



GOVERNMENT OF TAMILNADU
DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI

STATE PROJECT COORDINATION UNIT

(Established Under Canada India Institutional Cooperation Project)

CURRICULUM

Course Name	CONCRETE DESIGN AND ANALYSIS
Course Code	CE / 2020 / 016
Course Duration	80 Hours
Minimum Eligibility Criteria and Pre requisites (if any)	Diploma / Graduates
Course Objectives	Training Module has been designed for the Participants to - Understand the basics of the analysis of structure - Design and analyse concrete structure - Design loads in beams of characteristics loads in limit state and working stress method
Course Outcomes	At the end of the training, participants will be able to - Design RCC beam, column and slab - Design Framed Structures - Analyse and design the flexural member as laterally restrained and unrestrained beams
Expected Job Roles	Structural Design Engineer

TEACHING AND SCHEME OF EXAMINATION						
Course Code	Course Name	Hours		Assessment Marks		Duration of Examination
				Min	Max	
CE / 2020 / 016	CONCRETE DESIGN AND ANALYSIS	Theory	80	50	100	3 Hours
		Practical	---	---	---	
		Total	80	50	100	

DETAILED SYLLABUS

UNIT NO.	MODULES	NO. OF THEORY HOURS
I	CONCRETE DESIGN	10
1.1	Introduction to concrete design - Concrete design specification - Structural concrete - Introduction – Material properties of concrete	
II	FLEXURAL ANALYSIS OF R.C.C BEAMS	14
2.1	Flexural analysis - Analysis – Flexural strength of the members - Problems	
III	DEFLECTION AND CONTROL OF CRACKING	14
3.1	Deflection and control of cracking - Definition of Deflection – Cracking - Definition – List of symbols	
IV	ONE WAY SLAB	14
4.1	One way slab - Definition of one way slab – Minimum slab thickness – Span – Bar spacing – Maximum reinforcement ratio	
V	AXIALLY LOADED COLUMNS	14
5.1	Axially loaded columns - Structural concrete members – Axial load flexure – Effects of shrinkage and creep.	
VI	MEMBER IN COMPRESSION AND BENDING	14
6.1	Member in compression and bending - General – Material strength – Tension – Compression – Bending – Torsion – Shear – Compression and Bending equations – Axial resistance – Bending	
TOTAL HOURS		80

HARDWARE REQUIREMENT

SL. NO.	LIST OF TOOLS / EQUIPMENTS / MATERIALS
	NIL

SOFTWARE REQUIREMENT

SL. NO.	NAME OF THE SOFTWARE
	NIL

REFERENCE BOOKS

SL. NO	NAME OF THE BOOK	AUTHOR	PUBLISHER
1.	Concrete Design and Analysis	M. Nadeem Hassoun	AK them AI – Mana seer John Wiley & Sons, 2015 American Concrete Institute
2.	Concrete Design and Analysis	Unni Krishna Pillai	Devdas Menon 3 rd Edition Publishing Ltd.

ASSESSMENT AND CERTIFICATION

S.No	Criteria for Assessment
1.	A trainee will be assessed based on the performance in End Examination for Theory conducted internally in the CIICP Project Polytechnic College for a duration of 3 hours
2.	A trainee must have 75% of attendance to appear for End examination in Theory.
3.	The assessment for theory part will be based on the marks scored in the end theory examination on the knowledge bank of questions.
4.	The passing criteria for successful completion of training is every trainee should score 50% of marks in the End Theory and Practical examination.
5.	On successful completion of training, Certificate will be issued to the participants by the Directorate of Technical Education through the Project Polytechnics.

END EXAMINATION ALLOCATION OF MARKS

S. No.	Description	Maximum Marks
1.	THEORY EXAM PART – A (20 Qns x 1 Marks) : 20 PART – B (15 Qns x 3 Marks) : 45 PART – C (7 Qns x 5 Marks) : 35	100
TOTAL		100

THEORY MODEL QUESTION PAPER

CE / 2020 / 016 – CONCRETE DESIGN AND ANALYSIS

(Maximum Marks: 100)

PART - A

Answer any **Twenty** Questions

20 x 1 = 20 Marks

- 1) Write the properties of concrete?
- 2) Define flexural strength of concrete?
- 3) Write the formula for flexural strength of concrete?
- 4) Define deflection of member?
- 5) Write the formula for stiffness of member?
- 6) What are the reasons for cracking?
- 7) How to rectify the crack in concrete member?
- 8) Define one way slab?
- 9) Define effective span of slab?
- 10) Write the formula for effective thickness of slab?
- 11) Write the IS standard for spacing of reinforcement in slab?
- 12) Define compression member?
- 13) Define creep?
- 14) Write the formula for strength of compression member?
- 15) Define shrinkage in compression member?
- 16) Define bending stress?
- 17) Write the formula for compression and bending equation?
- 18) Define characteristic's strength of concrete?
- 19) Define modular ratio?
- 20) Write the limit for maximum reinforcement ratio in slab?
- 21) Write the IS standard for longitudinal reinforcement?
- 22) Write the limitations for lateral ties and pitch?
- 23) Expand R.C.C and P.C.C?
- 24) Why steel is used as a tension member in concrete?
- 25) Define Basic value?

PART - B

Answer any **Fifteen** Questions

15 x 3 = 45 Marks

- 1) Write the assumption made for limit state of flexure?
- 2) What are the differences between under reinforced section and over reinforced section?
- 3) What are the classifications of limit state?
- 4) Write the anchorage values for Bends and Hooks?
- 5) What is mean by curtailment of reinforcement of beam?
- 6) Write the classification of slab?

- 7) Write the formula for Effective span of S.S slab and cantilever slab?
- 8) Write the minimum and maximum area of reinforcement in slab?
- 9) Write the difference between one way slab to two way slab?
- 10) What are the factors to be considered while design a slab?
- 11) Write the assumptions for limit state of collapse in compression?
- 12) Write the conditions for effective length of compression member?
- 13) Write the limitations for slenderness and eccentricity of column?
- 14) Write the limitation for longitudinal reinforcement and transverse reinforcement as per IS-456-2000 for column?
- 15) Write the procedure for designing M30 grade concrete?
- 16) Write the difference between one-way slab to two way slab?
- 17) What are the types of cements used in construction?
- 18) What is mean by grade of concrete and grade of steel?
- 19) What are the types of loads act on structure?
- 20) Draw the stress strain curve for concrete and name the stress points?

PART - C

Answer any **Seven** Questions

7 x 5 = 35 Marks

- 1) Write the design procedure for singly reinforced beam.
- 2) Determine the strength of simply supported beam of span 4m of 300mmX550mm effective in size. It's consisting of 4nos of 16mm dia. Use m20 grade concrete and fe415 steel?
- 3) Design a simply supported beam of span 6m to carry an impose load of 10Kn/m. use M20 grade concrete and Fe 415 steel.
- 4) Design a cantilever beam of span 2.2m to carry live load of 6.3Kn/m and finish load of 1.2Kn/m. use M20 grade concrete and Fe415 steel.
- 5) Write the design procedure for design a simply supported one way slab?
- 6) Design the sunshade of projection of 800mm supported on wall thickness of 200mm. The slab carries a live load of 3Kn/m. use M25 grade concrete and mild steel.
- 7) Design a simply supported slab of size 3M x 7M. Assume all other data required.
- 8) Design the simply supported slab of span 4mX4m. to carry a live load of 4Kn/m². Finish load 1.3Kn/m. use M20 grade concrete and Fe415 steel.
- 9) Determine the strength of axial loaded column of size 300mmX500mm. The column consists of 6nos of 20mm dia longitudinal bar.
- 10) Design the circular column to carry an axial load of 1200Kn. Use M20 grade concrete and Fe415 steel.
