	2			
CO2	2	2	3	2	1	-	3			
CO3	2	2	1	3	1	-	2			
CO4	2	2	2	2	3	-	3			
CO5	2	2	1	2	3	-	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	MSBTE, Mumbai.	Learning Manual of Emerging Trends in Civil Engineering	MSBTE, Mumbai.
2	Dr. Manoranjan Samal	Advanced Construction Techniques and Equipment	S.K. Kataria & Sons, 2022, ISBN: 978-93-5014-751-1
3	Dr. R. P. Rethaliya	Advanced Construction and Equipment	Atul Prakashan, Ahmedabad, 1 January 2019, ISBN: 978-93-81518.94-6
4	Dr. R. Vigneswaran	Advanced Construction Technology	Magnus Publication, ISBN: 978-81-964838-0-7
5	K. Ganesh Babu, H. Sudarsana Rao, Y. Amarnath	Emerging Trends in Civil Engineering Select Proceedings of ICETCE 2018	Springer Publication, 12 January 2020 ISBN:978-9811514036
6	Mohit Bajpai Dr. A.V. Sudhakara Reddy and Dr. V. Lakshmi Devi	Emerging Trends in Engineering and Technology (Volume - 5)	Integrated Publicaions, New Delhi, ISBN:978-93-93502-97-1

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://www.engineeringcivil.com/softwares.	Introduction of software in civil engineering
2	https://www.nbmcw.com/tech-articles/concrete/3725-new-construction-materials-for-modern-projects.html	Advance construction material
3	https://geniebelt.com/blog/10-innovative-construction-materials	Innovative construction material
4	https://www.viatechnik.com/blog/modern-construction-machines-theyre-used/	Modern construction machines
5	https://www.academia.edu/28172313/ADVANCED_BUILDING_CONSTRUCTION_EQUIPMENT	Advance building construction equipments
6	https://theconstructor.org/construction/sustainability-construction-civil-engineering/9492/	Concept of sustainability
7	https://www.susdrain.org/delivering-suds/using-suds/suds-components/suds-components	Sustainable drainage system(SuDs)
8	https://www.designingbuildings.co.uk/wiki/Advanced_construction_technology	Advanced construction technology
9	https://www.constructionjunkie.com/blog/2018/1/7/the-16-most-interesting-advances-in-construction-technology-of-2017	Most interesting advances in construction technology
10	https://mysubs.in/buy/recent-trends-in-civil-engineering-and-technology-journal-subscription?gclid=Cj0KCQjw6IfoBRCiARIsA	Recent Trends In Civil Engineering &

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EMERGING TRENDS IN CIVIL ENGINEERING **Course Code : 315315**

Sr.No	Link / Portal	Description
	F6q06scZ5teDIexIYz_j85yy2ZH_v1kiQcytNvYf3AelfE3LcZndTbhrOwaAqv2EALw_wcB.	Technology (RTCET)
11	https://www.nobroker.in/blog/mivan-construction-technology-explained/	Mivan construction technology

Note :

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

MSBTE Approval Dt. 24/02/2025 **Semester - 5, K Scheme**

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ENTREPRENEURSHIP DEVELOPMENT AND STARTUPS **Course Code : 315002**

Programme Name/s	**: Artificial Intelligence/ Artificial Intelligence and Machine Learning/ Automation and Robotics/ Cloud Computing and Big Data/ Civil Engineering/ Chemical Engineering/ Computer Technology/ Computer Engineering/ Civil & Rural Engineering/ Construction Technology/ Computer Science & Engineering/ Digital Electronics/ Data Sciences/ Electrical Engineering/ Electronics & Tele-communication Engg./ Electrical and Electronics Engineering/ Electrical Power System/ Electronics & Communication Engg./ Electronics Engineering/ Computer Hardware & Maintenance/ Industrial Electronics/ Information Technology/ Computer Science & Information Technology/ Civil & Environmental Engineering/ Computer Science/ Electronics & Computer Engg.**
Programme Code	**: AI/ AN/ AO/ BD/ CE/ CH/ CM/ CO/ CR/ CS/ CW/ DE/ DS/ EE/ EJ/ EK/ EP/ ET/ EX/ HA/ IE/ IF/ IH/ LE/ SE/ TE**
Semester	**: Fifth**
Course Title	**: ENTREPRENEURSHIP DEVELOPMENT AND STARTUPS**
Course Code	**: 315002**

I. RATIONALE

Entrepreneurship and Startups are introduced in this curriculum to develop the entrepreneurial traits among the students before they enter into professional life. Exposing and interacting with entrepreneurship and startup eco-system, students will develop entrepreneurial mind set. The innovative thinking with risk-taking ability along with other traits will be inculcated in the students through micro-projects and training. This exposure will be instrumental in orienting the students in transforming them to become job generators after completion of Diploma in Engineering.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Develop project proposals for launching small scale enterprises and starts up.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

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

- CO1 - Identify one's entrepreneurial traits.
- CO2 - Use information collected from stakeholder for establishing/setting up/founding starts up
- CO3 - Use support systems available for Starts up
- CO4 - Prepare project plans to manage the enterprise effectively

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	
315002	ENTREPRENEURSHIP DEVELOPMENT AND STARTUPS	ENDS	AEC	1	-	2	-	3	1	-	-	-	-	-	50	20	25@	10	-	-	75

MSBTE Approval Dt. 24/02/2025 **Semester - 5, K Scheme**

Total IKS Hrs for Sem. : 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.* 10 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 Compare advantages and disadvantages of Entrepreneurship TLO 1.2 Identify entrepreneurial traits through self-analysis TLO 1.3 Compare risk associated with different type of enterprise	**Unit - I Introduction to Entrepreneurship Development** 1.1 Entrepreneurship as a career – charms, advantages, disadvantages , scope- local and global 1.2 Traits of successful entrepreneur: consistency, creativity, initiative, independent decision making, assertiveness, persuasion, persistence, information seeking, handling business communication, commitment to work contract, calculated risk taking, learning from failure 1.3 Types of enterprises and their features : manufacturing, service and trading	Presentations Lecture Using Chalk-Board
2	TLO 2.1 Explain Important factors essential for selection of product/service and selection of process TLO 2.2 Suggest suitable place for setting up the specified enterprise on the basis of given data/ circumstances with justification. TLO 2.3 Suggest steps for the selection process of an enterprise for the specified product or service with justification. TLO 2.4 Plan a market study / survey for the specified enterprise	**Unit - II Startup Selection Process** 2.1 Product/Service selection: Process, core competence, product/service life cycle, new product/ service development process, mortality curve, creativity and innovation in product/ service modification / development 2.2 Process selection: Technology life cycle, forms and cost of transformation, factors affecting process selection, location for an industry, material handling. 2.3 Market study procedures: questionnaire design, sampling, market survey, data analysis 2.4 Getting information from concerned stakeholders such as Maharashtra Centre for Entrepreneurship Development[MCED], National Institute for Micro, Small and Medium Enterprises [NI-MSME], Prime Minister Employment Generation Program [PMEGP], Directorate of Industries[DI], Khadi Village Instries Commission[KVIC]	Presentations Lecture Using Chalk-Board
3	TLO 3.1 Explain categorization of MSME on	**Unit - III Support System for Startup** 3.1 Categorization of MSME, ancillary industries	Presentations Lecture Using

ENTREPRENEURSHIP DEVELOPMENT AND STARTUPS **Course Code : 315002**

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.
	the basis of turnover and investment TLO 3.2 Describe support system provided by central and state government agencies TLO 3.3 State various schemes of government agencies for promotion of entrepreneurship TLO 3.4 Describe help provided by the non governmental agencies for the specified product/service TLO 3.5 Compute breakeven point, ROI and ROS for the specified business enterprise, stating the assumptions made	3.2 Support systems- government agencies: MCED, NI MSME, PMEGP,DI, KVIC 3.3 Support agencies for entrepreneurship guidance, training, registration, technical consultation, technology transfer and quality control, marketing and finance. 3.4 Breakeven point, return on investment (ROI) and return on sales (ROS).	Chalk-Board
4	TLO 4.1 Explain key elements for the given business plan with respect to their purpose/size TLO 4.2 Justify USP of the given product/ service from marketing point of view. TLO 4.3 Formulate business policy for the given product/ service. TLO 4.4 Choose relevant negotiation techniques for the given product/ service with justification TLO 4.5 Identify risks that you may encounter for the given type of business/ enterprise with justification. TLO 4.6 Describe role of the incubation centre and accelerators for the given product/service.	**Unit - IV Managing Enterprise** 4.1 Techno commercial Feasibility study, feasibility report preparation and evaluation criteria 4.2 Ownership, Capital, Budgeting, Matching entrepreneur with the project 4.3 Unique Selling Proposition [U.S.P.]: Identification, developing a marketing plan. 4.4 Preparing strategies of handling business: policy making, negotiation and bargaining techniques 4.5 Risk Management: Planning for calculated risk taking, initiation with low cost projects, integrated futuristic planning, definition of startup cycle, ecosystem , angel investors, venture capitalist 4.6 Incubation centers and accelerators : Role and procedure	Presentations Lecture Using Chalk-Board

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 Collect information of successful entrepreneurial traits	1	*Preparation of report on entrepreneurship as	2	CO1
LLO 2.1 Identify different traits as an entrepreneur from various field LLO 2.2 Suggest different traits from	2	Case study on 'Traits of Entrepreneur'	2	CO1

ENTREPRENEURSHIP DEVELOPMENT AND STARTUPS **Course Code : 315002**

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
identified problem				
LLO 3.1 Explore probable risks for identified enterprise.	3	*Case study on 'Risks associated with enterprise	2	CO1
LLO 4.1 Identify new product for development LLO 4.2 Prepare a newly developed product	4	*Preparation of report on 'Development of new Product	2	CO1 CO2
LLO 5.1 Identify Process for development of product for new startup	5	Preparation of Report on ' Process selection 'for new startup	2	CO1 CO2 CO3
LLO 6.1 Develop questioner for market survey	6	*Market survey for setting up new Start up	2	CO2 CO3
LLO 7.1 Interpret the use of Technology Life Cycle	7	A Case study on ' Technology life cycle' of any successful entrepreneur.	2	CO3
LLO 8.1 Use information related to support of startups from Government and non-government agencies' LLO 8.2 Prepare report for setting up startup	8	*Preparation of report on 'Information for setting up new startup' from MCED/ MSME/KVIC etc	2	CO3 CO4
LLO 9.1 Compute ROI of successful enterprise.	9	Case study on 'Return on Investment (ROI)'of any successful startup	2	CO3
LLO 10.1 Calculate of ROS of any successful enterprise	10	Case study on 'Return on sales (ROS)'of any successful startup	2	CO3
LLO 11.1 Calculate Brake even point of any enterprise	11	Preparation of report on 'Brake even point calculation' of any enterprise.	2	CO3 CO4
LLO 12.1 Prepare feasibility report of given business	12	*Preparation of report on 'feasibility of any Techno-commercial business"	2	CO4
LLO 13.1 Plan a USP of any enterprise.	13	*A case study based on 'Unique selling Proposition (USP) of any successful enterprise	2	CO4
LLO 14.1 Prepare a project report using facilities of Atal Incubation center.	14	*Prepare project report for starting new startup using 'Atal incubation center (AIC)	2	CO1 CO2 CO3 CO4

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)

Micro project

- Prepare a 'Pitch- desk' for your start up
- Prepare a business plan for a. Market research b. Advertisement agency c. Placement Agency d. Repair and Maintenance agency e. Tour and Travel agency
- Prepare a 'Social entrepreneurship business plan, plan for CSR funding.

- Prepare a ‘ Women entrepreneurship business plan ‘ Choose relevant government scheme for the product/service
- Prepare a business plan for identified projects by using entrepreneurial eco system for the same (Schemes, incentives, incubators etc.)

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	Computers with internet and printer facility	All

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	Introduction to Entrepreneurship Development	CO1	4	0	0	0	0
2	II	Startup Selection Process	CO2	2	0	0	0	0
3	III	Support System for Startup	CO3	2	0	0	0	0
4	IV	Managing Enterprise	CO4	2	0	0	0	0
Grand Total				**10**	**0**	**0**	**0**	**0**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Assessment during practicals

Summative Assessment (Assessment of Learning)

- End of term examination

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)	Programme Specific Outcomes* (PSOs)

ENTREPRENEURSHIP DEVELOPMENT AND STARTUPS **Course Code : 315002**

	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	2	2	2	-	-	3	2			
CO2	2	2	2	2	-	3	2			
CO3	2	2	2	2	-	3	2			
CO4	2	2	2	2	-	3	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	Dr. Nishith Dubey, Aditya Vyas , Annu Soman , Anupam Singh	Un- boxing Entrepreneurship your self help guide to setup a successful business	Indira Publishing House ISBN 2023,978-93-93577-70-2
2	Gujral, Raman	Reading Material of Entrepreneurship Awareness Camp	Entrepreneurship Development Institute of India (EDI), GOI, 2016 Ahmedabad
3	Chitale, A K	Product Design and Manufacturing	PHI Learning, New Delhi, 2014; ISBN: 9788120348738
4	Charantimath, Poornima	Entrepreneurship Development Small Business Entrepreneurship	Pearson Education India, New Delhi; ISBN: 9788131762264
5	Khanka, S.S.	Entrepreneurship and Small Business Management	S.Chand and Sons, New Delhi, ISBN: 978-93-5161-094-6

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	http://www.mced.nic.in/allproduct.aspx	MCED Product and Plan Details
2	http://niesbud.nic.in/Publication.html	The National Institute for Entrepreneurship and Small Business Development Publications
3	http://niesbud.nic.in/docs/1standardized.pdf	Courses : The National Institute for Entrepreneurship and Small Business Development
4	https://www.nabard.org/Tenders.aspx?cid=501andid=24	NABARD - Information Centre
5	http://www.startupindia.gov.in/pdffile.php?title=Startup%20India%20Action%20Planandtype=Actionandq=Action%20Plan.pdfandc ontent_type=Actionandsubmenupoint=action	Start Up India
6	http://www.ediindia.org/institute.html	About - Entrepreneurship Development Institute of India (EDII)
7	http://www.nstedb.com/training/training.htm	NSTEDB - Training

Note :

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

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ENTREPRENEURSHIP DEVELOPMENT AND STARTUPS **Course Code : 315002**

MSBTE Approval Dt. 24/02/2025 **Semester - 5, K Scheme**

SEMINAR AND PROJECT INITIATION COURSE **Course Code : 315003**

Programme Name/s	**: Automobile Engineering./ Artificial Intelligence/ Artificial Intelligence and Machine Learning/ Automation and Robotics/ Cloud Computing and Big Data/ Civil Engineering/ Chemical Engineering/ Computer Technology/ Computer Engineering/ Civil & Rural Engineering/ Construction Technology/ Computer Science & Engineering/ Digital Electronics/ Data Sciences/ Electrical Engineering/ Electronics & Tele-communication Engg./ Electrical and Electronics Engineering/ Electrical Power System/ Electronics & Communication Engg./ Electronics Engineering/ Computer Hardware & Maintenance/ Industrial Electronics/ Information Technology/ Computer Science & Information Technology/ Civil & Environmental Engineering/ Mechanical Engineering/ Mechatronics/ Production Engineering/ Computer Science/ Electronics & Computer Engg.**
Programme Code	**: AE/ AI/ AN/ AO/ BD/ CE/ CH/ CM/ CO/ CR/ CS/ CW/ DE/ DS/ EE/ EJ/ EK/ EP/ ET/ EX/ HA/ IE/ IF/ IH/ LE/ ME/ MK/ PG/ SE/ TE**
Semester	**: Fifth**
Course Title	**: SEMINAR AND PROJECT INITIATION COURSE**
Course Code	**: 315003**

I. RATIONALE

Most of the diploma graduates lack the confidence and fluency while presenting papers or interacting verbally and expressing themselves with a large gathering. Seminar presentation boosts the confidence of the students and prepares them precisely for facing the audience, interviews and group discussions. The course on seminar is to enhance student's ability in the art of academic writing and to present it. It also helps broaden the minds of the participants. Through this course on Seminar, students will develop new ideas and perspectives of the subject /themes of emerging technologies and services of their area of studies. Project initiation enhances project planning skill which establishes measurable objectives and interaction skills.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences: Present a seminar on the selected theme/area of study effectively and confidently to the specific audience and stakeholders. Plan innovative solutions independently or collaboratively to the identified problem statement.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

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

- CO1 - Identify topics of seminar presenting to the large gathering at the institute/conference.
- CO2 - Collect relevant and updated research-based data and information to prepare a paper of seminar presentation.
- CO3 - Apply presentation skills.
- CO4 - Create conducive environment for learning and discussion through seminar presentation.
- CO5 - Identify a problem statement and establish the action plan for the successful completion of the project.

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	
315003	SEMINAR AND PROJECT INITIATION COURSE	SPI	AEC	-	-	1	2	3	1	-	-	-	-	-	25	10	25@	10	25	10	75

V. General guidelines for SEMINAR and Project Initiation

- The seminar must be related to emerging trends in engineering / technology programme or may be inter/ multi-disciplinary, based on the industry expected outcomes of the programme.
- The individual students have different aptitudes and strengths. Therefore, SEMINAR should match the strengths of students. For this purpose, students shall be asked to select the TITLE (Theme)of SEMINAR they would like to prepare and present.

- Seminar titles are to be finalized in consultation with the faculty mentor.
- Seminar must involve logic development of applications of various technologies/ processes applicable in industry.
- Seminar must be assigned to the single student. However, support of other students may be sorted while presenting the seminar
- Students are required to prepare using relevant software tools, write ups for presentation
- Students shall submit One Hard copy and one Soft copy each of the presentation and may be encouraged to keep a recorded copy of the presentation made during the seminar.
- Batch of 3-4 students shall be formed for project initiation.
- Projects give a platform for the students to showcase an attitude of inquiry to identify the problem statement related to the programme. Students shall Identify the information suggesting the cause of the problem and possible solutions
- Students shall study and assess the feasibility of different solutions and the financial implications.
- Students should collect relevant data from different sources (books/internet/market/suppliers/experts through surveys/interviews).
- Students shall prepare required drawings/ designs and detailed plan for the successful execution of the work.
- Students may visit the organisation pertaining to the problem statement as part of initial study.

VI.Guidelines for Seminar preparation and presentation :

Once the title/topic of a seminar has been finalized and allotted to the student, the teacher's role is important as guide, mentor and motivator, to promote learning and sustain the interest of the students.

Following should be kept in mind while preparing and presenting the seminar:

- **Seminar Orientation cum -briefing**: the seminar topics/themes should be innovative, novel and relevant to the curriculum of the programme, and also aligned to the expectations of industry.
- **Seminar Literature surve**y: Information search and data collection: the information and data should be authentic, realistic and relevant to the curriculum of the programme.
- **Seminar Preparation, and presentation**: The seminar shall be present with suitable software tools and supporting handout/notes. The presentation of seminar should not be more than 20 minutes including Q-A session.

The following guidelines may be followed for Project Initiation

- **Establishing project scope:** Determine the boundaries of the project.
- **Defining project objectives:** Set clear and measurable objectives that align with the project's purpose.
- **Stakeholder identification and analysis:** Perform an exercise in identifying all stakeholders involved in the project and analyzing their needs and expectations.
- **Team Formation:** Carefully build a team with the necessary skills and expertise to execute the project successfully.
- **Documentation.** Create a project planner showcasing the action plan, define the project's scope, outline the project definition, and design of the project. The document has to be made available to all stakeholders

VII. Criteria of Assessment /Evaluation of Seminar

A. Formative Assessment (FA) criteria

The assessment of the students in the fifth semester Progressive Assessment (PA) for 50 marks is to be done based on following criteria.

A. Suggestive RUBRICS for assessment

Sr. No.	Criteria	Marks
1	Selection Topic/Theme of seminar	05
2	Literature review and data presentation	05
3	Quality of Preparation and innovativeness	05
4	Q-A handling	05
5	Time Management	05
6	Seminar Presentation report	10

Rubrics for assessment of Project Initiation

Sr. No.	Criteria	Marks
1	Selection of Theme of Problem Statement and its innovativeness	05

2	Stages of development of Action plan	05
3	Prototyping	05

The total marks as per above out of 50, shall be converted in proportion of 25 marks.

B. Summative Assessment criteria/

The summative assessment of the students in the fifth semester End-Semester-Examination (ESE) for 50 marks is to be done based on following criteria. This assessment shall be done by the Faculty.

Suggestive **RUBRICS** may be developed by the faculty

Sr. No.	Criteria	Marks
1	Quality of information/Knowledge presented in SEMINAR	10
2	Creativity, Innovation in SEMINAR presentation	10
3	Response to the question during seminar presentation	10
4	Establishment of Innovative Problem Statement and its presentation	10
5	Objectives of the project and action plan	10

The total obtained marks shall be converted in proportion of 25 marks.

VIII. Suggestive CO-PO Mapping

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**
CO-1	3	1	0	-	2	2	3		
CO-2	2		2	-	2	1	3		
CO-3	3	1	1	2	1	2	3		
CO-4	2	0	0	2	1	2	3		
CO-5	3	3	3	2	2	3	3		

VIII.Typographical instructions/guidelines for seminar preparation & presentation

- The seminar PPT shall be computer typed (English- British)
- Text Font -Times New Roman (TNR), Size-12 point
- Subsection heading TNR- 12 point bold normal
- Section heading TNR- 12 capital bold
- Chapter Name/ Topic Name – TNR- 14 Capital
- All text should be justified. (Settings in the Paragraph)
- Different colors text/diagrams /tables may used
- The name of the candidate, diploma (department), year of submission,name of the institute shall be printed on the first slide of PPT.

IX.Seminar and Project Initiation Report

On completion and presentation of Seminar, every student will submit a brief report which should contain the following:

- Cover Page (as per annexure 1)
- Title page (as per annexure 2)

- Certificate by the Guide (as per annexure 3)
- Acknowledgment (The candidate may thank all those who helped in the execution of the project).
- Abstract of Paper presented in the seminar (It should be in one page and include the purpose of the seminar & methodology if any .)
- Index
- List of Figures
- Introduction
- Literature Review
- Information/Chapters related to Seminar topic
- Advantages and Disadvantages
- Conclusion
- Project Initiation : a) Description of problem statement. b) Scope and objectives. c) State holder d) Platform/ Equipment/ Resources identification.
- Bibliography
- References

NOTE: Seminar report must contain only relevant – technology or platform or OS or tools used and shall not exceed 25-30 pages.

Details of Softcopy to be submitted:
The soft copy of seminar presentation is required to be provided on the back cover of the seminar report in clear packet, which should include the following folders and contents:

1.Presentation (should include a PPT about project in not more than 15 slides)
2.Documentation (should include a word file of the project report)

NOTE: Soft copy must be checked for any harmful viruses before submission.

X. Sample Formats

1) Cover Page - Annexure-I

2) Index - Annexure-II

3) Assessment - Annexure-III

Annexure - I

MSBTE LOGO

SEMINAR Report

Institute Logo

"SEMINAR Title_ _ _ _ _ _ _ _ _ _ _ _ _"

as a partial fulfilment of requirement of the

THIRD YEAR DIPLOMA IN

Submitted by

Name of Student **Enrollment Number**

SEMINAR AND PROJECT INITIATION COURSE **Course Code : 315003**

FOR THE ACADEMIC YEAR 20___20___

(H.O.D) **(Principal)**

(Internal Guide) **(External Examiner)**

Annexure - II

Institute Name

(An Affiliated Institute of Maharashtra State Board of Technical Education)

Table of Contents

INDEX

Sr. No.	Chapter	Page No.
1.	Chapter–1 Introduction (background of the seminar)	**1**
2.	Chapter–2 Literature review for the seminar topic/theme	**5**
3.	Chapter–3 -	
-	-	
-	Seminar Report	
-	**Bibliography**	
-	**Referances**	

***Students can add/remove/edit chapter names as per the discussion with their guide**

Annexure - III

Format for SEMINAR and PROJECT INITIATION Assessment /Evaluation

Formative Assessment

CRITERIA AND WEIGHTAGE

Enrollment No	**1** Selection Topic/ Theme of seminar (5)	**2** Literature review and data presentation (5)	**3**. Quality of Preparation and innovativeness (5)	**4** Q-A handling (5)	**5** Time Management (5)	6. Seminar Presentation report (10)	**7** Selection of Theme of Problem Statement and its innovativeness (5)	**8** Stages of development of Action plan (5)	**9.** Prototyping (5)	**10.** Total (50)	Scaled to (25)

SummativeAssessment

CRITERIA AND WEIGHTAGE

Enrollment No	**1.** Quality of information/ Knowledge presented in SEMINAR **10**	**2** Creativity, Innovation in SEMINAR presentation 10	**3**. Response to the question during seminar presentation 10	**4** Establishment of Innovative Problem Statement and its presentation 10	**5** Objectives of the project and action plan 10	Total **(50)**	Scaled to **(25)**

SEMINAR AND PROJECT INITIATION COURSE **Course Code : 315003**

Sign: **Name: ----------** **(Course Expert/s)**	**Sign:** **Name: ----------** **(Program Head)** **(Information Technology)**

MSBTE Approval Dt. 24/02/2025 **Semester - 5, K Scheme**

INTERNSHIP(12 WEEKS) **Course Code : 315004**

Programme Name/s	**: Automobile Engineering./ Artificial Intelligence/ Artificial Intelligence and Machine Learning/ Automation and Robotics/ Cloud Computing and Big Data/ Civil Engineering/ Chemical Engineering/ Computer Technology/ Computer Engineering/ Civil & Rural Engineering/ Construction Technology/ Computer Science & Engineering/ Digital Electronics/ Data Sciences/ Electrical Engineering/ Electronics & Tele-communication Engg./ Electrical and Electronics Engineering/ Electrical Power System/ Electronics & Communication Engg./ Electronics Engineering/ Computer Hardware & Maintenance/ Industrial Electronics/ Information Technology/ Computer Science & Information Technology/ Civil & Environmental Engineering/ Mechanical Engineering/ Mechatronics/ Production Engineering/ Computer Science/ Electronics & Computer Engg.**
Programme Code	**: AE/ AI/ AN/ AO/ BD/ CE/ CH/ CM/ CO/ CR/ CS/ CW/ DE/ DS/ EE/ EJ/ EK/ EP/ ET/ EX/ HA/ IE/ IF/ IH/ LE/ ME/ MK/ PG/ SE/ TE**
Semester	**: Fifth**
Course Title	**: INTERNSHIP(12 WEEKS)**
Course Code	**: 315004**

I. RATIONALE

Globalization has prompted organizations to encourage skilled and innovative workforce. Internships are educational and career development opportunities, providing practical/ hands-on experience in a field or discipline. Summer internship is an opportunity for students to get accustomed to modern industry practices, apply the knowledge and skills they've acquired in the classroom to real-world situations and become familiar with industry environments before they enter the professional world. Keeping this in mind, industrial training is incorporated to all diploma programmes as it enables the student to get equipped with practical skills, soft skills and life skills

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences: Apply skills and practices to industrial processes.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

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

- CO1 - Observe time/resource management and industrial safety aspects.
- CO2 - Acquire professional experience of industry environment .
- CO3 - Establish effective communication in working environment.
- CO4 - Prepare report of assigned activities and accomplishments.

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

INTERNSHIP(12 WEEKS) **Course Code : 315004**

				CL	TL	LL					Practical										
											FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
315004	INTERNSHIP(12 WEEKS)	ITR	INP	-	-	-	-	36 - 40	10	-	-	-	-	-	100	40	100#	40	-	-	200

Legends: # External Assessment

Note: Credits for Industrial Training are in-line of guidelines of NCrF : The industrial training is of 12 weeks considering 36-40 hours per week engagement of students (as per Guidlines of GR of Maharashtra Govt.) under Self Learning with guidance of industry supervisor / Mentor

V General guidelines for organizing Industrial training

The Industry/organization selected for Industrial training/ internships shall be Government/Public Limited/ Private limited / Startup /Centre of Excellence/Skill Centers/Skill Parks etc.

1. Duration of Training - 12 weeks students engagement time
2. Period of Time slot - Between 4th and 5th semester (12 weeks) i.e. commencement of internships will be immediately following the 4th semester exams.
3. Industry area - Engineering Programme Allied industries of large, medium or small-scale, Organization/ Govt./ Semi Govt Sectors.

VI Role(s) of Department at the Institute:

Following activities are expected to be performed by the concerned department at the Polytechnics.

Table of activities to be completed for Internship

S.No	Activity	Suggested Schedule WEEKS
1	Collection of information about industry available and ready for extending training with its offered capacity of students (**Sample Format 1**)	1st to 3rd week of 4th Semester
2	Allocations of Student and Mentor as per availability (Mentor: Student Ratio (1:15)	4th to 6th week of 4th semester
3	Communication with Industry and obtaining its confirmation Sample letter Format	6th to 8th week of 4th semester
4	Securing consent letter from parents/guardians of students (Sample Format 2)	Before 10th week of 4th semester
5	Enrollment of Students for industrial training (Format 3)	Before 12th week of 4rd semester
6	Issue of letter to industry for training along with details of students and mentor (Format 4)	Before 14th week of 4th Semester
7	Organize Internship Orientation session for students	Before end of 4th Semester

8	Progressive Assessment of industry training by Mentor	Each week during training period
9	Assessment of training by institutional mentor and Industry mentor	5th Semester ESE

Suggestions-

1. Department can take help of alumina or parents of students having contact in different industries for securing placement.
2. Students would normally be placed as per their choices, in case of more demand for a particular industry, students would be allocated considering their potentials. However preference for placement would be given to students who have arranged placement in company with the help of their parents or relatives.
3. Principal/HOD/Faculty should address students about industrial safety norms, rules and discipline to be maintained in the industry during training before relieving students for training.
4. The faculty members during the visit to industry or sometimes through online mode will check the progress of the student in the training, student attendance, discipline, and project report preparation each week.

VII Roles and Responsibilities of students:

1. Students may interact with the mentor to suggest choices for suitable industry, if any. If students have any contact in industry through their parents or relatives then the same may be utilized for securing placement for themselves and their peers.
2. Students have to fill the forms/formats duly signed by institutional authorities along with a training letter and submit it to a training officer/mentor in the industry on the first day of training.
3. Students must carry with him/her Identity card issued by the institute during the training period.
4. Students should follow industrial dressing protocols, if any. In absence of specific protocol students must wear college uniform compulsorily.
5. Students will have to get all necessary information from the training officer/mentor at industry regarding schedule of training, rules and regulation of the industry and safety norms to be followed. Students are expected to observe these rules, regulations and procedures.
6. Students must be fully aware that if they disobey any rule of industry or do not follow the discipline then non-disciplinary action will be taken .
7. Students must maintain a weekly diary (**Format 6**) by noting daily activities undertaken and get it duly signed from industry mentor or Industrial training in charge.
8. In case students face any major problems in industry such as an accident or any disciplinary issue then they should immediately report the same to the mentor at the institute.
9. Prepare a final report about the training for submitting to the department at the time of presentation and viva-voce and get it signed from a mentor as well as industry training in charge.

10. Students must submit the undertaking as provided in **Format 5**.

VIII Typographical guidelines for Industry Training report

Following is the suggestive format for preparing the training report. Actual report may differ slightly depending upon the nature of industry. The training report may contain the following

1. The training report shall be computer typed (English- British) and printed on A4 size paper.
2. Text Font -Times New Roman (TNR), Size-12 point
3. Subsection heading TNR- 12 point bold normal
4. Section heading TNR- 12 capital bold
5. Chapter Name/ Topic Name – TNR- 14 Capital
6. All text should be justified. (Settings in the Paragraph)
7. The report must be typed on one side only with double space with a margin 3.5 cm on the left, 2.5 cm on the top, and 1.25 cm on the right and at bottom.
8. The training report must be hardbound/ Spiralbound with a cover page in black color. The name of the candidate, diploma (department), year of submission, name of the institute shall be printed on the cover.
9. The training report, the title page should be given first then the Certificate followed by the acknowledgment and then contents with page numbers.

IX Suggestive format of industrial training report

Following format may be used for training report. Actual format may differ slightly depending upon the nature of Industry/ Organization.

- Title Page
- Certificate
- Abstract
- Acknowledgement
- Content Page

Chapter 1	Organization structure of Industry and general layout.
Chapter 2	Introduction to Industry / Organization (history, type of products and services, turn over and number of employees etc.)
Chapter 3	Types of Major Equipments/raw materials/ instruments/machines/ hardware/software used in industry with their specifications, approximate cost, specific use and routine maintenance done
Chapter 4	Processes/ Manufacturing Manufacturing techniques and methodologies and material handling procedures
Chapter 5	Testing of Hardware/Software/ Raw materials/ Major material handling product (lifts, cranes, slings, pulleys, jacks, conveyor belts etc.) and material handling procedures.
Chapter 6	Safety procedures followed and safety gears used by industry.
Chapter 7	Particulars of Practical Experiences in Industry/Organization if any in Production/Assembly/ Testing/Maintenance
Chapter 8	Detailed report of the tasks undertaken (during the training).

Chapter 9	Special/challenging experiences encountered during training if any (may include students liking & disliking of workplaces).
Chapter 10	Conclusion
Chapter 11	References / sources of information

X Suggested learning strategies during training at Industry

- Students should visit the website of the industry where they are undergoing training to collect information about products, processes, capacity, number of employees, turnover etc.
- They should also refer to the handbook of the major machines and operations, testing, quality control and testing manuals.
- Students may also visit websites related to other industries wherein similar products are being manufactured.

XI Tentative week wise schedule of Industry Training

Industrial training is a common course to all Diploma programmes , therefore the industry selection will depend upon the nature of the programme and its related industry. The training activity may vary according to nature and size of industry.

The following table details of activities to be completed during industrial training.

Details of Activities to be completed during Industry training
Introduction of Industry and departments.
Study of Layout of Industry, Specifications of Machines , raw materials, components available in the industry
Study of setup and manufacturing processes
Execute given project or work assigned to the students, study of safety and maintenance procedures
Validation from industry mentor regarding project or work allocated
Report writing

XII CO-PO Mapping Table to be created by respective Department/faculty.

XIII. Formative Assessment of training : Suggested RUBRIC
(Note : Allot the marks in proportion of presentations and outcome observed. Marks excluding component of week 11 are to be filled by Institute mentor)

Week No	**Task to be assessed**	**Outcome Achievement - Poor**	**Outcome Achievement - Moderate**	**Outcome Achievement - High**		**Week-wise total Marks**
		Poor Marks	Average Marks	Good Marks	Excellent Marks	
1	Introduction of Industry	Minimal Knowledge of Departments, processes, products and work culture of the company **(Marks –1)**	Moderate Knowledge of Departments, processes, products and work culture of the company **(Marks –2)**	Good Knowledge of Departments, processes, products and work culture of the company **(Marks –3/4)**	Extensive Knowledge of Departments, processes, products and work culture of the company **(Marks –5)**	

2	Presentation of Layout of Industry, Specifications of Machines, raw materials, components available in the industry	Minimal w.r.t. tasks **(Marks –1)**	Moderate w.r.t. tasks **(Marks –2)**	Good w.r.t. tasks **(Marks –3/4)**	Extensive w.r.t. tasks **(Marks –5)**	
3	Participation in setup and manufacturing processes/ platforms	Minimal Participation with poor understanding **(Marks –1-8)**	Moderate Participation with poor understanding **(Marks –9-12)**	Good Participation with poor understanding **(Marks –13-17)**	Extensive Participation with poor understanding **(Marks –18-20)**	
4 to 10	Execution of given project or work to the students, Follow of safety and maintenance procedures	Minimal Participation with poor understanding **(Marks –1-8)**	Moderate Participation with lower level understanding **(Marks – 9-12)**	Good Participation with Good understanding **(Marks – 13-17)**	Extensive Participation with excellent understanding **(Marks – 18-20)**	
11	Validation by industry mentor regarding project or work allocated	Minimal Participation with poor performance **(Marks –1-10)**	Moderate Participation with acceptable performance **(Marks – 11-15)**	Good Participation with Good performance **(Marks – 16-20)**	Extensive Participation with excellent performance **(Marks – 21-25)**	
12	Diary writing	• Results are not Presented properly, • Project work is summarized and concluded not acceptable • Future extensions are not specified **(Marks –1-10)**	• Results are Presented just casually • Project work is summarized and concluded casually • Future extensions are casually specified **(Marks –11-15)**	• Results are Presented well and properly, • Project work is summarized and concluded to a Good level • Future extensions are well specified **(Marks –16-20)**	• Results are Presented exhaustively • Project work is summarized and elaborated in excellent manner , concluded • Future extensions are excellently specified **(Marks – 21-25)**	
Total Out of :100						

Marks for (FA) are to be awarded for each week considering the level of completeness of activity observed as per table specified in Sr.No. XIII above, from the daily diary maintained . Feedback from industry supervisor shall

also be considered.

XIV Summative Assessment (SA) of training:

Academic year : 20 -20

i) Suggested RUBRIC for SA

Enrollment Number	**Observations from Orals**				**Presentations**				**Total (100)**
	Tasks undertaken (20)	Overall Understanding (20)	Creativity / Innovation demonstrated (10)	Knowledge acquired (10)	Speech Clarity (10)	Body Language (10)	Presentations (10)	Diary , Report writing and / Product (10)	

Name of mentor:
Signature of Mentor

XV FORMATS

Format-1: Collecting Information about Industry/Organization available for training along with capacity

1) Name of the industry/organization:
2) Address/communication details with email :
3) Contact person details:
   a) Name:
   b) Designation:
   c) Email
   d) Contact number/s:

4) Type:

   Govt / PSU / Pvt /

   Large scale / Medium scale / Small scale …..

5) Products/services offered by industry:

6) a) Whether willing to offer Industrial training facility during May/ June for Diploma in Engineering students: **Yes / No.**
   b) If yes, whether you offer 12 weeks training: **Yes/No**
   c) Possible Industrial Capacity:

Students	Programme name/ Title					Total
	Civil	Mechanical	Chemical			
Male						
Female						
Total						

7) Whether accommodation available for interns **Yes / No.**
If yes capacity:_____

8) Whether internship is charged or free:
If charged please specify amount per candidate: _____

Signature of responsible person at Industry:

INTERNSHIP(12 WEEKS) **Course Code : 315004**

Format-2: Obtaining Consent Letter from parents/guardians

(Undertaking from Parents)

To,

The Principal,
_____,

Subject: Consent for Industrial Training.
Sir/Madam,

I am fully aware that -

i) My ward studying in _____ semester at your _____ institute has to undergo 12 weeks of Industrial training for partial fulfillment towards completion of Diploma in _____ Engineering.

ii) For this fulfillment he/she has been deputed at_____ industry, located at _____ for Industrial training /internship for the period from _____ to _____ .

With respect to above I give my full consent for my ward to travel to and from the mentioned industry. Further I undertake that –

a) My ward will undergo the training at his/her own cost and risk during training and/or stay.
b) My ward will be entirely under the discipline of the organization where he/she will be placed and will abide by the rules and regulations in face of the said organization.
c) My ward is NOT entitled to any leave during the training period.
d) My ward will regularly submit a prescribed weekly diary, duly filled and countersigned by the training supervisor of the organization to the mentor faculty of the polytechnic.

I have explained the contents of the letter to my ward, who has also promised to adhere strictly to the requirements. I assure that my ward will be properly instructed to take his own care to avoid any accidents/injuries in the industry. In case of any accident neither industry nor the institute will be held responsible.

Signature :
Name : _____
Address : _____

Phone Number :

INTERNSHIP(12 WEEKS) **Course Code : 315004**

Format-3: Students Enrollment for Industrial Training

(Academic Year –)

Sr No	Enrollment Number	Name of Student	Name of Industry	Name of Mentor at Institute

MSBTE Approval Dt. 24/02/2025 **Semester - 5, K Scheme**

INTERNSHIP(12 WEEKS) **Course Code : 315004**

Format-4: Issue Letter to the Industry/Organization for the training along with details of students and mentors

To,

The HR Manager,

_____

Subject: Placement for Industrial training of ___ weeks in your organization….

Reference: Your consent letter no: ….

Sir,

With reference to the above we are honored to place the following students from this institute for Industrial training in your esteemed organization as per the arrangement arrived at.

The purpose of this training is to equip the student with some essential skills relevant to the demands of the industry and world of work, as well as to provide exposure to the professional environment and work culture. It is hoped that this training may enhance his/her employability and livelihood opportunities. In view of the above, we kindly request your support in facilitating this Industrial Training for the student. He/she has been adequately oriented and guided on the expectations of this training, including the maintenance of a daily diary during the training period. Additionally, the institute has secured the necessary consent and undertaking from the parent/ guardian regarding the guidelines for exit training. In view of all the above industry shall refrain from involving students into the mundane and housekeeping activities. Your cooperation in this regard will be highly appreciated.

Diploma programme in _____ Engg.

Sr.No	Enrollment No	Name of Student	Name and designation of Mentor

Diploma programme in _____ Engg.

Sr.No	Enrollment No	Name of Student	Name and Designation of Mentor

Kindly extend all possible cooperation to the students for above.

Thanking you

Yours sincerely, (Principal) Cc- To HoD/Mentor
Name of the Institute:

MSBTE Approval Dt. 24/02/2025 **Semester - 5, K Scheme**

with Seal

Format-5: Undertaking by the students

TO

Principal

Subject: Undertaking regarding Placement for Industrial training of 12/16/18 weeks duration

I …….Reg No:…….. S/o/D/o. ……Studying in ---------- ---------- at ---------- Institute at ----------fully aware of the Industrial Training requirement and related responsibilities and participation in the ……, Industrial training between From: …… To……..

I assure you that I will be of good behavior and be obedient to the staff and mentor during the ……/ Industrial training. I will also abide and will not participate in all activity. I will also discipline myself within the rules and regulations of the Institution. I am also aware that I am participating in the …….. at my own risk and I will not hold the ----------Institute responsible in any way in any eventuality namely Accident / Injury/death or whatever mishap and I myself will be solely responsible for my safety.

Place :Signature of the student

Date :Reg. No.

INTERNSHIP(12 WEEKS) **Course Code : 315004**

Format-6: Internships Daily Diary

Name of the Student: _____ Name of the mentor (Faculty) : _____

Enrollment Number: _____ Semester: _____ Academic Year _____

Week	Day & Date	Discussion Topics/ Activity	Details of Work Allotted Till Next Session /Corrections Suggested/ Faculty Remarks	Signature of Industry Mentor
Week 01	Mon, Date			
	Tue, Date			
	Wed, Date			
	Thu, Date			
	Fri, Date			
	Sat, Date			
.	Mon, Date			
	Tue, Date			
.	Wed, Date			
	Thu, Date			
.	Fri, Date			
	Sat, Date			
Week n	Mon, Date			
	Tue, Date			
	Wed, Date			
	Thu, Date			
	Fri, Date			
	Sat, Date			

29-09-2025 10:39:08 AM

ROAD TRAFFIC ENGINEERING **Course Code : 315318**

Programme Name/s	**: Civil Engineering/ Civil & Rural Engineering/ Construction Technology/ Civil & Environmental Engineering/**
Programme Code	**: CE/ CR/ CS/ LE**
Semester	**: Fifth**
Course Title	**: ROAD TRAFFIC ENGINEERING**
Course Code	**: 315318**

I. RATIONALE

Transportation is backbone of our country. For smooth flow of traffic without any congestion, Traffic engineering is an important aspect of road transportation. Due to the abundant growth in population and infrastructure development, there is urgent need for proper planning, management and designing. similarly, on street parking and off street parking on road and road side is also very important to improve the road dynamics including safety of vehicle users as well as pedestrians. Relevant legislations also play important role to improve traffic regulation and rules for smooth and safe flow of traffic. This course is expected to develop basic knowledge of performing various traffic surveys, analysis and interpretation of the data and provide the solutions for smooth flow of traffic.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Manage the traffic flow condition effectively and efficiently in the given locality.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

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

- CO1 - Analyze the traffic characteristics for the given road pattern.
- CO2 - Undertake relevant types of traffic surveys for the identified situation.
- CO3 - Design the typical parking pattern for the given area.
- CO4 - Justify the need of lighting along with arboriculture for given road section.
- CO5 - Suggest the preventive measures to avoid accidents.

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	
315318	ROAD TRAFFIC ENGINEERING	TEN	DSE	4	-	2	-	6	2	3	30	70	100	40	25	10	25#	10	-	-	150

Total IKS Hrs for Sem. : 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.* 10 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 Explain the necessity of traffic management in the given locality. TLO 1.2 Describe the characteristics of road users in the given situation. TLO 1.3 Describe the vehicular characteristics for the given road section. TLO 1.4 Signify the importance of the road characteristics for the given road condition. TLO 1.5 Determine reaction time of driver in the given situation.	**Unit - I Fundamentals of Traffic Engineering.** 1.1 Traffic engineering- Definition, objects, scope` 1.2 Road user's characteristics-physical, mental, emotional factors. 1.3 Vehicular characteristics-width, length, height, weight, speed, efficiency of breaks. 1.4 Road characteristics-gradient, curve of a road, design speed, friction between road and tyre surface. 1.5 Reaction time-factors affecting reaction time. PIEV Theory.	Lecture Using Chalk-Board Presentations Video Demonstrations
2	TLO 2.1 Clarify the use of terms such as, "Speed, journey, Time and Delay Studies" in traffic survey. TLO 2.2 Collect traffic volume count data for the given road section. TLO 2.3 Analyze the data collected for origin-destination studies of the given road. TLO 2.4 Evaluate spot-speed study data collected for the given road. TLO 2.5 Explain the term, "ITS (Intelligent Transport system)" with its application. TLO 2.6 Suggest the relevant measure/s to control the Urban Traffic conditions in the given situation.	**Unit - II Traffic Surveys and Intelligent Transport system** 2.1 Introduction and Use of Speed, journey, Time and Delay studies. 2.2 Traffic volume count data-representation and analysis of data. 2.3 Necessity of O-D study and its methods. 2.4 Speed studies, spot speed studies and its presentation. 2.5 ITS and Its application. 2.6 Difficulties in Urban Traffic conditions and measures to meet the problems.	Lecture Using Chalk-Board Presentations Video Demonstrations
3	TLO 3.1 Justify the need of parking in the given area. TLO 3.2 Undertake the relevant type of survey for parking purpose in a given locality. TLO 3.3 Explain the impact of unplanned parking TLO 3.4 Compute the parking space requirement in the given area using IRC	**Unit - III Parking studies** 3.1 Need of parking survey and common terms. 3.2 Types of Parking Survey. 3.3 Parking Problems, ill Effects of parking. 3.4 Parking Space Requirement as per IRC standards. 3.5 On-street parking facilities and layout. 3.6 Off-street parking facilities and	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.
	standards. TLO 3.5 Draw layouts of different On-street parking for given locality. TLO 3.6 Propose the relevant Off-street parking pattern for the given locality. TLO 3.7 Justify the necessity of Parking regulation.	methods. 3.7 Need for Parking regulation and its types.	
4	TLO 4.1 Design the street lighting system for the given road section. TLO 4.2 Suggest the relevant type of trees for road side plantation based on the given criteria to increase the visibility. TLO 4.3 Justify the need of protecting the road side plantation. TLO 4.4 Describe the methods of protecting the road side plantation.	**Unit - IV Street lighting and Arboriculture** 4.1 Street lighting –definition, sources necessity, types-luminaire, foot candle, lumen, factors affecting their utilization and maintenance. 4.2 Factors affecting visibility at night. 4.3 Arboriculture- definition, objectives, factors affecting selection of type of trees. 4.4 Maintenance of trees-protection and care of road side trees	Lecture Using Chalk-Board Presentations Video Demonstrations
5	TLO 5.1 Explain the types of collision occurring during road accident. TLO 5.2 Explain the causes of accident occurred on the given road section. TLO 5.3 Suggest preventive measures to avoid the accidents on the given road section TLO 5.4 Interpret the given symbol employed in collision condition diagram. TLO 5.5 Suggest preventive measures used for Pedestrian safety. TLO 5.6 Explain the relevant legislation related to road user’s safety.	**Unit - V Road Accident Studies** 5.1 Road Accidents-Definition, Types-Collision and non-collision accidents. 5.2 Causes of accidents. 5.3 Measures to prevent road accidents. 5.4 Collision and condition diagram 5.5 Considerations regarding Pedestrian safety. 5.6 Legislation and law enforcement, education and propaganda.	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 Prepare a report on Road user’s and Vehicular characteristics for any existing road.	1	*Identification of road traffic characteristics for any existing road.	2	CO1
LLO 2.1 Analyze the measured traffic volume at an intersection in peak hours (Morning & Evening).	2	Traffic volume analysis for the given section of road.	2	CO2
LLO 3.1 Prepare a report on analysis of the relevant data collected during O-D study with a brief Description report on factors affecting trip generation.	3	*Analysis of the relevant data with a brief report on Factors affecting trip generation.	2	CO2

ROAD TRAFFIC ENGINEERING **Course Code : 315318**

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 4.1 Determine the percentile speed graphically based on measured data of the spot speed on corridor of given road way.	4	*Determination of percentile speed using the distribution of spot speeds data.	2	CO2
LLO 5.1 Conduct the parking survey for institute campus with your recommendations on improvement of parking system.	5	Carry out parking survey and prepare a report on vehicle parking systems.	2	CO3
LLO 6.1 Observe the traffic and parking behavior at a crowded area to identify the relevant issues to be addressed.	6	*Analysis of Local Traffic and Parking Behavior in a Crowded Area.	2	CO3
LLO 7.1 Prepare a site visit report on the existing street lighting system of any two types of roads in your area.	7	Field visit to observe Existing Street Lighting Systems.	2	CO4
LLO 8.1 Identify the existing type of trees to suggest relevant maintenance required.	8	*Identification of type of tree on a given road to suggest relevant maintenance strategy.	2	CO4
LLO 9.1 Draw a collision diagram with a labelled sketch for the point of conflicts on the basis of the observation made at a busy intersection.	9	Field visit to an intersection to identify the point of conflicts.	2	CO5
LLO 10.1 Prepare the report on the Field visit to an intersection to identify Causes of Accidents and required Preventive Measures.	10	*Field visit to an intersection to identify Causes of Accidents and required Preventive Measures.	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

- Write criteria for application of speed limits of 50,65,80 and 100kmph.
- Identify the criteria for provision of grade separated intersection.
- Explain pedestrian crossing design.
- Prepare a chart of Parking Space Requirement as per IRC standards.
- Download road safety audit form(A-1) and find causes and intensity of accident.
- Illustrate uniform motor vehicle Act.1988 for traffic regulation.
- These are the optional activities for extra learning of students.

Micro project

- Perform traffic survey of busy road junction of city in groups and to suggest measures for improvement.
- Illustrate the technique shifting of trees while widening of road.
- Prepare a report on ITS (Intelligent Traffic Survey) in any three countries.
- Identify the any three method of the planting, protecting and maintaining the trees along the road.
- Prepare a model of any three traffic controlling devices.
- Prepare a report on advanced Vehicle Control System(.IVHS)

- These are the optional activities for extra learning of students.

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	Computer system (Any computer system with basic configuration) Drawing board with accessories	All
2	Drawing board with accessories.	All
3	LCD Projector with accessories	All
4	Measuring tape.	All
5	Line Dori, white wash, brush	All

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 Traffic Engineering.	CO1	4	0	8	0	8
2	II	Traffic Surveys and Intelligent Transport system	CO2	10	4	8	6	18
3	III	Parking studies	CO3	10	4	8	6	18
4	IV	Street lighting and Arboriculture	CO4	8	0	8	4	12
5	V	Road Accident Studies	CO5	8	2	0	12	14
Grand Total				**40**	**10**	**32**	**28**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Two-unit tests of 30 marks each will be conducted and average of two-unit tests considered. For formative assessment of laboratory learning 25 marks. Each practical will be assessed considering appropriate % weightage to process and product and other instructions of assessment.

Summative Assessment (Assessment of Learning)

- Pen and Paper Test (Written Test),Term Work, Practical examination.

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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	2	2	1	3	2	1	2			
CO2	2	3	2	2	2	2	2			
CO3	2	2	2	2	2	2	2			
CO4	2	1	1	1	3	2	2			
CO5	2	1	2	2	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	Dr.L.R.Kadiyali	Traffic Engineering and Transport Planning	Khanna Publishers, Delhi, 2001, ISBN:10: 8185240779;
2	Arora, N. L.	Transportation Engineering	Khanna Publishers, Delhi, 1996, ISBN: 81-7319-0933,
3	Vazirani, V N Chaondola, S P	Transportation Engineering Vol. I & II	Khanna Publishers. Delhi, 2016 ISBN: 9780128038185; 9780128038895
4	Saxsena, S C	Traffic planning and design	Dhanpat Rai & Sons Delhi, 2016 ISBN-10: 8123915500
5	Khanna S.K., Justo, C E G and Veeraragavan, A.	Highway Engineering	New Chand and Brothers, Rookie, 2010, ISBN 978-8185240800

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://archive.nptel.ac.in/courses/105/101/105101008/	Fundamentals of Traffic Engineering and Traffic Surveys
2	https://www.youtube.com/watch?v=G7qU7HOw9QA	Fundamentals of Traffic Engineering
3	https://www.scribd.com/doc/216984580/nptel-ceTEI-L38	Parking studies
4	https://www.youtube.com/playlist?list=PLCC59953860B62145	Road Accident Studies
5	https://archive.nptel.ac.in/courses/105/105/105105215/	Traffic engineering
6	https://www.youtube.com/results?search_query=spot+speed+study+traffic-engineering+nptel	Spot speed studies
7	https://www.youtube.com/watch?v=U46xKnQjfnI&list=PLXkUO1gJka5Ly7H99lILMdJw415xZoBvR&index=2	Traffic stream and traffic volume

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Sr.No	Link / Portal	Description
8	https://www.youtube.com/watch?v=WSxdh50iZpU	Road arboriculture

Note :

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

MSBTE Approval Dt. 24/02/2025 **Semester - 5, K Scheme**